

# QST

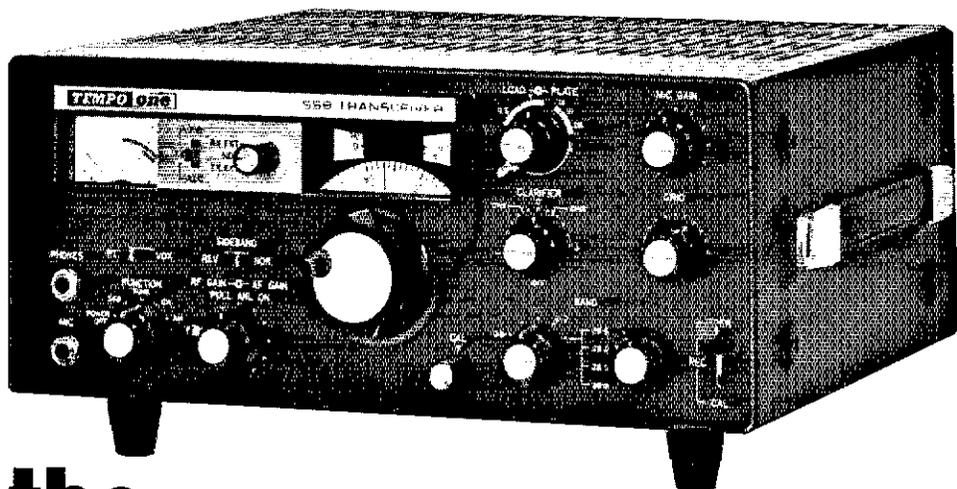
August 1975

\$1.00

devoted entirely to Amateur Radio



# the new look of a proven performer



## the tempo 'ONE' SSB TRANSCEIVER

*... a proven name, a proven value. Look at the specifications, look at the price tag, ask any of the thousands of Tempo ONE owners about its reliability... and the reason for its unparalleled popularity will be obvious.*

### SPECIFICATIONS

**FREQUENCY RANGE:** All amateur bands 80 through 10 meters, in five 500 khz. ranges: 3.5-4 mhz., 7-7.5 mhz., 14-14.5 mhz., 21-21.5 mhz., 28.5-29 mhz. (Crystals optionally available for ranges 28-28.5, 29-29.5, 29.5-30 mhz.)

**SOLID STATE VFO:** Very stable Colpitts circuit with transistor buffer provides linear tuning over the range 5-5.5 mhz. A passband filter at output is tuned to pass the 5-5.5 mhz. range.

**RECEIVER OFFSET TUNING (CLARIFIER):** Provides  $\pm 5$  khz. variation of receiver tuning when switched ON.

**DIAL CALIBRATION:** Vernier scale marked with one kilohertz divisions. Main tuning dial calibrated 0-500 with 50 khz. points.

The Tempo line is available  
at select dealers throughout the U.S.

**FREQUENCY STABILITY:** Less than 100 cycles after warm-up, and less than 100 cycles for plus or minus 10% line voltage change.

**MODES OF OPERATION:** SSB upper and lower sideband, CW and AM.

**INPUT POWER:** 300 watts PEP, 240 watts CW

**ANTENNA IMPEDANCE:** 50-75 ohms

**CARRIER SUPPRESSION:** -40 dB or better

**SIDE BAND SUPPRESSION:** -50 dB at 1000 CPS

**THIRD ORDER INTERMODULATION PRODUCTS:** -30 dB (PEP)

**AF BANDWIDTH:** 300-2700 cps

**RECEIVER SENSITIVITY:**  $1/2 \mu\text{v}$  input S/N 10 dB

**AGC:** Fast attack slow decay for SSB and CW.

**SELECTIVITY:** 2.3 khz. (-6 dB), 4 khz. (-60 dB)

**IMAGE REJECTION:** More than 50 dB.

**AUDIO REJECTION:** 1 watt at 10% distortion.

**AUDIO OUTPUT IMPEDANCE:** 8 ohms and 600 ohms

**POWER SUPPLY:** Separate AC or DC required. See AC "ONE" and DC "ONE" below.

**TUBES AND SEMICONDUCTORS:** 16 tubes, 15 diodes, 7 transistors

TEMPO "ONE" TRANSCEIVER

\$399.00

AC/ONE POWER SUPPLY

117/230 volt 50/60 cycle ...

\$99.00

DC/1-A POWER SUPPLY 12 volts DC

\$120.00

Prices subject to change without notice

# Henry Radio

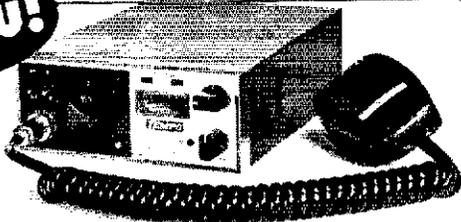
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# The TEMPO line . . . commercial quality at amateur prices

Compare this equipment with any other available. Compare their performance, their quality of construction, their ease of maintenance, and then compare prices. Your choice will have to be TEMPO.

**new!**



## TEMPO/CL 146A

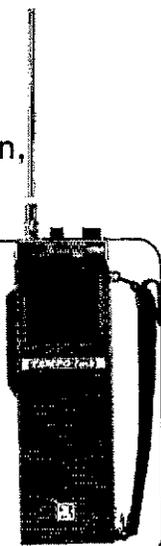
. . . a VHF/FM mobile transceiver for the 2 meter amateur band. It is compact, ruggedly built and completely solid state. One channel supplied plus two channels of your choice

**FREE**

144 to 148 MHz coverage  Multifrequency spread of 2 MHz  12 channel possible  Metering of output and receive  Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at \$239.00.

## TEMPO/fmh

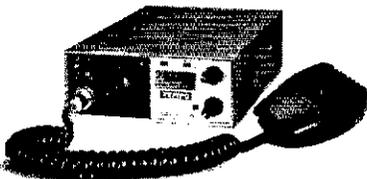
So much for so little! 2 watt VHF/FM hand held 6 Channel capability, solid state, 12 VDC. 144-148 MHz (any two MHz), includes 1 pair of crystals, built-in charging terminals for nicad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone.



\$199.00

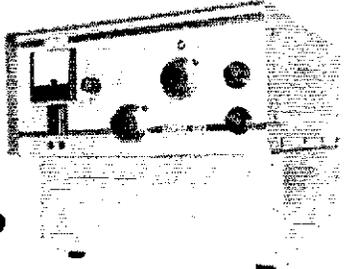
FMH-MC for Marine & Commercial service also available.

## TEMPO CL 220



As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146A, but operates in the frequency range of 220-225 MHz (any two MHz without retuning). At \$299.00 it is undoubtedly the best value available today.

## TEMPO 6N2



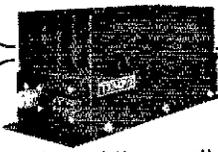
The Tempo 6N2 meets the demand for a high power six meter and two meter power amplifier. Using a pair of Eimac 8874 tubes it provides 2000 watts PEP input on SSB and 1000 watts input on CW and FM. Completely self-contained in one small desk mount cabinet with internal solid state power supply, built-in blower and RF relative power indicator.

\$795.00

The Tempo 2002.. 2 meters only \$695.00

The Tempo 2006.. 6 meters only \$695.00

## TEMPO VHF/UHF AMPLIFIERS



Solid state power amplifiers for use in most land mobile applications. Increase the range, clarity, reliability and speed of two-way communications.

VHF (135 to 175 MHz)				UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price	Drive Power	Output	Model No.	Price
2W	130W	130A02	\$199	2W	70W	70D02	\$270
10W	130W	130A10	\$179	10W	70W	70D10	\$250
30W	130W	130A30	\$189	30W	70W	70D30	\$210
2W	80W	80A02	\$169	2W	40W	40D02	\$180
10W	80W	80A10	\$149	10W	40W	40D10	\$145
30W	80W	80A30	\$159	2W	10W	10D02	\$125

FCC Type accepted models also available.

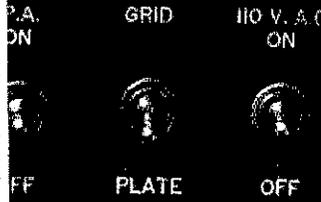
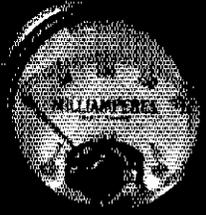
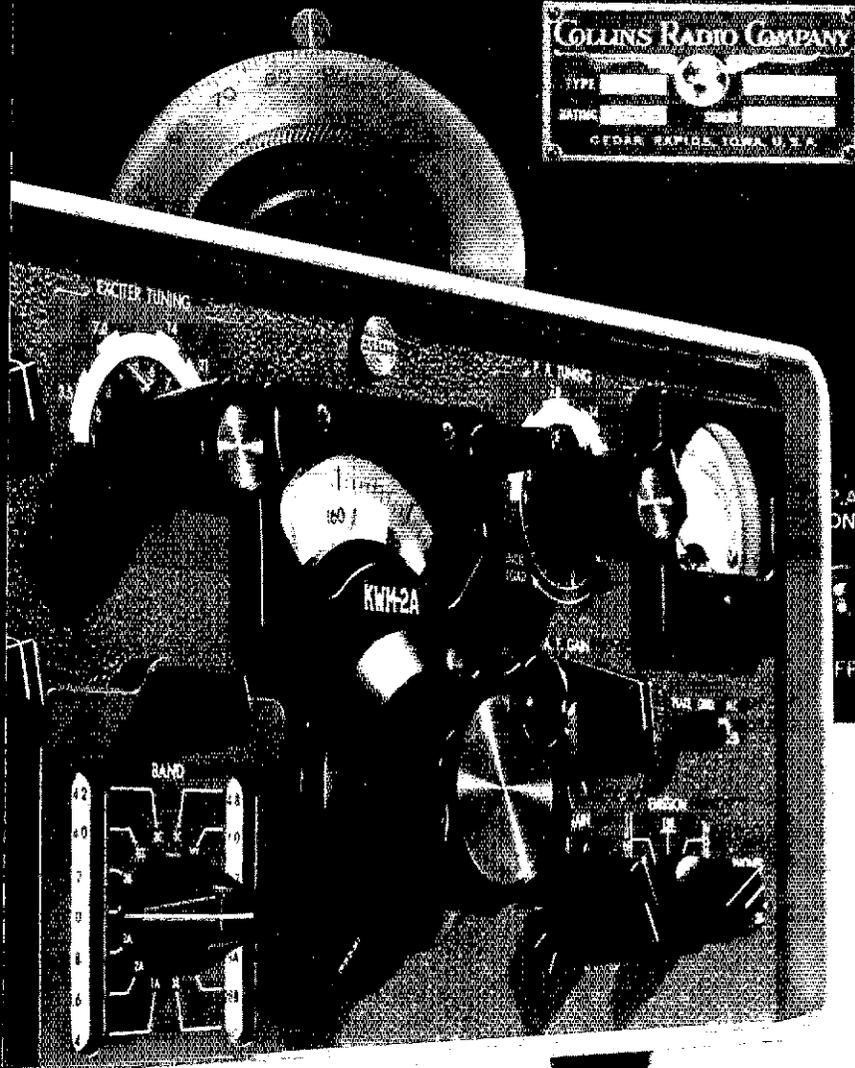
Available at select dealers throughout the U.S.

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that way.

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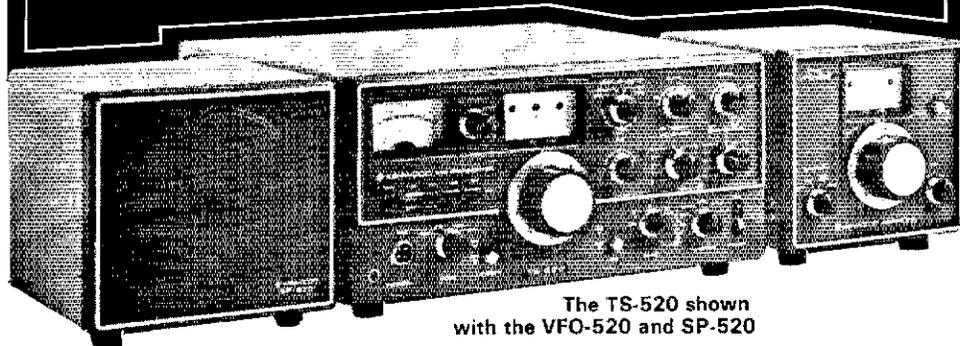
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with the VFO-520 and SP-520

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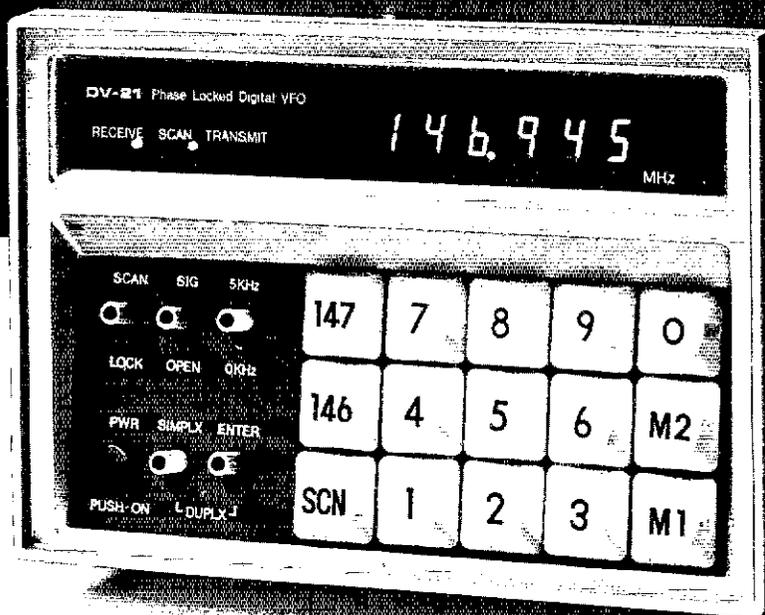
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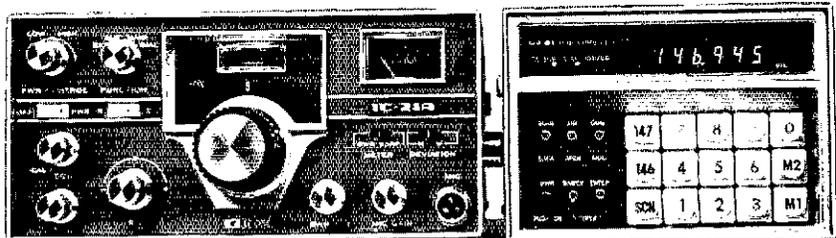
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Section Communications Managers of the ARRL

Reports Invited. All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licensee or higher may be appointed OBS, OVS, OPS, OO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. SCMs desire application leadership posts of SEC, EC, RM and PAM where vacancies exist.

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San Joaquin Valley	W61PH	Ralph Saravay	6204 E. Townsend Ave.	Fresno 93702
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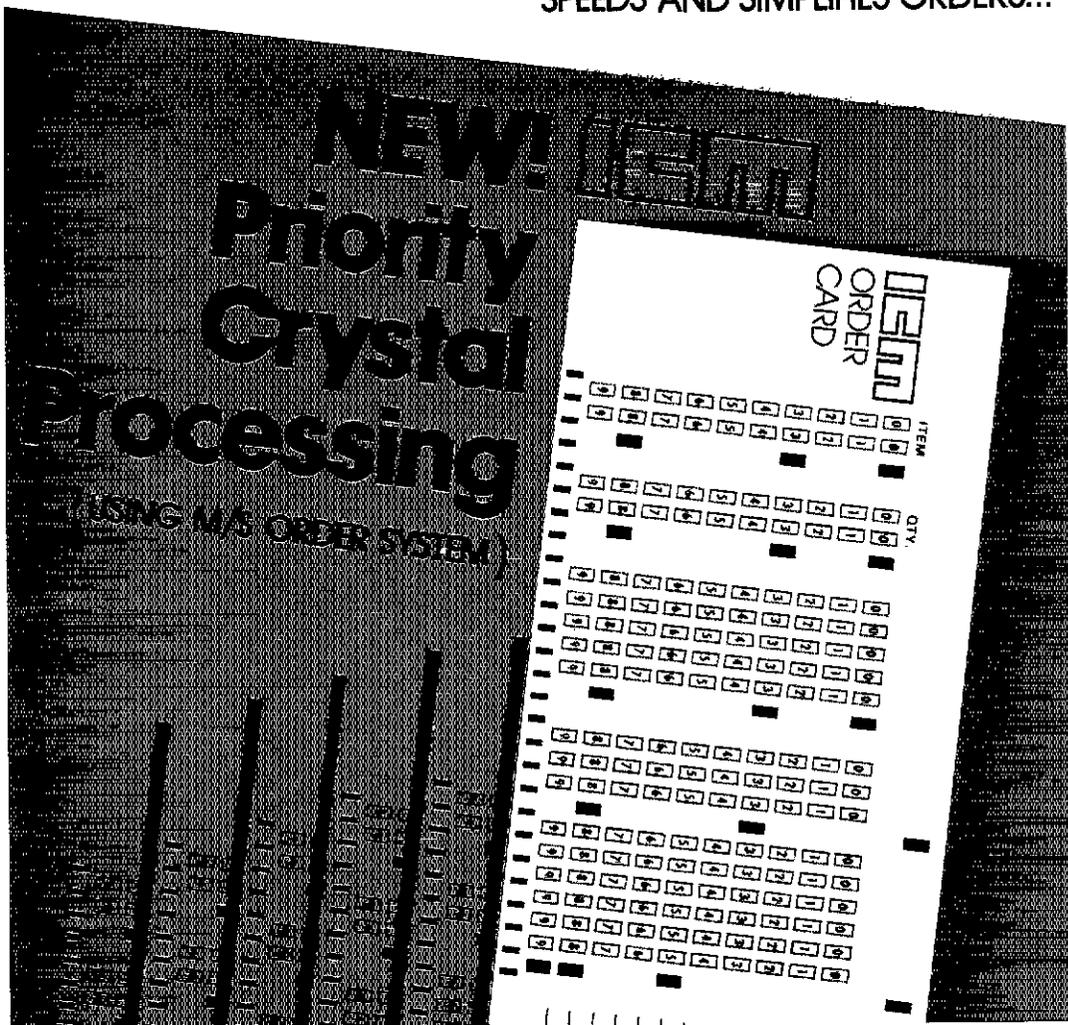
Alberta	VE6TK	Don Sutherland	925 24th Ave. N.E.	Calgary, Alta. T2E 1X2
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Manitoba	VE4FQ	Steven Fink	14 Grandcrest St.	Winnipeg L7, Manitoba
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

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

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.



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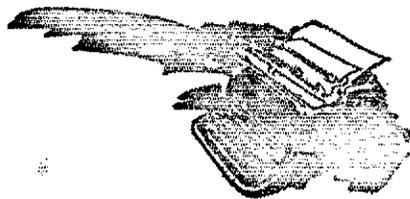
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## "It Seems to Us..."



**A**WARENESS — specifically, the public's awareness of amateur radio — will play a large part in the future of amateur radio. In today's world of political realities, a concerted effort is needed to aggressively boost the image of amateur radio in the public's eye. The average amateur, actively involved in his hobby, needs no convincing that amateur radio is a worthwhile endeavor. But hams have access to a large portion of a valuable resource — radio-frequency spectrum allocations — and these allocations are, in the main, determined through political channels. There is no indication that this will change in the future, and common sense dictates that amateurs must actively make themselves heard in a manner such that the public, and the public's elected decision makers, are made more aware of the phenomenon known as amateur radio. Where does the ARRL fit into this picture? Well, as the representative society of well over 100,000 amateurs in the U.S. and Canada, the League obviously has a considerable responsibility to help promote amateur radio. We'd like to tell you about a few of the things that are being done.

The League has sponsored the production of two films, *This is Amateur Radio* and *The Ham's Wide World*. The latter, being approximately 25 minutes long, is ideally suited to showing on television. These films don't just sit at Hq; they are circulated by a commercial computerized film distribution service under contract to the League. Dozens of prints are in circulation, and are often booked up solid for months in advance. Another League-sponsored promotional program is a series of 30- and 60-second radio spots, recorded on tape, extolling the virtues of particular aspects of amateur radio. These are intended for use by commercial radio stations as a way of fulfilling their public service obligations. Still another effort to reach the public was the donation last year of an Amateur Radio and Oscar display to the Kennedy Space Center in Florida, where it is expected to be viewed by over four million people annually! Additionally, the League maintains a mailing list, for publicity purposes, of 1300 newspaper and magazine publishers, wire services, and various other media in the U.S. and Canada. Press releases are sent regularly regarding all noteworthy

amateur activities, be it hams helping in emergencies, state amateur radio weeks, or Field Day.

Of special importance is the selling of amateur radio to the younger generation. To this end, the League has made extensive use of the fast-growing satellite technology of the 60's and 70's by giving youngsters their first exposure to amateur radio through the Oscar Education Program, which the League sponsors in cooperation with NASA. What could be a more exciting way of being introduced to amateur radio than witnessing a live classroom demonstration of Oscar communications? Hq provides coordination between amateurs and school authorities, and helps make arrangements for on-the-air contacts through Oscar. In addition, we make available a curriculum supplement, a "guide" to classroom demonstrations of satellite communications, copies of Amsat newsletters, and reprints of other amateur radio literature. Production was recently completed on a half hour color videotape depicting an actual Oscar contact in a classroom setting. It features radio personality Jean Shepherd, K2ORS, and Owen Garriott, W5LFL, NASA astronaut, and is intended for showing on public television stations.

The ARRL also makes direct approaches to Washington decision makers, within our capacity as a nonprofit, noncommercial organization, in an effort to assure that the goals and desires of amateurs are made known to the people who wield political power. Last year, in April when tornadoes struck sections of the Midwest, and in September when Hurricane Fifi devastated Honduras, Washington newsletters were sent to key Executive and Congressional officials to emphasize the essential public service roles that amateurs played during and after these disasters. A more recent example of the League's efforts to protect the interests of amateur radio comes to mind: in May, Congressman Vanik of Ohio introduced a bill in the House of Representatives that

(Continued on page 37)

## League Lines . . .

In this issue you'll find an article on radio direction finding -- good basic info plus some practical circuits. An amateur activity that was very popular a few years ago was the hidden transmitter hunt -- a fun-type affair often programmed for club meetings and hamfests/conventions. It's still a fun-type activity, but we present this article for a more serious purpose, to aid in the tracking down of those clowns (or imbeciles or you pick your own word) who like to create intentional interference to service nets. Go get 'em!

The Antique Wireless Association Museum is now in new and spacious quarters in the old Bloomfield Academy, East Bloomfield, N.Y. The displays, in several large rooms, include some 25,000 artifacts, replicas of early stations operating under the call W2AN, and an extensive library which is available for research. The Museum is open to the public Sundays from 2 to 5 p.m., and Wednesdays from 7 to 9 p.m., May through October. For further info, contact W2ICE, K2WW, or W2QY.

Kudos to FCC for the return to a policy which permits Commission personnel to appear at hamfests and conventions in order to give license exams. This spring at Fresno, with a convention registration of 500, K6RI gave exams to about 80 applicants. Later, at Rochester, N.Y., with a registration of something like 4000, K3CT gave an even 300 exams. These are, of course, all for upgrading. Incidentally, at Rochester the percentage of those passing was 76. FB!

The May 1975 issue of Scientific American contains a fascinating story on the possibility of life in other universes. The treatment of radio communications will be of interest to the readers of QST. And for more on the subject, see page 50 of this issue of QST.

After a period of relatively speedy service, routine processing of amateur applications is again at a snail's pace -- as much as twelve weeks may elapse between taking the exam and receiving the license. Ironically, cause of the delay is an avalanche of class D citizens band applications, which are also handled at Gettysburg. To facilitate handling of amateur examination requests and license applications, all amateur mail addressed to Gettysburg should henceforth be addressed to P.O. Box 1020.

The 14th International Scouting Jamboree, NORDJAMB-75 -- is being held in Lillehammer, Norway, from 29 July through 7 August. Look for LC1J, especially on 3940, 7090 and 14290 ssb (LC1J will monitor 7290 for 40-meter operation). On cw, 3590, 7030, and 14,070. WB2SZV is there to report for QST.

More Scouting activity on the local scene. K2BSA, the permanent club station at BSA Hq., New Brunswick, NJ., will be monitoring 3940, 7290, 14,290, and 21,360 Wednesday evenings 8-10 and Saturday mornings 10-noon.

The Summer Olympic Games are scheduled to be held in Montreal during the period of July 17 to August 3, 1976. The Olympic Amateur Radio Station, with the call sign CZ20, will operate from a public-viewed area in the Stadium, on phone, cw, RTTY, and SSTV. The Canadian DOC has given VE amateurs permission to use XO in Newfoundland, and XJ in the rest of Canada, for a period of one year, from August 1, 1975, to July 31, 1976.

Quote of the month: "Amateur Radio doesn't measure its success by volume of traffic, gross revenue, or audience, but simply by how well it has served humanity." W3ASK

# The Accu-Memory

BY JAMES M. GARRETT,\* WB4VVF AND  
D. A. CONTINI,\*\* W4YUU

THE RESPONSE to the Accu-Keyer<sup>1</sup> has really been enthusiastic. There have been over 4000 ready-made keyer boards shipped, and no way of telling how many additional boards have been made from published etching patterns, so someone must still be interested in cw. Many enthusiasts have requested an add-on memory system. The system described below permits storage of up to 200 letters of text<sup>2</sup> organized in one, two, three, or four messages. A digital display provides an indication of the message being sent or loaded (No. 1, 2, 3, or 4) and the message bit being addressed (0 to 512). Any number of pauses may be programmed into a message to allow manual insertion of changeable text (such as RST or contest serial number). After manual insertion a touch of the RUN button allows the remainder of the programmed message to continue. The message being sent may be aborted by pressing the STOP button (the "I didn't mean to press the button!" button). Unlike some programmable keyers, the use of a free-running (asynchronous) clock in the load mode has been avoided, greatly simplifying the loading process. All features of the original Accu-Keyer have been retained. The dot and dash memories of the Accu-Keyer and its automatic character-space feature are used to good advantage in the Accu-Memory along with an added feature, a tone oscillator and speaker.

In addition to the Accu-Keyer board, three printed circuit boards make up the Accu-Memory:

<sup>1</sup> For this and all subsequent references, see the listing at the end of this article.

\* 126 W. Buchanan Ave., Orlando, FL 32809.

\*\* 4620 Middlebrook Ln., Orlando, FL 32806.

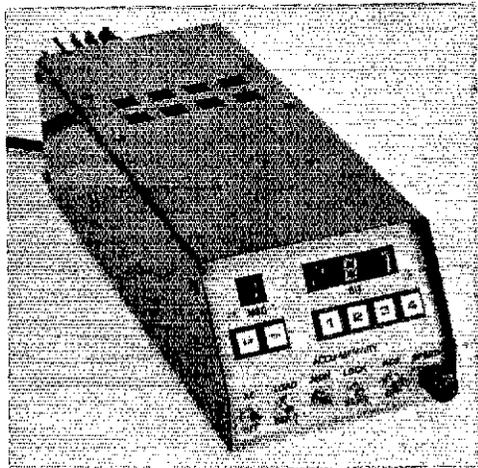
a memory board, a display board, and a display-driver board. A heavier power supply than used in the Accu-Keyer provides 5 volts at 0.8 ampere to power all the circuitry.

The circuitry has been arranged so that those not wishing to tackle the entire project may omit the bit-display feature (two pc boards including the tone oscillator). The memory board may be constructed with but one memory IC (1024 bits of memory) and the second memory IC added at a later date. Since the message indicator display is located on the memory board, the message display feature can be retained even if the bit display is not included. At a minimum, an existing Accu-Keyer can be upgraded to an Accu-Memory by the construction of one additional pc board (13 ICs) and a huskier power supply.

The Accu-Memory has been "battle tested" in three contests and has been found to be very effective in reducing operator fatigue. It is of use whenever there is a requirement for repeatedly sending the same cw sequences such as in contests, DX pileups, and net-control operations. Experience has shown that the digital displays are far more useful than originally anticipated.

## *Operation of the Random-Access Memory IC*

The storage capability of the Accu-Memory is provided by use of a static random-access memory (RAM). Two type 2102 or 2602 MOS ICs, each a 1024-word by one-bit device, are employed to provide 2048 total bits of storage capacity. The 2602 ICs are available from quite a few manufacturers including Intel, Mostek, TI (TMS 4035 NL), and Signetics. Initial prices were about \$25 each but they are now starting to appear in the "discount" ads at about \$15 and the price trend is downward. Dynamic RAMs cannot be used in the Accu-Memory. A static type of RAM will store data for as long as power is applied and does not need to be "refreshed," as is the case with a dynamic RAM. The main advantage that a RAM offers over a shift register is the instant access to any memory location that the RAM allows.



The front view of the Accu-Memory

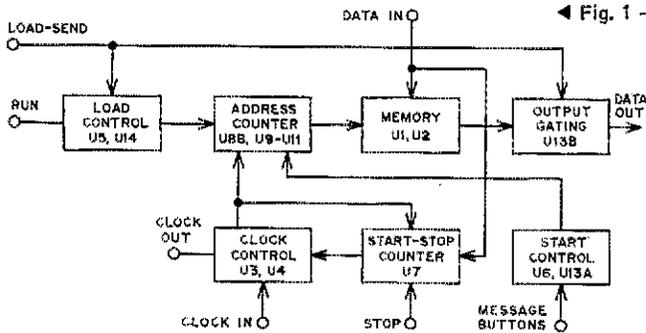


Fig. 1 - Block diagram of the Accu-Memory.

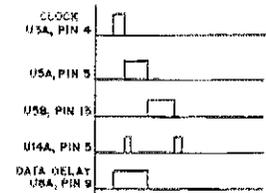


Fig. 2 - Timing diagram.

Ten of the 16 pins of the 2602 are "address" inputs (pins) 1, 2, 4, 5, 6, 7, 8, 14, 15, 16). The possible different binary combinations of these ten inputs total 1024. The first memory location is addressed by applying 0000000000 to these lines, the second by 0000000001, and the 1024th by 1111111111. The RAM has two modes of operation, read and write, as selected by the read/write input (pin 3). When pin 3 is low (write), the data (high or low) being applied to the data input (pin 11) are loaded into the memory position selected by the address inputs. When pin 3 is high the stored data in the memory locations cannot be changed. In the read mode (pin 3 high) the "data out" line (pin 12) presents the data stored in the locations being addressed. In the Accu-Memory the output lines of a binary counter are connected to the address inputs of the RAM. The counter input is connected to the keyer clock. In operation, the clock is started and the counter "counts" the keyer clock pulses and the counter outputs sequentially step the RAM through all its addresses. In the LOAD mode the cw characters from the Accu-Keyer are written into the memory positions as ones and zeros. In the SEND mode the stored ones and zeros forming those cw characters are read from the memory and fed into the output stage of the keyer. As the counter counts the clock pulses and steps the memory through its addresses, cw characters are produced at the keyer at the speed to which the keyer is set.

Pin 3 is normally held high and in the write mode is pulsed low after the address inputs have reached the intended binary number and the data input is stable. If pin 3 were held low continuously in the write mode rather than pulsed, the data

would be "smeared" - written into more than one location in memory.

An important function is provided by the chip-select (pin 13) input. Unless *CE* is low, no data is produced at the data output pin and no data can be loaded into the input pin. Thus several memory ICs can be combined into a larger memory by connecting all corresponding leads of the ICs in parallel and addressing the desired IC through the use of the chip-select pin. In the Accu-Memory two 1024-bit RAMs are connected to act like a single 2048-bit RAM in which the chip-select input behaves like an eleventh address input.

A word is in order about the organization of RAMs. The 2602 is organized as a  $1024 \times 1$  RAM. This means that there are 1024 bits of memory addressable, one bit at a time. A  $512 \times 2$  RAM has the same total bits, 1024, but they are addressable only in pairs. Likewise, a  $256 \times 4$  would have 1024 bits addressable four at a time. In these RAMs, two or four input and output lines are provided instead of one.

### Theory of Operation

A detailed circuit description would be lengthy and difficult to follow, so a functional description will be given that will enable interested readers to trace through the logic. Fig. 1 is a block diagram of the memory and reference will be made to the functional names in this description.

The RAMs, U1 and U2, are described in the previous section. In both SEND and LOAD modes they are addressed by a binary counter consisting of U9, U10, U11 and U8B. The initial start count for the address is determined by presets, generated by U6 and U13, and controlled by the push buttons for message selection. Jumpers are used to vary the preset depending on whether one or two memories are installed.

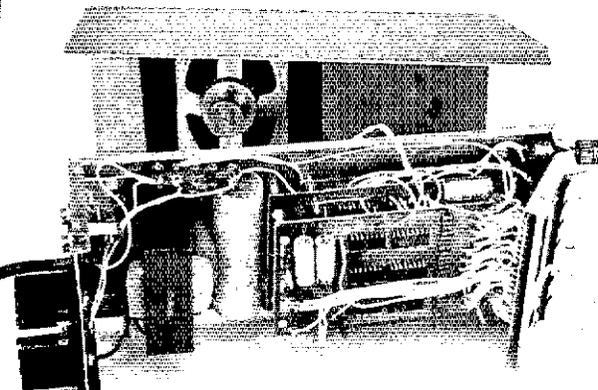


Fig. 3 - A look at the inside of the Accu-Memory. The power supply components may be seen at the left, and the three "stacked" circuit boards to their right. The fourth circuit board, containing the readout, is mounted behind the sloping portion of the front panel. The board at the bottom of the "stack" is that of the original Accu-Keyer (see reference 1).

In the SEND mode, the output of the memories is connected to the Accu-Keyer manual key input and the memory addressed sequentially by the keyer clock. U7 is used as a start-stop counter. It will gate off the clock and thus prevent the memory from advancing if nine sequential zero bits are detected in the output data. These nine zeros

are placed at the end of each message in the LOAD mode as a stop signal.

In the LOAD mode U5 and U14 are used to generate load commands to the memories. To load them correctly, it is necessary for the proper sequence of commands to occur. One-shot multi-vibrators U5 and U14 generate this sequence.

**TABLE I - INTERCONNECTIONS**

WIRE NUMBER	FUNCTION	
<i>Keyer-to-memory interconnections.</i>		
1	Clock - connect to R6	
2	Anode CR1	
3	Cathode CR1 (Remove CR1 in keyer and connect as shown.)	
4	Data in (Connect to U7B in keyer and tone oscillator on driver board.)	
5	Data out (Connect to manual key input, U7B pin 5 in keyer.)	
<i>Memory-to-control switches</i>		
6	Send 1	
7	Send 2	
8	Load 1	Dpdt switch
9	Load 2	
10	Common 1	
11	Common 2	
<i>Memory to readout</i>		
12	Insert	
13	Insert return	
14	Reset 1	
15	Reset 2	
16	Reset 3	Push buttons
17	Reset 4	
18	Reset common	
19	Stop	
a, b, c, d, e, f, g	Quadrant readout	
<i>Memory to driver</i>		
20	Readout count	
21	Readout reset	
22	Readout quadrant reset (use with one 2601)	
23	Readout quadrant reset (use with two 2602s)	
24	NOR 1	
25	NOR 2	
26	NOR out	
<i>Driver to readout</i>		
27-33 (a-g, LSB)	Least-significant digit	
34-40 (a-g, CSB)	Center-significant digit	
41-47 (a-g, MSB)	Most-significant digit	
48-49	Pitch control (short if no control desired)	
50	Speaker	

*Memory interconnections*

For one memory IC connect: A to H, B to G, C to I, D to F, J to ground, K to + 5 V, L to N, and M to O.

For two memory ICs connect: A to J, B to I, C to K, D to H, E to F, G to + 5 V, L to O, and M to P.

Connect DP (decimal point) on readout board to wire 13.

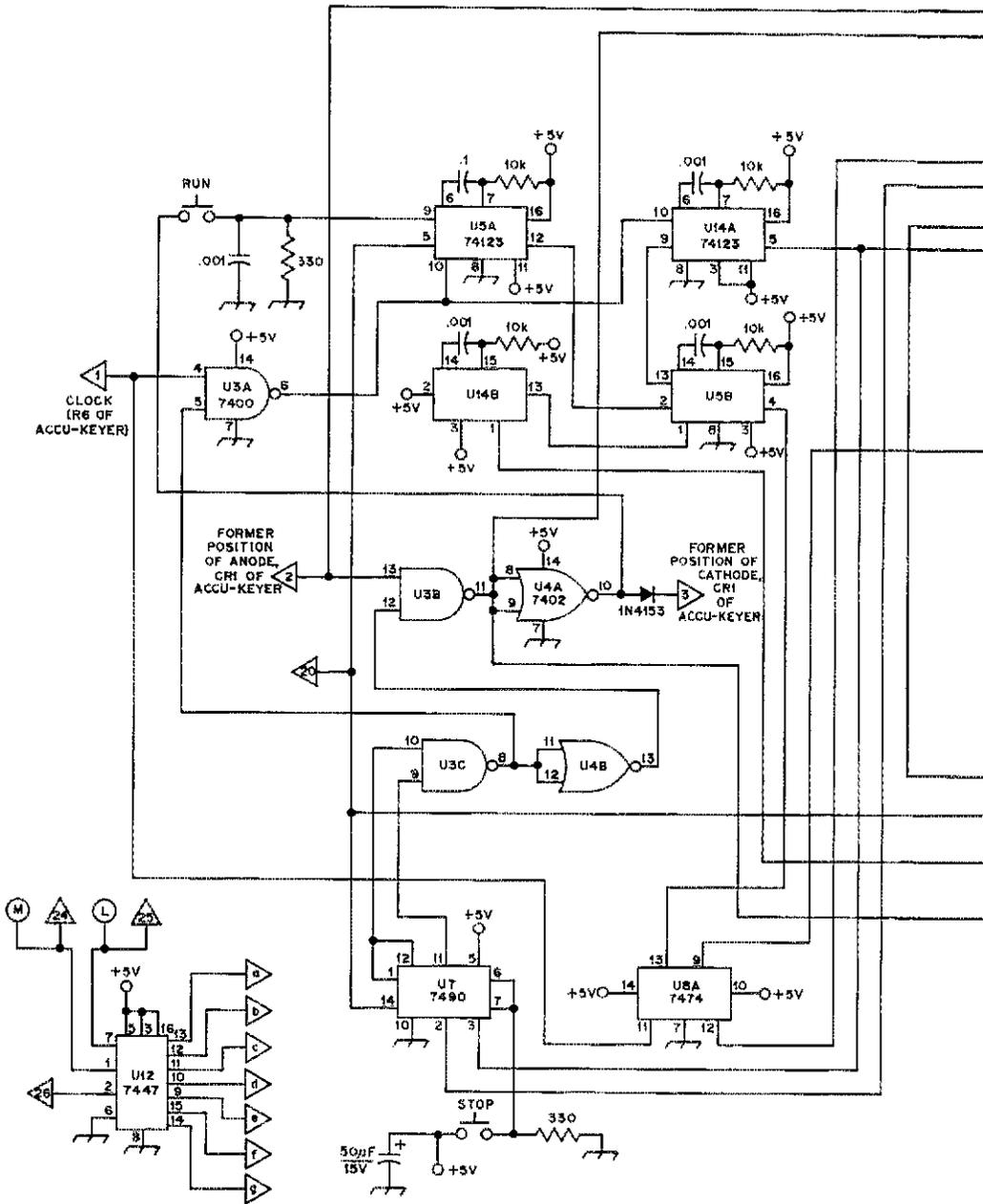


Fig. 4 - Diagram of memory circuitry of the Accu-Memory. See Table II for list of parts. Numbers and letters in triangles identify inter-connections to other parts of the Accu-Memory, as listed in Table I. Letters in circles indicate terminals for jumpers to be wired for either one or two RAM ICs. This wiring information is also listed in Table I.



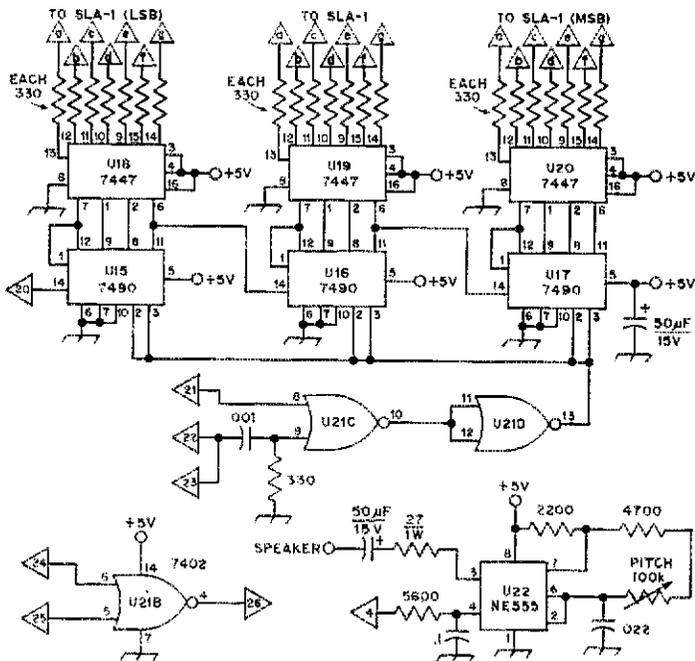


Fig. 5 - Diagram of driver and display. See Table II for list of parts. Numbers inside triangles identify interconnections to other parts of the Accu-Memory, as listed in Table I.

When a message button is depressed in the LOAD mode, the memory is preset to the correct message start point and the address counter to zero. U7, a decade counter, will allow the keyer clock to run unless it is at a count of nine. Inside U7 an AND function takes place from inputs on pins 2 and 3, and results in U7 being reset to zero if data are present from the keyer and a clock pulse occurs (as it will when the paddle is closed). U3B and C and U4A and B are used to keep the clock in the keyer running until the stop signal (nine sequential zeros) occurs. Operation of U7 is identical in the SEND mode except the data output of the memory is AND gated with the clock pulse.

Each clock pulse generated by the keyer initiates the series of pulses shown in the timing diagram, Fig. 2. The data (1 or 0) from the keyer output are stored in flip-flop U8A on the leading edge of the clock pulse. The output of U8A is the input to the memories. From Fig. 2 it can be seen that a load command is sent to the memory twice from U14A. In between these commands the memory address is changed by U5A pin 5, and U8A is reset by U5B pin 4. This results in loading the input data in one location, incrementing the address by one, and then loading a zero in the next address. This zero is changed by the next clock pulse except in the case where U7A stops the clock. In this case the zero is not cleared and nine consecutive zeros are written into the memory. At the end of each word of message, therefore, a series of nine zeros is put in. The ninth zero will be changed to a one by the next word, except at the end of the message. In the SEND mode, this will cause U7 to stop the clock.

U3A is used to block the clock to the one-shots except when U7 is reset. The keyer can therefore be used manually without advancing the memory address when U7 times out or is stopped with the STOP button. U3D blocks load commands to the memory in the SEND mode.

As a manual input, the STOP button will force U7 to a nine count, stopping the memory. The RUN button, in the LOAD mode, manually triggers one-shot U5A which causes U7A to count from 9 to 0, and thus causes the clock to run until U7 again reaches a count of nine. This action loads eight additional zeros into the memory at the end of the nine already there at the end of the previous word. A second part of the message is then loaded. In the SEND mode, the message will stop at the end of the first nine spaces, allowing manual insertion. If the RUN button is then depressed, U7 will reset and attempt to count to nine, but on the count of nine new data will appear, reset U7, and keep the memory running.

A seven-segment decoder, U12, decodes the memory message location and drives a message readout. It is connected to count from one to four (a zero count on pins 1 and 7 is changed to a four count by a NOR gate, U21, on the driver board).

The bit readout is driven by a three-stage BCD counter/decoder consisting of U15-U20. The reset line and count line from the memory address counter are used to start the bit count at zero and advance it in step with the memory advance. Also, each time the message number changes during SEND or LOAD the bit count is reset.

The tone oscillator is quite conventional and

uses an NE555 timer. It is contained on the readout driver board.

### Construction

As shown in Fig. 3, the Accu-Memory is constructed in an aluminum box made by cutting and bending sheet aluminum. The front-panel dimensions are deliberately made small because depth in most ham shacks is more abundant than frontal-area space. This method also gives a neat, streamlined appearance. The overall outside dimensions are 4-1/4 x 3-1/4 x 10-1/2 with the length dimension measured across the bottom plate, less knobs and heat sink. The heat sink for the LM309 is attached to the rear panel,<sup>3</sup> along with the key jack, the output jack, and a fuse holder (Safety First!). Power supply components are located on the bottom plate near the rear. Two terminal strips are used to mount the power supply diodes and filter capacitor. All the other electronic parts are mounted on four printed-circuit cards.

Three of these cards are "stacked" on top of each other while one, the readout board, is attached to the front panel. The bottom board is the basic Accu-Keyer board, followed by the memory board, and the driver board on top. These boards are mounted using No. 4 screws with spacers for separation. The interconnecting wiring was routed around the front of the boards so that, with screws removed, they could be lifted easily for service (not required as yet). The readout board is attached to the back of the front panel after the panel has been drilled. All the rectangular holes can be made with a 1/2-inch square chassis punch. The miniature switches and speed control are mounted along the bottom edge of the panel.

A small speaker is mounted in the box lid, using 1/2-inch square holes and a piece of cloth fabric for grille cloth. Holes drilled along the edges of the box lid are used to attach it by means of sheet-metal screws to flanges bent along the box edges. Rubber feet pressed into the bottom holes keep the unit in place.

The push buttons are sold by Solid State Systems (see reference 3). One word of caution: do not increase the value of the filter capacitor in the power supply. It has been chosen for minimum dissipation by the LM309 regulator.

Fig. 4 is a schematic diagram of the circuitry on the memory board and Fig. 5 shows the circuitry on the driver and display board. Figs. 6, 7, and 8 show the pc-board layout and parts placement for the three boards. Wires that interconnect the boards are shown as numbers or lower case letters in triangles on the figures. Selectable jumpers allow the use of one or two RAM ICs. The jumper points are shown as capital letters in circles in Figs. 4 and 6. Table I is a list of interconnecting wires. Table II gives a parts list for each board. Fig. 9 is a diagram of the power supply.

### Operation

The memory is designed so that the basic Accu-Keyer retains all its features when the

memory function is not in use. Operation of the memory is divided into two modes, the LOAD mode and the SEND mode.

To load a message, place the LOAD/SEND switch in the LOAD position, press the button for the number of the message that it is desired to load, and key in the message. For proper loading, the message should be keyed one word at a time with the automatic character space on. After each word is inserted, the memory counter will automatically provide an eight-bit pause for a word-space interval, and then stop.

To send, place the LOAD/SEND switch in the SEND position and press the proper message button. The STOP button will halt sending, but the message can be continued from the halted point if the RUN button is depressed.

If it is desired to use the insert feature, load the first part of the message as described above. Then after the memory stops advancing, press the RUN button once, wait until the count stops, and then

TABLE II — Accu-Memory Parts List

Memory Board		
2	7474 ICs	U8, U11
2	7493 ICs	U9, U10
1	7408 IC	U6
2	74123 ICs	U5, U14
1	7400 IC	U3
1	7490 IC	U7
1	7402 IC	U4
1	7420 IC	U13
1	7447 IC	U12 (optional)
2	2102 or 2602 ICs	U1, U2 (U2 optional)
1	2N2222A transistor	
3	1N4148 silicon diodes or equivalent	
8	1500-Ω 1/2-W resistors	
4	10-kΩ 1/4-W resistors	
2	330-Ω resistors	
1	4700-Ω resistor	
4	.001-μF disk ceramic capacitors	
4	.1-μF disk ceramic capacitors	
1	50-μF 15-V electrolytic capacitor	
Driver Board		
3	7490 ICs	
3	7447 ICs	
1	7402 IC	
1	NE555 IC	
22	330-Ω resistors	
1	5600-Ω resistors	
1	2200-Ω resistor	
1	4700-Ω resistor (33kΩ with no pitch control)	
1	27-Ω resistor	
1	.001-μF disk ceramic capacitor	
1	.022-μF disk ceramic capacitor	
2	.1 μF disk ceramic capacitors	
2	50-μF 15-V electrolytic capacitors	
Readout Board		
4	SL A-1 readouts	
6	Push buttons (see text)	
8	330-Ω resistors	

COMPONENT SIDE UP

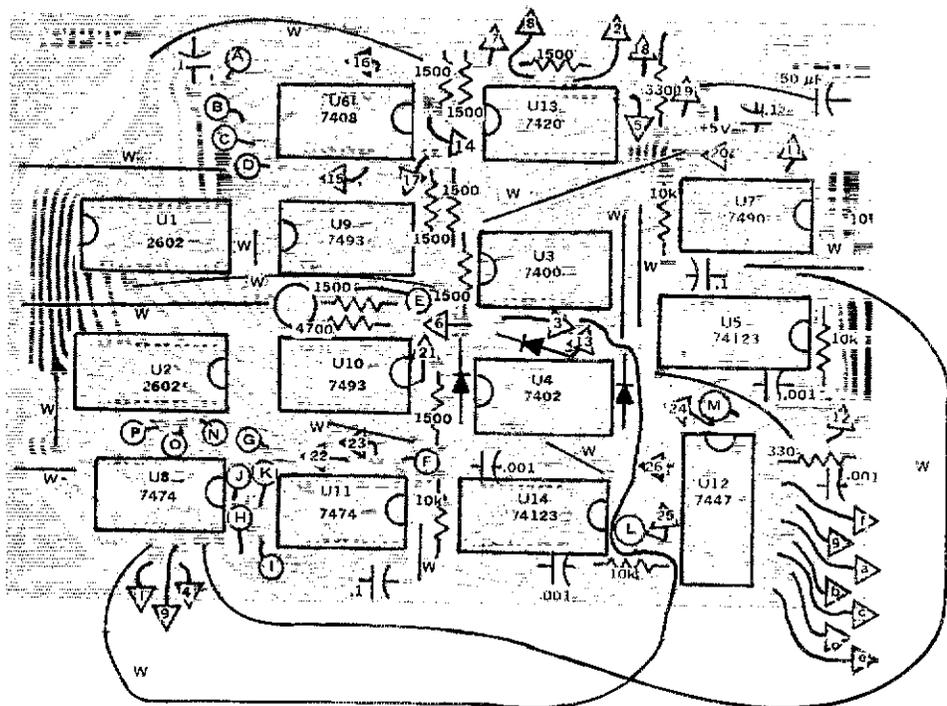


Fig. 6 - Etching pattern and component layout for memory board of the Accu-Memory as seen from component side of board. Ready-made circuit boards are available (see reference 4). Letters and numbers in circles indicate points for connection to other parts of the device, as listed in Table I. W = wire jumpers.

load the second half of the message. In the SEND mode the memory will send the first part, stop and allow insertion of manual input such as signal reports, and then, when the RUN button is depressed, continue with the second half. This procedure may be repeated as many times as necessary.

If a message is too long for one of the four message locations it will automatically continue into the next message location in line. Using this feature, messages of any desired length may be loaded, up to the full 2048-bit capacity.

The readout indicates the message number and the location within the message starting at 000 and continuing through either 256 or 512, depending on whether one or two memories are installed. A decimal point lights when the keyer is sending either manually or automatically.

### Helpful Advice

Some additional information that has been gleaned from appearance of the earlier article<sup>1</sup> is perhaps in order. After a lot of correspondence with amateurs who built the Accu-Keyer, it is apparent that some do not know that there is a difference between a 7400, a 74H00, a 74L00, and a 74C00. These are all members of a family of

quad two-input gates that are different internally and are not interchangeable (in almost all cases) with each other. Some IC distributors tend to be haphazard about which type they send.

Rf shielding is essential and quite often totally neglected. Each side of the ac line, in particular, should be bypassed to the chassis with .01- $\mu$ F 1000-V capacitors.

Logic is particularly difficult to troubleshoot by mail, because in almost all cases any number of failures can cause the same problem. Substitution of ICs is the best troubleshooting procedure. Sockets or Molex pins are therefore very helpful. Besides bad ICs, two common problems are improper substitution of parts and solder bridges. Some of the boards that have been repaired looked like they were built by dripping solder on the board from a blowtorch! *A small-tipped iron is essential.* A Polaroid picture taken of the board before assembly will permit easy location of solder bridges later.

As with the Accu-Keyer, ready-made boards are available for the memory through Garrett.<sup>4</sup> A business-size self-addressed stamped envelope is mandatory to reduce addressing time to a minimum. Experience has shown that addressing envelopes is a real problem. Now we know what a

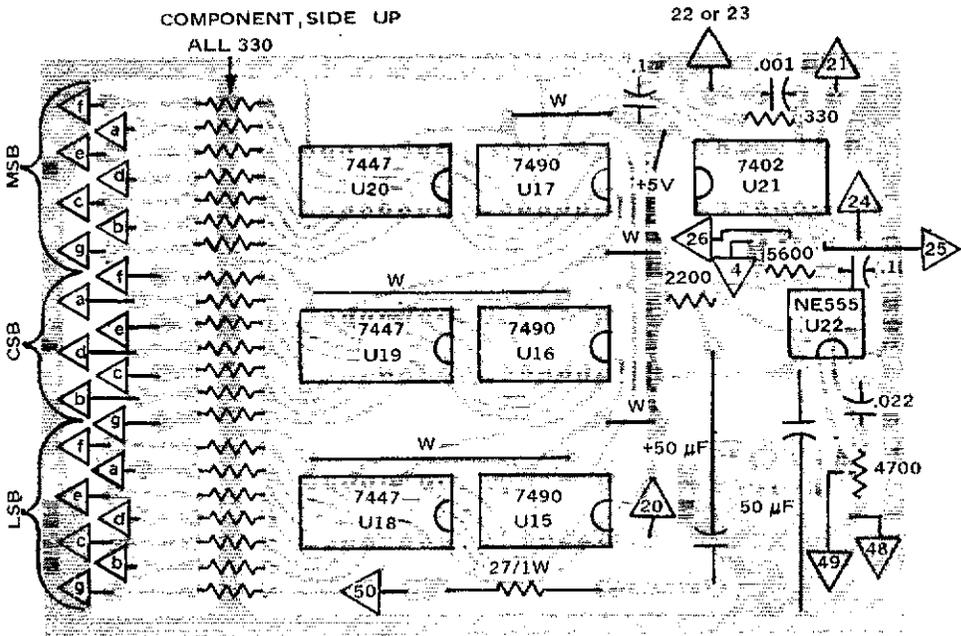


Fig. 7 — Etching pattern and component layout for driver board as seen from component side. W = wire jumpers. See Table I for wiring connections to other parts of the circuit.

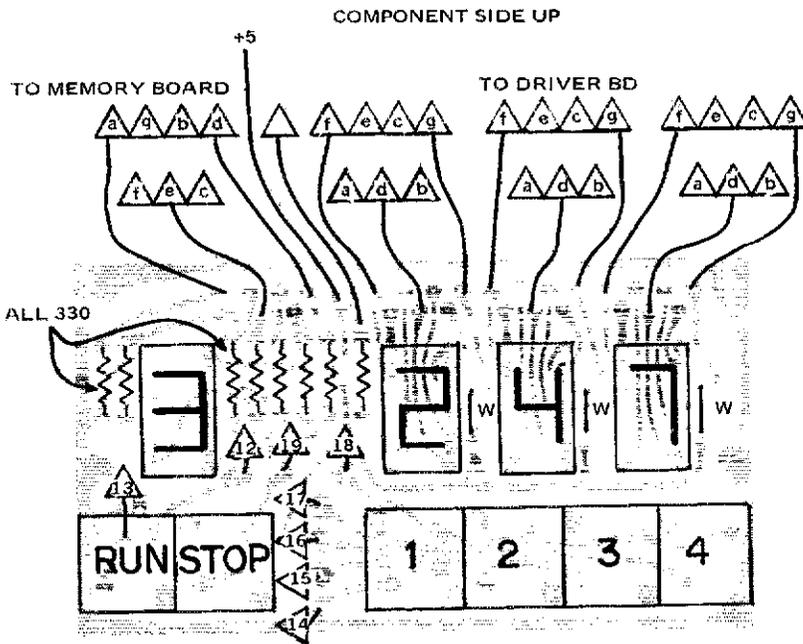


Fig. 8 — Etching pattern and component layout for readout board, shown from component side. W = wire jumpers. See Table I for wiring connections to other parts of the circuit.

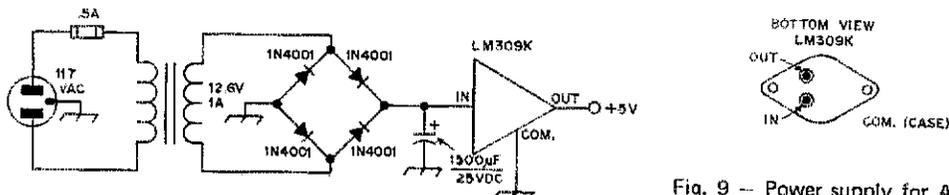


Fig. 9 - Power supply for Accu-Memory and keyer. See text.

QSL manager must go through. If any problems develop or changes occur in the circuit, a data sheet showing corrections will be included.

### References

<sup>1</sup> Garrett, "The WB4VVF Accu-Keyer," *QST*, August, 1973. Also see Garrett, "More on the Accu-Keyer," Technical Correspondence, *QST*, May, 1974, p. 58. Information also appears in *The Radio Amateur's Handbook*, 1974, and later editions.

<sup>2</sup>The memory has a total of 2048 bits of storage capacity. A dot occupies one bit, a space

one bit, a dash three bits, a letter space three bits, and a word space eight bits.

<sup>3</sup>The heat sink for the LM-309 is available from Solid State Systems, Inc., Box 773, Columbia, MO 65201.

<sup>4</sup>As a service to those who wish to avail themselves, ready-made circuit boards may be obtained through Garrett. All boards are glass epoxy and drilled. At the time of this printing, the Accu-Keyer board (see reference 1) is \$3.50. The memory, readout, and readout-driver boards are \$12 as a set. The memory board, if ordered alone, is \$6.

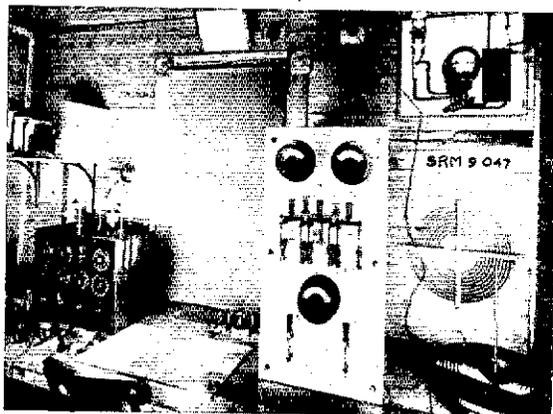
## Strays

### Stolen Equipment

Stolen May 12, 1975, stereo translator station (F.M.) with serial number 740516. (Station operated under F.C.C. license W-213-AA to rebroadcast signal of WFCR Public Radio in Amherst, MA) Any information concerning whereabouts or present use should be forwarded to radio station WFCR at the University of Mass., Amherst, MA, or to the F.B.I. or the F.C.C.

Stolen May 15, Clegg FM-27B, serial number 27053-1854. Please notify W4PIG or Ft. Myers FL Police Department.

Icom model IC-230 stolen May 29, serial number 1276. Contact Roy A. Cartier, K4AC, 800 National Avenue, Winchester, VA 22601.



Recent Silent Key K6K1 leaves a radio legacy going back to 1915; his station, pictured above, would be termed "immaculate" even by today's standards. TNX to K6QI for the picture.

### Transatlantic Sporadic-E Propagation

In June and July, 1974, there were several instances of transatlantic work on 28 MHz, presumably via multihop sporadic-E propagation. (See "World Above 50 Mc." in August and September, 1974, *QST*.) It started happening again in June, 1975, which is of special significance in view of the very low state of solar activity and absence of high-latitude E-layer propagation above about 20 MHz.

ARRL is interested in details of any reception or two-way work with Europe on 21, 28, or 50 MHz during summer, 1975. Several instances on 21 and 28 MHz have already been observed, and F8SH, sporadic-E coordinator for IARU, has unconfirmed reports of reception of American and Canadian 50-MHz stations. The undersigned heard the German beacon, DLØIGI, 28.195 MHz, around 1500 UT, June 21. No 50-MHz operation is presently authorized in Europe, but cross-band tests, 50-28, might bring results, as they did so successfully in the period of high F-layer muf 15 years ago. The 50-MHz region is full of video in Europe, and the familiar buzz should be a tip-off for 6-meter listeners in this hemisphere. The IARU beacon stations between 28.16 and 28.2 provide good 10-meter indicators. Most likely times are 1200 to 1500 and 2000 to 2300 UT. - *WHDQ*

### QST Congratulates

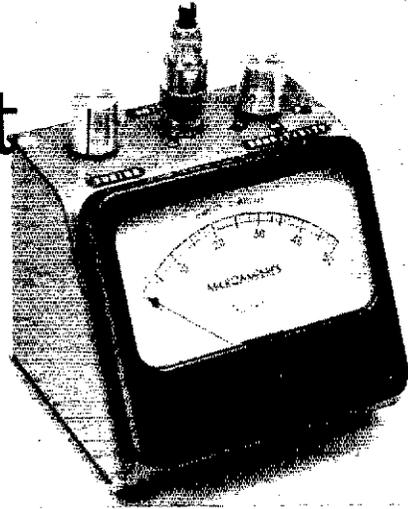
Bernard Ostrofsky, W9HTF, named a Fellow in the American Society for Nondestructive Testing. Ostrofsky is technical editor of "Materials Evaluation," as well as being a member of the American Chemical Society, the American Crystallographic Assoc., the Electron Probe Analysis of America, the American Society for Testing and Materials, and the ARRL.

Anthony F. Knoll, WA2TRK, who won five awards for his "Radio Emissions from Jupiter" project at the Greater Trenton Science Fair.

James F. Bartram, W1PDL, ex-president of NCRC, who was made a Fellow of the Acoustical Society of America.

# A SIMPLE Field-Strength Meter and how to Calibrate It

BY DOUG DeMAW,\* WICER



**F**EW AMATEUR STATIONS, fixed state or mobile, are without need of a field-strength meter. An instrument of that type serves many useful purposes during antenna experiments and adjustments. Extreme meter sensitivity is not always a requisite, and for hf-band near-field checks the circuit of Fig. 1 should be fine. Amateurs desiring to make far-field checks (several wavelengths from the antenna under test) may wish to build the instrument described in an earlier issue of *QST*.<sup>1</sup>

The unit described here has ample sensitivity

<sup>1</sup> McCoy, "A Linear Field-Strength Meter," *QST* for January 1973, p. 18.

\* *QST* Technical Editor.

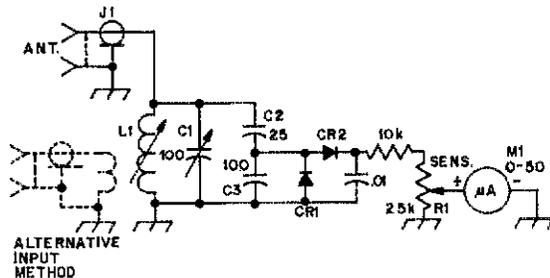


Fig. 1 — Schematic diagram of the simple field-strength meter. Fixed-value capacitors are disk ceramic unless otherwise noted. Fixed-value resistors are 1/2-W composition. C1 is a small 100-pF variable. CR1 and CR2 are 1N34A germanium diodes, or equivalents. J1 is an antenna connector of the builder's choice. L1, C2, and C3 are selected values (see Table I), M1 is a 50- $\mu$ A meter, and R1 is a 25,000-ohm, linear-taper composition control.

for most amateur work. The larger the pickup antenna, the greater the sensitivity. Far-field measurements can be made by using the alternative input circuit shown in Fig. 1. In that application a reference dipole, cut for the frequency of interest, is connected to the input link. Alternatively, a one-quarter wavelength wire can be used as a far-field pickup antenna. The polarization of the two antennas involved in a test should be the same if meaningful results are to be obtained.

Most of the simple field-strength meters used by amateurs are capable of recording only *relative* signal levels, and such readings are useful in a number of tests. However, knowing the approximate dB increase resulting from antenna adjustments can be helpful in evaluation work with matching networks, loading inductors, and the like. Reasonable accuracy can be had with the circuit of Fig. 1.

## Circuit Highlights

A schematic presentation of the instrument is given in Fig. 1. In this model the tuned circuit, L1, C1, C2, and C3, was selected for the 160-meter operation. The constants can be changed for the amateur bands from 80 through 10 meters. Table I lists the inductance and capacitance values needed.

A capacitive divider (C2 and C3) is used to provide a low-impedance connection point for the voltage doubler, CR1/CR2. Since the rectifier diodes would otherwise load down the tuned circuit and spoil the *Q* — assuming they

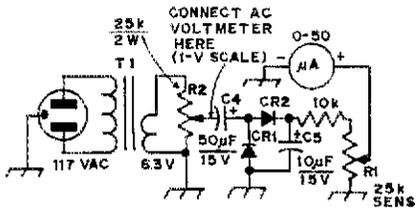


Fig. 2 — Schematic illustration of a suitable circuit for calibrating the instrument in dB (see text). T1 is a small 6.3-V filament transformer. C4 and C5 are electrolytic capacitors.

were connected at the high-impedance end of L1 — the capacitive divider is employed. Because CR1 and CR2 provide a square-law response as rectifiers, the meter deflection (relative to changes in signal-input level) will be nonlinear. Addition of the 10,000-ohm resistor between CR2 and R1 helps to linearize the meter response, but it also reduces the sensitivity of the instrument somewhat. This design trade-off is acceptable for most amateur work.

### Construction

It makes little difference what the size or shape of the enclosure is. It should be made of metal to prevent rf energy from entering the tuned circuit by any path other than that of the pickup antenna. A 4-1/2-inch meter was used in the model shown here, primarily because it was at hand in the writer's "goodie cache." Physically smaller meters are quite acceptable, but the builder should use a 50-µA instrument if good sensitivity is desired. Large-format meters are more suitable for viewing from a distance, and with advancing age it is not uncommon for some of us to suffer the "tired-eyes syndrome," which can be offset considerably through the use of large meters! For far-field observations one can use a telescope or field glasses to read the meter scale.

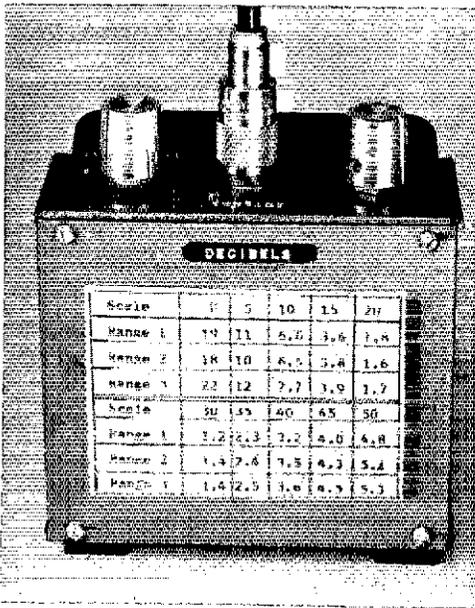
Component wiring inside the instrument box can be of the builder's choosing, provided all rf leads are kept as short and direct as practical. Although metal knobs are shown in the photographs, they aren't necessarily the most ideal kind to use. Touching them will affect the meter readings markedly if the meter case is not connected to an earth ground. Plastic knobs are, therefore, recommended.

### Calibration

A simple technique for obtaining calibration of M1 in dB is shown in Fig. 2. CR1 and CR2 are used as rectifiers, but the tuned circuit of Fig. 1 is disconnected from them. T1, R2, and C4 are used temporarily to provide low-level 60-Hz voltage for calibrating the instrument. It is necessary to install C4 and C5 (electrolytic capacitors) for 60-Hz work. The capacitance values shown are suitable for low reactance at this frequency.

T1 and R2 are used in combination with a VOM or VTVM to supply and monitor 60-Hz energy between 0.1 and 1 volt. Midscale (25) on M1 represents zero dB. All readings below 25 are *minus* dB, and the readings above 25 are *plus* dB. Thus, midscale, or 25, is the reference point for all measurements. Meter calibration is effected at three settings of the sensitivity control, R1. This is done because the meter readings versus field strength in dB will vary somewhat as the ohmic value of R1 is changed. The greater the amount of resistance, the more linear the meter response.

During calibration, R2 (Fig. 2) is adjusted for midscale response of M1 at each of the settings of R1. Maximum sensitivity will occur when R1 is set at maximum resistance (position 1). Position 2 (moderate sensitivity) is established by using an ohmmeter to locate a position of the R1 arm that places 8000 ohms of resistance between the high end of R1 and M1. Position 3 (low sensitivity) is established when the arm of R1 is positioned to provide 16,000 ohms of resistance between the high end of R1 and M1.



Rear view of the meter cabinet showing the calibration chart in dB. Ranges 1, 2, and 3 are discussed in the text.

TABLE I

Band	160 M	80 M	40 M	20 M	15 M	10 M
L1 (μH)	100 (Nom.)	25 (Nom.)	10 (Nom.)	2.2 (Nom.)	1.3 (Nom.)	0.5 (Nom.)
C2 (pF)	25	25	15	15	10	10
C3 (pF)	100	100	68	68	47	47
Miller	4409	4407	4406	4404	4403	4303
Coil						

Component values for the various amateur bands in which the field-strength meter will be used. Miller coils can be ordered by mail from: J. W. Miller Co., 19070 Reyes Ave., P. O. Box 5825, Compton, CA 90224.

Decibel reference points are found for the three preselected settings of the sensitivity control by varying the voltage to CR1 and CR2 by means of R2. In each instance the value of ac voltage at zero reference is recorded. Then the setting of R2 is changed until the meter reading drops or increases to the next numbered point - 30, 35, 40 and so on, or 20, 15, 10, and downward. The change in dB for each change in meter reading can be computed by:

$$dB = 20 \log \frac{E1}{E2}$$

where E2 = ac voltage at zero reference (25 on the

meter scale), and E1 = the voltage above or below zero reference. Thus, if E1 was 0.9 volt, and E2 was 0.2 volt, the increase in dB would equal 13. Example:

$$dB = \frac{0.9}{0.2} = 20 \times \log 4.5 = 20 \times 0.6532 = 13$$

which tells us that working in the opposite direction our answer would be in *minus* dB.

A rear-panel view of the author's instrument is shown photographically. If the circuit of Fig. 1 is used, the calibration points visible in the picture will be valid for 50-μA meters. QST

I would like to get in touch with . . .

- . . . other high school age hams interested in Oscar communication. WB9IPV.
- . . . anyone interested in exchanging information on APL computer programs for contests. WA1MYK.
- . . . others interested in facsimile operation on bands below six meters (when allowed). W4QAJ.

Official first-day covers commemorating the launch of Amsat-Oscar 7 are available from Amsat, P.O. Box 27, Washington, DC 20044. These covers were postmarked at the launch site, Lompoc, California on the day of the launch, and contain the "Progress in Electronics" commemorative stamp. They are available for \$1.00 each (or 5 IRCs, and a business-size self-addressed, stamped envelope (or an additional IRC in lieu of postage).

## Strays



Richard L. Daniels, WA4DGU, (right) receives the Space-Ship Earth award from NASA Administrator James Fletcher and Deputy Administrator George Lowe for his personal contributions to the development and use of the Oscar amateur satellite program as a valuable educational tool. Daniels was also recently presented Ham of the Year award at the Dayton Hamvention by Judge Stanley Phillips. While director of Program Review and Resources Management Division of the Office of Space Science, WA4DGU has devoted much of his own time to planning and organizing the work of Amsat leading to the assembly and launch of Oscar 6 and 7, the satellites now serving thousands of amateurs throughout the world.

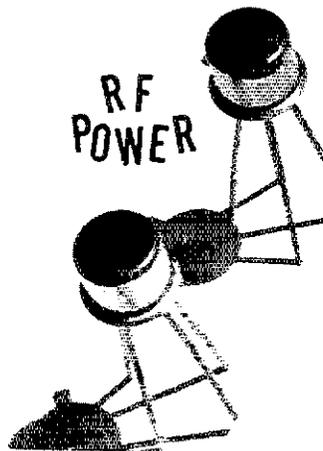


# LEARNING TO WORK WITH SEMICONDUCTORS

## Part IV

BY DOUG DeMAW,\* WICER AND  
JAY RUSGROVE,\*\* WAILNQ

*Part III of this series treated the complex subject of low-level power stages in solid-state cw transmitters, and illustrated by means of simple algebra some approaches to network design. A QRP transmitter evolved from the material presented in Parts I through III. In this installment we will examine the subject in somewhat greater depth. More network information will be given along with generalized data of interest to prospective amateur designers. Part V will show how to build a 10-watt amplifier stage which can be added to the QRP transmitter already described.*



**I**N PREVIOUS INSTALLMENTS of this course we covered basic design approaches for  $T$  and  $\pi$  networks. There are a number of additional resonant networks being used by industry and private designers, but it would be an almost endless endeavor to discuss all of them in detail. Therefore, we will dwell mainly on a few circuits that will meet most of our needs in amateur work. Each network treated here can be designed by means of simple math.

When selecting a network for use between input terminal and load, for coupling between transmitter stages, or for matching the output stage to its load, certain considerations are essential in making a choice. A viable network is dependent on the impedance-transformation ratio and is affected by the  $Q_L$  of the design. That is, certain combinations of  $Q$  and transformation ratio cannot be met easily by some of the networks. If the wrong network is employed, it will be practically impossible to effect the physical requirements of the design. The formulas may yield an inductance value of, say,  $0.5 \mu\text{H}$  at 3.5 MHz, which the builder could manage. However, if the operating frequency of the transmitter was raised to 14 MHz, the coil inductance would be only  $0.125 \mu\text{H}$ . . . hardly a convenient value! This situation is notable in the case of a  $\pi$  network operating at moderate or high amounts of  $Q_L$ , and where the terminal impedances are low. A  $T$  network would be more appropriate for the application.

One of the most useful aids for amateurs who are embarking on an adventure in solid-state transmitter building is *Motorola Application Note*

*AN-267*, available from Motorola Semiconductor Products Inc., Box 955, Phoenix, AZ 85001. Four of the most popular networks in commercial use are illustrated in the publication, and equations are provided for calculating the  $L$  and  $C$  values of each. Furthermore, the paper contains nine pages of reactance values for the various networks over a wide range of  $Q$  versus impedance levels. The charts are based on a 50-ohm output impedance for each network, but input impedances from 1 to 6000 ohms are listed for some of the networks. Part of the design data given in this course was extrapolated from *AN-267*.

A factor in the network-design criteria concerns the degree of selectivity desired by the builder. Although it is not mandatory that the low-level and intermediate stages of a solid-state transmitter produce pure output waveforms, it is desirable that they do. Simple networks — the  $L$  network for one — are not capable of providing high orders of harmonic rejection, and bipolar power transistors (especially Class C ones) are notorious for generating harmonic currents in the collector circuit. It is rather useless to pass such unwanted energy on to the succeeding transmitter stage. If sufficient harmonic energy is fed to the input of an amplifier, the efficiency of the stage (at the desired operating frequency) can be impaired significantly. The degradation results from the transistor being driven to its safe maximum power level before the desired power amount can be developed at the chosen operating frequency. *Unwanted energy becomes part of the driving power.* One side effect of high harmonic current in the driving signal is the possible production of *spurious energy*. The harmonics can mix with the desired energy within the amplifier and create different frequencies (e.g., 3.5

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\*\* ARRL Technical Assistant.

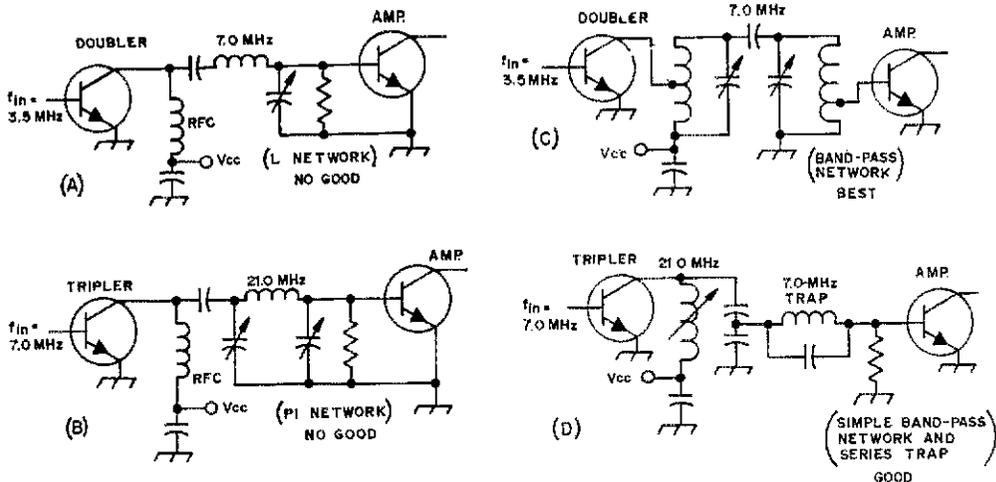


Fig. 1 — Examples are given at A and B to illustrate the wrong kind of network for use in frequency-multiplier stages. The  $L$  and  $\pi$  networks shown are low-pass circuits, thereby offering little rejection of the driving-signal applied to the input port of the multiplier. The circuits at C and D are suited to the application, however, because they are bandpass networks, and will discriminate against frequencies above and below the desired one. A 7-MHz trap is shown at D. It offers additional rejection of the unwanted 7-MHz frequency, some of which may appear at the output of the simple bandpass network used.

MHz (desired) plus second harmonic (7.0 MHz) = 10.5 MHz). Ideally, a good design assures purity of waveform (a clean sine wave) at the output of each amplifier network, consistent with the overall design capability.

Frequency-multiplier stages in a transmitter should employ bandpass networks rather than  $\pi$  or  $L$  networks (Fig. 1). The reason is that  $\pi$  and  $L$  networks are low-pass devices; they will provide no useful attenuation of the input signal at the multiplier output. A bandpass network, on the other hand, will enhance the desired output signal of a multiplier while attenuating the driving signal

and harmonics.  $\pi$  and  $L$  networks can be used for matching a bandpass network to a load, though it is seldom necessary to use that technique. If the input frequency of a multiplier is not reduced significantly at the output of such a stage, the unwanted energy appears in the drive to a following stage, and degrades the efficiency (as harmonic energy will). A good motto is, "keep it clean."

Even though the driving energy is "laundered" before it is supplied to a succeeding amplifier stage, waveform distortion usually takes place across the base-emitter junction of a power amplifier. It can be a discouraging experience to view the waveform

on a scope, only to see a grossly distorted sine wave. However, there is satisfaction in the knowledge that the stage is not being driven by energy other than that of the desired frequency.

The operating efficiencies of doublers, triplers, and quadruplers are theoretically similar to those of vacuum tubes, assuming that the operating mode is Class C . . . approximately 50, 33, and 25 percent, respectively. In practice, when using transistors harmonic energy results from the action of the junction diodes (varactor-diode action) in addition to envelope distortion. The junction capacitance changes in a nonlinear manner during the sine-wave excursion, and nonlinearity is extremely conducive to the generation of harmonic currents. Therefore, a theoretically linear amplifier

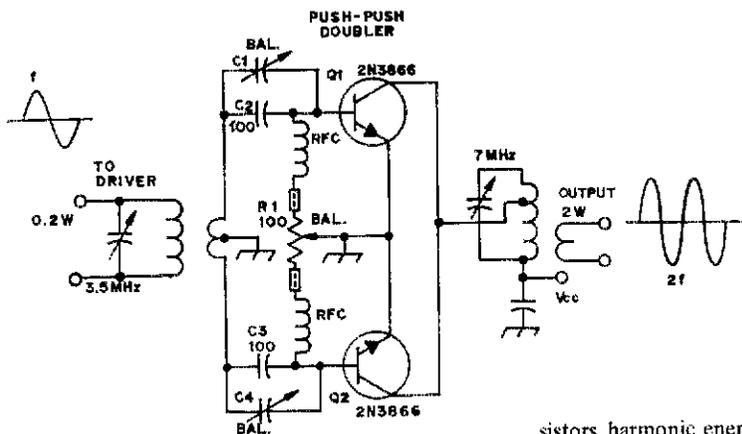


Fig. 2 — Example of a push-push transistor doubler. C1, C4 and R1 are used to effect input balance. They are adjusted to provide the purest waveform obtainable at the output of Q1-Q2. For best performance Q1 and Q2 should be as closely matched in dynamic characteristics as possible.

of the single-ended species (Class AB or Class B) can produce considerable harmonic output if transistors are used. It is for this reason that many have said, "Transistors cause more TVI than tubes do." The foregoing is correct only if sensible design measures are not taken. We might say that such a statement about TVI is simply an *untrue truism*. Push-pull doublers (Fig. 2) are nearly as efficient as amplifiers. Considerable investigation of push-pull doublers was done by Hayward (W7ZO1), and

his findings proved this to be true. Furthermore, he observed that proper electrical balance in the devices and matching networks yielded second-harmonic output that was practically devoid of the doubler input frequency.

### Some Other Networks

Since we have already discussed pi and L network design in Part III of this course, let's look at two versions of the L network, both of which are in common use by amateurs and commercial designers. Examples of those networks are given in Figs. 3 and 4. If a single L section is used between the output amplifier and antenna, it is prudent to include a harmonic filter (Fig. 4B). Some designers, in the interest of avoiding the necessity of a

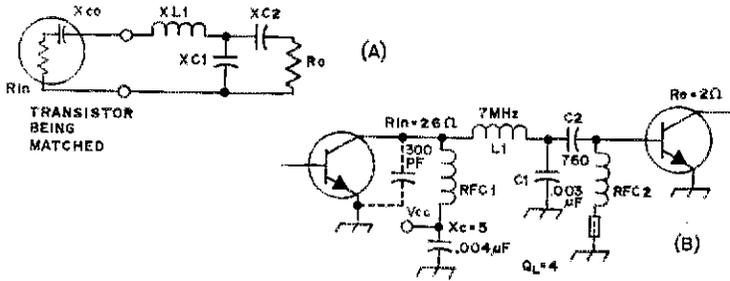


Fig. 3 - One version of an L-type resonant network. At A the electrical equivalent of the working circuit is shown. A typical circuit is shown at B, and a sample network problem is resolved by means of simple equations.

#### NETWORK 1

(A)

1- Choose a  $Q_L$

2  $X_{L1} = Q_L R_{IN} + X_{C0}$ , where  $C_0$  = transistor output capacitance.

3-  $X_{C2} = A R_O$ , where term  $A = \sqrt{\left[ \frac{R_{IN}}{R_O} \frac{Q_L^2 + 1}{R_O} \right] - 1}$

4-  $X_{C1} = \frac{B}{Q_L A}$ , where term  $B = R_{IN} (1 + Q_L^2)$

#### DESIGN EXAMPLE:

(B)

1-  $X_{L1} = 4 \times 26 + \frac{1}{2\pi f C_0} = 104 + \frac{1}{6.28 \times 7 \times .0003} = \frac{1}{.013188} = 104 + 75.82 = 180$  ohms, where  $f$  = MHz and  $C$  =  $\mu$ F.

2- Term  $A = \sqrt{\left[ \frac{442}{2} \right] - 1} = \sqrt{220} = 14.8 \therefore X_{C2} = A R_O = 14.8 \times 2 = 29.6$  ohms.

3- Term  $B = R_{IN} (1 + Q_L^2) = 26 \times 17 = 442 \therefore X_{C1} = \frac{B}{Q_L A} = \frac{442}{4 \times 14.8} = \frac{442}{59.2} = 7.46$  ohms.

4-  $L1 = \frac{X_{L1}}{2\pi f} = \frac{180}{6.28 \times 7} = \frac{180}{44} = 4.09$   $\mu$ H, where  $f$  = MHz and  $X$  = reactance.

5-  $C1 = \frac{1}{2\pi f X_{C1}} = \frac{1}{6.28 \times 7 \times 7.46} = \frac{1}{328} = .003$   $\mu$ F, where  $C$  =  $\mu$ F and  $f$  = MHz.

6-  $C2 = \frac{1}{6.28 \times 7 \times 29.6} = \frac{1}{1301} = .00076$   $\mu$ F = 760 pF.

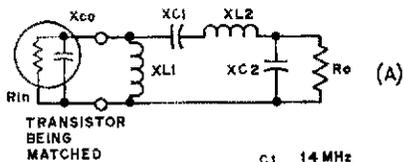
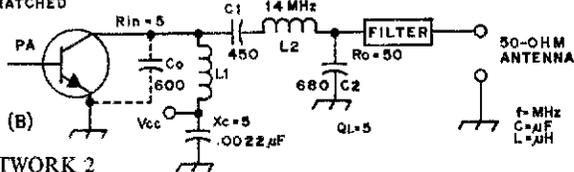


Fig. 4 - A variation of the network shown in Fig. 3. The electrical equivalent of the working circuit is given at A. A typical output network for 14 MHz is illustrated at B, along with the equations for obtaining the necessary values of  $L$  and  $C$ .



NETWORK 2

- (A) 1- Choose a  $Q_L$ .
- 2-  $X_{L1} = X_{C0}$ .
- 3-  $X_{C1} = Q_L R_{IN}$ .
- 4-  $X_{C2} = R_O \sqrt{\frac{R_{IN}}{R_O - R_{IN}}}$
- 5-  $X_{L2} = X_{C1} + \left(\frac{R_{IN} R_O}{X_{C2}}\right)$

- 3-  $X_{C1} = Q_L X_{RIN} = 5 \times 5 = 25$
- 4-  $X_{C2} = 50 \times \sqrt{\frac{5}{50-5}} = 50\sqrt{0.111} = 16.6$
- 5-  $X_{L2} = 25 + \left(\frac{5 \times 50}{16.6}\right) = 40$
- 6-  $L_1 = \frac{X_{L1}}{2\pi f} = \frac{19}{6.28 \times 14} = 0.216 \mu H$
- 7-  $C_1 = \frac{1}{2\pi f X_{C1}} = \frac{1}{6.28 \times 14 \times 25} = \frac{1}{2198} = .00045 \mu F = 450 \text{ pF}$

DESIGN EXAMPLE:

- (B) 1-  $X_{C0} = \frac{1}{2\pi f C_0} = \frac{1}{6.28 \times 14 \times .0006} = \frac{1}{.0527} = 19$
- 2-  $X_{L1} = X_{C0} = 19$

- 8-  $C_2 = \frac{1}{6.28 \times 14 \times 16.6} = \frac{1}{.00068} = 1459$   
 $.00068 \mu F = 680 \text{ pF}$
- 9-  $L_2 = \frac{40}{6.28 \times 14} = \frac{40}{88} = 0.45 \mu H$

harmonic filter, add external capacitance in parallel with  $C_0$  in the circuit of Fig. 4B. The added  $C$  helps to bypass the harmonic currents in the collector circuit, but must be included in the network equations when computing the  $L$  and  $C$  values. The technique is especially useful in minimizing vhf and uhf currents at the output of an hf-band amplifier, but imposes practical limits on the network design respective to viable  $L$  and  $C$  values.

available for transistors other than those intended for rf work. Therefore,  $C_0$  can become a troublesome "unknown" when trying to use switching or hi-fi transistors in rf circuits. Where  $C_0$  can't be found, the amateur can assume an arbitrary value of  $C$  (100 pF for hf band devices, and 25 pF for vhf power transistors). However nebulous such an approach may seem, it gives the designer a starting point for his network design. When the correct value of  $C_0$  is not known, a "sloppy network" should be employed to permit close matching of the impedances.

Network 1 of Fig. 3 is applicable when the transistor being matched exhibits a series real part of less than 50 ohms ( $R_0$ , a base-element of a transistor). In other words, Network 1 is useful for stepping down from a given value of  $R$  to some lower amount of  $R$ .

A sloppy network is one in which the  $L$  and  $C$  components are made variable over a range well above and below the design center. The values are juggled for best performance while the circuit is operating. After a matched condition is met, the builder may elect to measure the values to which each variable capacitor and inductor have been set, then substitute fixed values of  $L$  and  $C$ .

Network 2 is suitable for the opposite condition, where the transistor output  $R$  ( $R_{IN}$  of Fig. 4) is less than the load,  $R_0$ . It should be remembered that for many impedance combinations the  $T$  and  $\pi$  networks treated earlier are quite satisfactory.

A clue concerning the output  $C$  of an operating transistor (drive applied and with the device drawing its rated collector current) is that in Network 1 the reactances of  $L_1$  and  $C_0$  must be the same to assure resonance at the operating

A correct value for  $C_0$  (Figs. 3 and 4) can be obtained only from transistor data sheets, and will be different for each part of the spectrum in which the transmitter will be used. This was illustrated in Fig. 2B of Part I. The value of  $C_0$  is seldom

(Continued on page 104)

# Pip-Squeak Modifications

BY J. H. ELLISON,\* W6AOI

THE PIP-SQUEAK, described in *QST* for September 1972,<sup>1</sup> has shown considerable ability which can be enhanced by a few simple modifications. These changes are readily applicable to the pc board obtainable from Spectrum Research Laboratory and can be made either before or after the unit is assembled. Actually, the need for these changes became evident after construction and testing. Reference should be made to the schematic and pc-board layout in the original article.

The first item concerns the oscillator circuit where each crystal has its own series trimmer capacitor. With the use of high-accuracy crystals as recommended, a single trimmer may be sufficient if the crystals are connected together at the lower end. This also makes crystals interchangeable in the sockets.

The second item is of more significance. The varactor diode, CR1, rectifies the rf voltage present on the crystals and develops a dc voltage across R4. This voltage often exceeds the bias voltage established by divider R3 and R4, causing the operating point of the diode to shift to an area where the capacitance change per volt of audio is

considerably less than can be obtained with the bias voltage established by the divider. Since the developed-voltage magnitude depends on the activity of the particular crystal in use, it can also change the effect of the series capacitor. The rectified voltage developed across R3 can be reduced to an insignificant value by feeding the bias voltage from R3 and R4 through RFC1 to the diode. This change is shown in Fig. 1 and assures that the operating bias for the varactor diode is that value set by the divider.

The third item concerns the base biases of the transistors in the IC package U1. The RCA integrated-circuit manual should be referred to for the schematic for the CA3018. Probably because of manufacturing tolerances, I found it necessary to increase base biases to get optimum transistor operation and proper audio, even though resistor values first used were within less than 5% of those specified. This point should be borne in mind only in the event of unsatisfactory deviation or audio quality.

The final item concerns unwanted signal output. Because of the small number of tuned circuits employed, and because of the high gain of the transistors used, there is considerable feedthrough, in the final-stage output, of the oscillator fundamental frequency and second and third harmonics. These can be reduced considerably by a slight change in the base to ground circuit of Q2. If the high-impedance choke, RFC5, is replaced by a series-resonant circuit broadly tuned to the crystal fundamental frequency, and shunted by a low value of resistance to provide a dc return for the base, frequencies below the desired fourth harmonic are discriminated against. The revised circuit is shown in Fig. 2. Suitable values of L, C, and R are about 1.5 microhenrys, 49 picofarads and 470 ohms, respectively. It bears emphasizing that the harmonics referred to are *not* those generated in the Class C doubler and amplifier.

Incidentally, since a No. 47 pilot lamp was suggested as a tune-up load, the characteristics of this lamp may be of interest because it may be used similarly with any QRP project. They are tabulated below, for a typical No. 47 lamp.

\* 1720 Holly Ave., Menlo Park, CA 94025.

<sup>1</sup> DeMaw, "The Pip-Squeak Gets Smaller," *QST* for September, 1972.

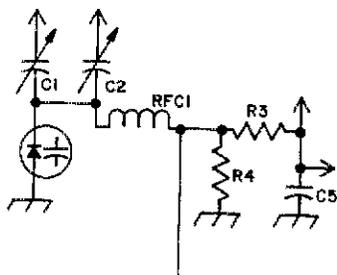


Fig. 1 — The author found that better varactor-diode performance can be obtained by placing RFC1 between the diode and the bias network. Refer to the original article for component designation.

% RATED LIGHT	VOLTAGE	CURRENT (A)	RESISTANCE (OHMS)
100	6.2	.150	41.4
60	5.5	.140	39.3
40	4.82	.130	37.1
20	4.2	.120	35.0
10	3.5	.110	31.8
4.5	3.0	.100	30.0

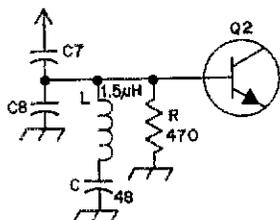


Fig. 2 — A series-resonant circuit is connected to the base of Q2 to aid in suppressing unwanted harmonics.

(The lamp will actually show color in daylight at 50 mA.) Note that at approximately the rated

current value the light level changes much faster than the resistance does, so that by using either a parallel or series carbon resistor with the lamp we can make a visual tuning indicator of nearly constant resistance for load purposes. For example, if we wish to approximate the resistance of a quarter-wave whip, a 200-ohm resistor in parallel with the lamp will result in a load which will vary from 31.2 to 34.4 ohms while the lamp brilliance varies from 40% to 100%. These characteristics are typical of tungsten-filament lamps. The same procedure can be employed with lamps of different ratings for other low-power uses by proportioning the brilliance and currents and then taking measurements of voltage and current to determine the lamp resistance.

QST



August, 1925

... Editor Warner blasts rumors that we are to lose the 160-meter band to broadcasting. That 1500-2000 kc. chunk of spectrum is most important to us, and we'll defend it to the death.

... The Chicago Radio Traffic Association is readying things for the third National Convention at the Edgewater Beach Hotel.

... John Clayton has a simple but effective two-tube plug-in-coil receiver which must have a very small tickler — else the regeneration control will also do the tuning. The bus wiring is all neatly at right angles.

... This is the heyday of radio-equipped expeditions. NRRL is on the way home, with the Navy now evaluating the superior performance of short-wave communication demonstrated by amateur Fred Schnell. WNP heads again for the Arctic with 1XAM-IQP (Reinartz) as chief op. And regular ham contact with an Amazon River expedition, avoiding weeks delay in the normal use of jungle runners, puts another feather in our cap.

... A console broadcast receiver by DeForest is the subject of this month's "recent equipment" discussion with special attention given to the loop antenna.

... For those who (like most of us) use half-wave rectification MIT's, Dr. Dellenbaugh points out the essential function of capacitors — for efficiency and regulation as much as filtering.



August, 1950

... Call letter license plates are making a quiet start — Florida, Mississippi and Louisiana now authorize ham calls on vehicle markers.

... Constantly promoting more interest in u.h.f., WIHDQ features 420-Mc. receiver and transmitter ideas to get us started. Ed says the territory is wide enough so that we won't have to adopt narrow-band techniques right away.

... OM Tilton also is the author of this issue's installment on basic operating — radiotelephony calling and working procedure is the subject with the theme "say it with words."

... Ecuador joins Canada, Chile and Peru as countries with whose amateurs we may handle third-party traffic — of the type, of course, which would not normally go by established means of communication.

... One of the worst floods ever on this continent was caused by the Red River emptying into Winnipeg, and Canadian amateurs performed outstanding service to municipal and relief agencies.

... WIJEQ seems regularly to come up with intriguing ideas for transmitter design, and this month features a two-control VFO rig with band-pass exciter — a compact job (less power supply) of 120 watts, f.m. or e.w.

... If you have one of the 4-Mc. ARC5s around, W6FPV's crystal-controlled converter will revamp it for 10-meter reception. — WRW

# RADIO DIRECTION — FINDING TECHNIQUES

BY TONY DORBUCK,\* W1YNC

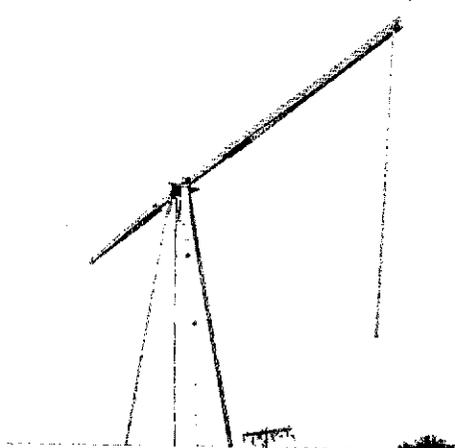
THE USE of radio for direction-finding purposes (RDF) is almost as old as its application for communications. However, the subject has been of limited interest to amateurs except for hidden transmitter hunts or by an occasional ham who was also interested in boating. Recently, less pleasant applications come to mind such as tracking down noise sources or illegal operation from unidentified stations. In addition, the ability of certain RDF types of antennas, particularly loops, to reject signals from selected directions has also been used to advantage in reducing QRM from undesired sources of interference.

The purpose of this article is to present a survey of some of the theoretical and practical aspects of the direction-finding art. Since a few of the subject areas are somewhat removed from amateur radio, they won't be dwelled upon in depth. However, a bibliography is included for those who might wish to study these areas further.

## The RDF Problem

*Best accuracy in obtaining a bearing on a desired source occurs when the propagation path is over a homogeneous terrain and when only the vertically polarized component of the ground wave is present. If a boundary exists, such as between land and water, the different conductivities and*

\* Assistant Technical Editor, *QST*.



permittivities of the two mediums under the ground wave cause bending (refraction) of the wave front. Also, reflection of rf energy from vertical objects such as mountains or buildings can add to the direct wave and cause RDF errors. These two effects are shown in Fig. 1.

Sky-wave propagation, where both vertically and horizontally polarized components are present, will also give unreliable results with simple loop antennas. This phenomenon was noted with 1f RDF systems years ago. During the daylight hours, *D*-layer absorption eliminated most of the sky wave and good bearings were obtainable. Once the *D* layer disappeared after sundown, bearings shifted, and in some cases a null was either very broad or didn't exist at all. This problem has been classified generally as "night effect" since that time.

Because sky-wave propagation is the predominant mode at hf, one might question the usefulness of loops for RDF or similar purposes in this frequency range. Generally speaking, they tend to be poor performers when compared to antenna types that are insensitive to horizontal polarization. Tilting a loop so that the loop plane is perpendicular to the angle of arrival of the wave front helps somewhat. However, there are also times when this method will not result in a sharp null.

Local objects also tend to distort the field, and a deviation chart similar to ones for magnetic compasses (Napier diagram) is usually required for a direction finder if it is to be used for navigation. In fixed locations, it is important that the RDF antenna be in the clear and away from surrounding objects such as trees, buildings, and overhead wires. It is advisable that RDF equipment be either portable or semiportable, so that it can be set up in locations where the foregoing conditions can be met.

Close-up view of the experimental Adcock antenna built by W1GQO. The tripod is made from 16-foot lengths of 1 X 3-inch pine fastened to a 1/2-inch thick plywood top plate by means of hinges.

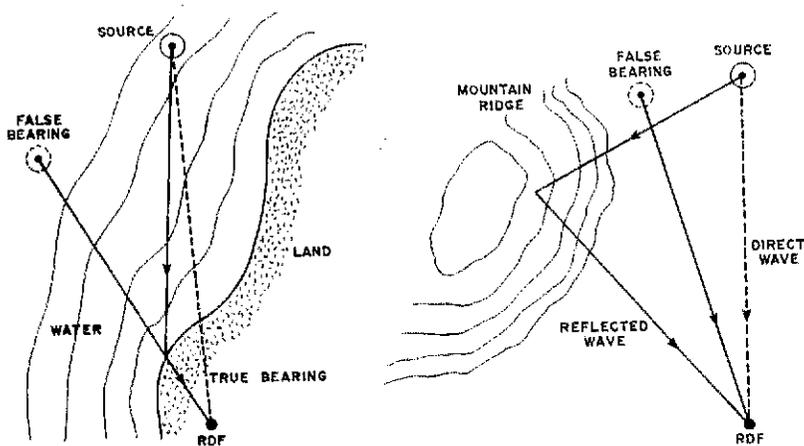


Fig. 1 — RDF errors caused by refraction and reflection.

Except for the antennas, gear for RDF is very similar to that used for ordinary communications reception. For hf-band amateur purposes, the station receiver or transceiver would be sufficient. As pointed out previously, best accuracy occurs at lf when the sky wave is absent, so most navigational aids operate in this range. Consequently, a receiver designed for RDF navigation must include lf coverage, particularly from 190 to 400 kHz. Sophisticated systems have been designed which also read out the bearing of some desired station directly. The so-called "radio compass" is an example of this type. At the other extreme, a direction finder could be simply a portable receiver which one carries around until a peak in amplitude (such as power-line noise) is located. It is desirable to incorporate some means for determining direction of signal arrival. At vhf, this could be accomplished by the use of a directional antenna such as a Yagi. At hf and below, gain antennas do not lend themselves to RDF purposes because of their large physical size. Of course, there is nothing to prevent their usefulness in fixed-station applications. For hf, a physically small antenna is used and one that has a very sharp *minimum* or null in its directional pattern. Loops and some directional arrays fall into this category. Generally speaking, the nulls on *most* antennas, including vhf types, are more suitable for RDF purposes.

### Loop-Antenna Fundamentals

Two forms of the loop antenna are shown in Fig. 2. The action of the loop when immersed in an electromagnetic field is much the same as the secondary winding on a transformer. The voltage at the output is proportional to the amount of flux passing through the coil and the number of turns. If the loop is oriented such that the greatest amount of area is presented to the magnetic field, the induced voltage will be the highest. On the

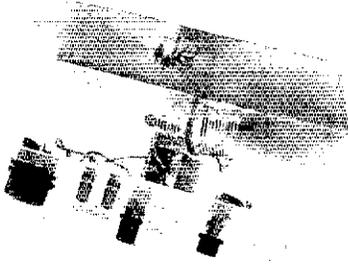
other hand, if it is rotated so that little or no area is cut by the field lines, the voltage induced in the loop will be zero and a null occurs. The directional pattern of the loop is also shown in Fig. 2.

In order to increase the output voltage of a loop, several approaches are possible. One way is to increase the number of turns or to increase the area. However, increasing the area means a larger loop. Also, the total length of wire around the circumference of the loop must be small in comparison to the wavelength of operation (approximately  $0.1\lambda$ ). This limits the number of turns that could be used with a particular loop, accordingly.

A second possibility is to increase the permeability of the medium in the vicinity of the loop. For instance, the flux in the core of a transformer is proportional to the cross-sectional area multiplied by the flux density in the core. In turn, the flux density is proportional to the product of the magnetic intensity and the *permeability*. The magnetic intensity is directly proportional to the magnetizing current in the primary of the transformer. In the case of an electromagnetic wave, there is no primary "current" as such. However, the time-changing component of the electric field associated with the traveling wave acts in this role. (This effect is sometimes referred to as *displacement current*.)

By winding a coil of wire around a form made with high-permeability material, such as a ferrite rod, a much greater flux (for a given magnetic intensity) can be obtained in the coil without the need for increasing the cross-sectional area. This is the principle behind the ferrite-rod antenna found in ordinary be sets and in some direction-finder receivers. One precaution should be kept in mind when working simultaneously with both ferrite-rod and conventional loops. Note that in Fig. 2, the

A coupler made from junk-box parts sufficed as a matching network for the Adcock antenna.



long dimension of the simple loop is oriented *parallel* to the direction of wave travel (for maximum signal), while the ferrite-rod loop has its longer length *at right angles* to the incoming wave. Consequently, a null occurs "broadside" with the former and "end-fire" with the latter. However, when the actual antenna coils are considered, the orientation of both types is the same.

While the analysis of simple loops from a magnetic-field standpoint shows their relation to ferrite-rod antennas, a somewhat different approach ties them in with certain dipole types of phased arrays. This is shown in Fig. 3. A wave front is assumed to be traveling from left to right with the electric field parallel to the side of the loop marked  $l$ . (Fig. 3A) The current in the loop,  $I_1$ , will be proportional to the product of length  $l$  and the field strength,  $E_1$ . As the wave front moves to the other side of the loop, a similar current,  $I_2$ , will be induced in the other leg as shown. Since the magnitudes of  $E_1$  and  $E_2$  will be the same, the magnitudes of  $I_1$  and  $I_2$  will be the same also. However, there will be a slight phase difference because of the time it takes for the wave to travel from one side of the loop to the other. This phase difference (in time) is equal to the distance the wave travels (dimension  $d$ ) divided by the speed of light,  $c$ .

The voltage induced in the secondary of  $T_1$ , and the resulting load current, will be proportional to the *total* primary current, which in this case will be the *difference* between  $I_1$  and  $I_2$ . If the dimension  $d$  is very small compared to the wave length of operation, this difference approaches zero since the relative phase shift between the two currents is also zero. As the phase shift increases (larger  $d$ ), complete cancellation of the current doesn't take place as shown in Fig. 3B. Notice that the resultant current ( $I_1 - I_2$ ) is zero when  $I_1$  and  $I_2$  are approximately at their maximum values. This corresponds to a 90-degree phase shift in total output current when compared to the induced current in either leg of the loop taken alone. The effect is important if the loop output is to be combined with that of another antenna such as a vertical.

If the loop is rotated so that it is broadside to the wave front, the electric fields at both legs of the loop will be exactly in phase. Consequently, the induced currents will be 180 degrees out of phase in the transformer primary and the induced voltage in the secondary will be zero. At this point, a pattern null occurs which agrees with the orientation for the same condition when magnetic coupling was considered. In other respects, the analyses of both cases lead to the same results.

So far, the effects of the upper and lower members of the loop have not been considered. If

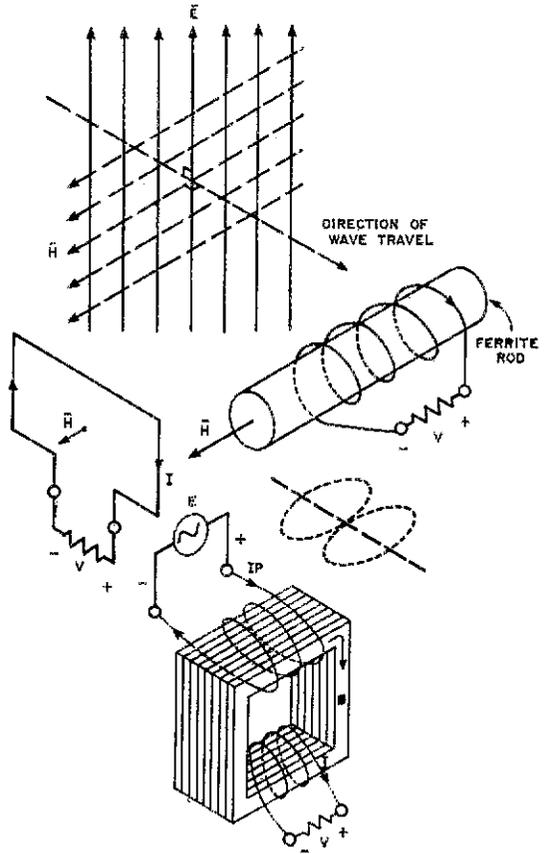


Fig. 2 - Response of a small loop to a passing electromagnetic wave and transformer equivalent

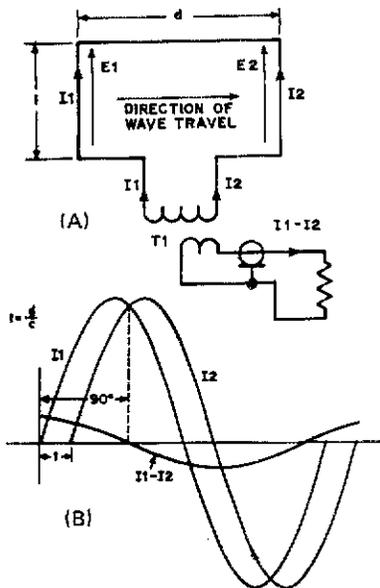


Fig. 3 - "Array" analysis of the small loop antenna.

the only component of electric field present is the vertically polarized one, no currents will be induced in the latter. However, if horizontally polarized radiation exists, such as in the case of a circularly polarized wave, currents will be induced in the upper and lower members in the same manner as they were for the vertical members. (The effect can be seen by rotating Fig. 3 by 90 degrees so that the  $E$  fields are horizontal.)

If the *vertical plane* of the loop is *parallel* to the wave front, no currents will be induced in the horizontal members regardless of the orientation of the two vertical ones (null condition for horizontal members). However, this will not be true if the loop plane is tilted to the wave front. Then the total current will consist of contributions from both the horizontal and vertical members. Consequently, the null will be either broad or non-existent, or it will appear to shift around as the propagation conditions change. As pointed out previously, the effect can be offset somewhat by tilting the loop. This is perhaps of more use in signal-rejection schemes rather than for RDF purposes.

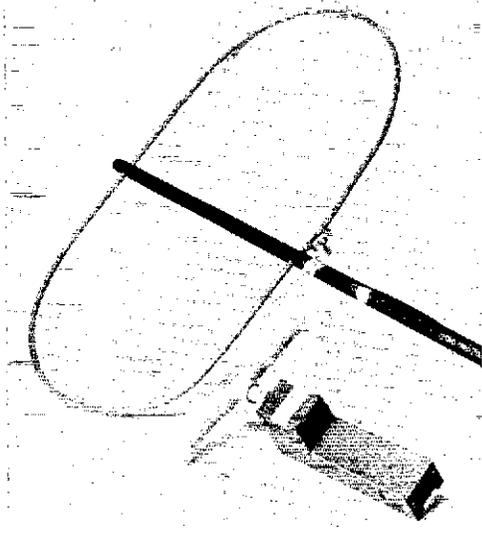
### The Sense Antenna

Since there are two nulls in the directional pattern of a loop, an ambiguity exists as to which one indicates the true direction of the station being tracked. If there is more than one receiving station taking bearings on a single transmitting station, or

if a single receiving station takes bearings on two different transmitting stations of known location, the ambiguity can be resolved easily. The point of intersection of the two bearings gives not only the true direction of the transmitting (or receiving) station, but the exact position as well. In navigational applications, some idea of the true direction is usually known from other data such as compass bearings.

However, it is sometimes desirable to have a pattern with only one null and this can be accomplished by combining the directional pattern of the loop with that from an omnidirectional antenna such as a vertical. If done properly, the result is a cardioid pattern as shown in Fig. 4A. One difficulty exists: there is a 90-degree phase shift between the output of the loop and the output of the vertical. Consequently, some form of phase-shift network is required to eliminate the phase difference between the loop and the vertical. This is shown in Fig. 4B, along with a practical circuit. The loop is resonant at a frequency higher than the greatest frequency of operation and it is coupled to the first rf stage of the receiver through T1. The combination of the loop and T1 is tuned to resonance by means of C1. Energy from the sense antenna is coupled also to the rf stage, and the level is adjusted by means of R1 until the proper cardioid pattern (or an acceptable one) is obtained. Since there is a 90-degree phase difference between the current in the primary of T1 and the voltage induced in its secondary, the need for an extra 90-degree phase-shift network is eliminated. Alternatively, both loop and sense inputs could be coupled to a common secondary through two individual primaries with a separate phase-shift network for the sense antenna. The latter method may be preferable where more complicated configurations than a single-turn loop are to be used.

Generally speaking, the sense antenna is of less importance in tracking applications than it is for



Two types of loop antennas suitable for RDF purposes. A single-turn unshielded loop is shown at the right, and a ferrite-rod model with preamp (W6VX) appears in the left of the photograph.

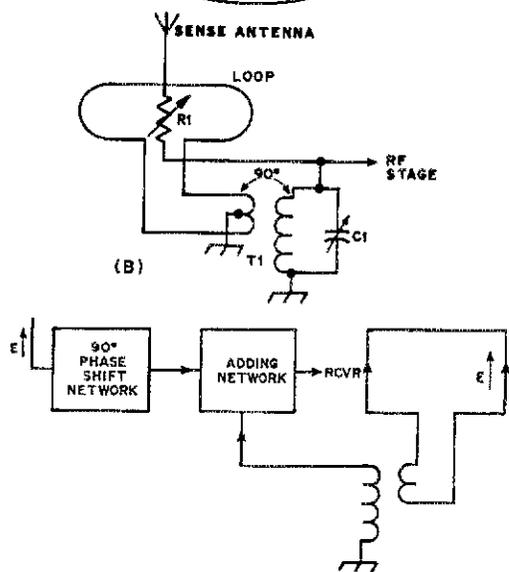
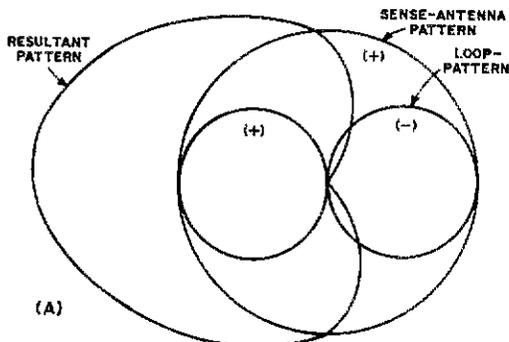


Fig. 4 — Directivity pattern of loop with sense antenna.

navigational purposes. However, the theory behind it does indicate the manner in which the directional pattern of the loop may be altered — usually from undesirable stray effects. Unless the loop is balanced carefully (or shielded), the currents in each of the members caused by the passing wave will be unequal. The unequal current distribution can be considered as a combination of a “balanced-loop” mode and an “antenna” mode. As a result, the null may be shifted or may not be very deep and the pattern becomes unsymmetrical. These effects seem to become more troublesome and hard to get rid of as the frequency of operation is increased. While there are methods of improving the null depth, an unsymmetrical pattern often results whether it is desired or not!

From the discussion on loop fundamentals, it is evident that if the loop dimensions are small in comparison to a wavelength, the difference current which produces the desired directivity pattern will be much smaller than the individual components in each leg. Consequently, making the loop dimensions as large as possible (without exceeding an outer circumference of approximately a tenth

wavelength) improves the “gain” of the desired pattern in comparison to the stray effects.

Ferrite-rod antennas also have many advantages in this respect and have largely replaced more conventional types, partly for this reason. In addition to their small size, extra “null-clearing” circuits are usually not required. An example of a model suitable for amateur RDF purposes, designed by Dave Atkins, W6VX, is shown in Figs. 5 and 6 and also in the accompanying photograph. One interesting feature of the unit is the built-in preamp which offsets somewhat the low gain of the ferrite-rod antenna.

### The Adcock Antenna

While loops are adequate in applications where only the ground wave is present, the question arises of what can be done to improve the performance of an RDF system for sky-wave reception. One type of antenna that has been used successfully for this purpose is the Adcock antenna. There are many possible variations and the basic configuration is shown in Fig. 7.

The operation of the antenna when a vertically polarized wave is present is very similar to a conventional loop. As can be seen from Fig. 7, currents  $I_1$  and  $I_2$  will be induced in the vertical members by the passing wave and the output current in the transmission line will be equal to their difference. Consequently, the directional pattern will be identical to the loop with a null broadside to the plane of the elements and with maximum gain occurring in end-fire fashion. As was the case for the loop, the magnitude of the difference current will be proportional to the spacing,  $d$ , and the length of the elements,  $l$ . Spacing and length are not critical, but somewhat more gain will occur for larger dimensions than for smaller ones. In the experimental model shown in the photograph,  $d$  was approximately 0.15 wavelength on 40 meters (21 feet) and  $l$  was 12 feet.

Response of the Adcock antenna to a horizontally polarized wave is considerably different from that of a loop, however. The currents induced in the horizontal members (dotted arrows in Fig. 7) tend to balance out regardless of the orientation of the antenna. This effect seemed to be borne out in practice, since good nulls were obtained with the experimental model under sky-wave conditions that produced only poor nulls with small loops (both conventional and ferrite-loop models). Generally speaking, the Adcock antenna seems to have very attractive properties in regard to amateur RDF applications. Unfortunately, its portability leaves something to be desired and it is more suitable to fixed or semiportable applications. While a metal support for the mast and boom could be used, wood is preferable because of its nonconducting properties. Less distortion of the pattern should result.

Since a balanced feed system is used, a coupler is required to match to the unbalanced input of the

receiver. It consists of T1 which is an air-wound coil with a two-turn link wrapped around the middle. The combination is then resonated to the operating frequency with C1. C2 and C3 are null-clearing capacitors. A low-power signal source is placed some distance from the Adcock antenna and broadside to it. C2 and C3 are then adjusted until the deepest null is obtained. The coupler can be placed on the ground below the wiring-harness junction on the boom and connected by means of a short length of 300-ohm Twin-Lead. A piece of aluminum tubing was used as a mast, but in a practical application it could be replaced with a length of PVC tubing extending to the ground. This would facilitate rotation and would provide a means of attaching a compass card for obtaining bearings.

One might wonder about the possibility of using either an Adcock antenna or a loop for

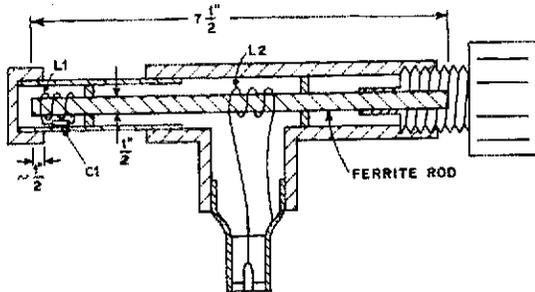


Fig. 5 - Construction of ferrite-rod antenna designed by W6VX. The body is made from PVC pipe fittings, and the ferrite-rod antenna is tuned by moving it back and forth through the coil consisting of L1 and C1. The base of the rod is cemented into the cap shown at the right.

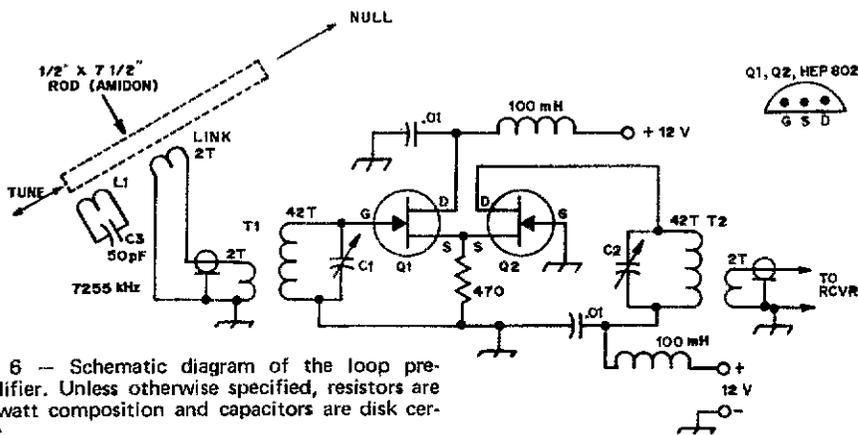


Fig. 6 - Schematic diagram of the loop pre-amplifier. Unless otherwise specified, resistors are 1/4-watt composition and capacitors are disk ceramic.

- C1, C2 - Ceramic trimmer, 8 to 50 pF.
- C3 - Corning glass capacitor, 50 pF.
- L1 - 11 turns of No. 18 enam. wire, 1/2-inch dia. (sliding fit with ferrite rod).
- L2 - 2 turns of No. 18 enam. wire.
- Q1, Q2 - HEP 802 (Motorola).

- T1, T2 - Toroidal transformer, low-impedance side 2 turns; high-impedance side, 42 turns of No. 30 enam. wire on Amidon T-68-6 core. (The cores and the ferrite rod can be obtained from Amidon Associates, 12033 Otsego St., N. Hollywood, CA 91607.)

transmitting purposes. While the small loop would still have directional properties, the radiation resistance is much lower than that of antennas of the same size (such as a dipole). However, the Adcock antenna has been used extensively for transmitting. A radio range used for aircraft landing beacons derives its directional pattern from two crossed Adcock antennas. However, the radiating elements are ground-mounted monopoles rather than dipoles. Incidentally, it is also possible to obtain the flexibility of a rotating Adcock antenna with two crossed ground-mounted ones. Instead of rotating the array, the pattern is shifted by means of a goniometer which produces the same effect. A goniometer consists of two fixed coils at right

angles to each other and with a rotatable coupling coil in the middle. While the system might have possibilities for an amateur RDF application, construction of suitable coils would be difficult.

### Practical Considerations

Possessing accurate maps and knowing how to use them is perhaps the most important aspect in any direction-finding application. Even in crude measurements, such as finding sources of line noise, a town or city map would help in plotting points where noise-amplitude readings were made. From such plots, the points where the noise amplitudes were highest would give a general idea of the location of the source. Line noise tends to

propagate along the power line and radiates as it does so. Instead of a single source, the noise seems to come from a series of sources instead. This renders ordinary direction-finding techniques ineffective in most instances and one is perhaps better off in just making an amplitude plot.

Sometimes it is advantageous to tune in and track the noise at frequencies *other* than those being used for operating. Noise energy at vhf tends to be absorbed rather quickly as it propagates along the power line, making the multisource effect less pronounced.

At the other end of the spectrum, actual radiation fields tend to diminish as the frequency of operation is lowered. However, this is not true for the so-called induction fields, or quasi-stationary fields which are independent of frequency. A loop will respond to the latter and its directional properties will be the same. For instance, the writer has obtained good nulls on neighborhood fluorescent lights with an lf direction finder. This was somewhat surprising considering the amount of house wiring, power lines, and other conducting paths in the area. Consequently, the direction of a noise source, which might be obscured by reradiation from surrounding objects at hf, could perhaps be determined more accurately by tuning it in at lf. This assumes the source is producing a strong component of magnetic field along with any electric fields.

In fixed-location RDF systems, it is advisable to attempt to correlate the bearings obtained by RDF versus the true bearing of a station as determined from a map. If a mobile unit is available, it could be used to transmit a signal from various locations around the compass until enough readings were made to ensure reasonable accuracy. The process could be simplified somewhat by taking many readings in some desired sector and fewer ones in directions of less interest. A similar process should be used if an RDF system is to be employed for navigation. RDF bearings for various orientations of the craft being tested should be checked against the true bearing as read from a chart. The error should then be plotted in tabular form, and the direction finder should *always* be used in the same location with various metallic objects (such as the hoops for a convertible canvas top!) in the same position as they were while the tests were being made. Of course, similar precautions should be taken for fixed-station applications.

Literature concerning the use of direction finders for tracking purposes is apt to be rather sparse and hard to come by. However, the same principles hold for navigational applications, and much of the information contained in texts devoted to this area can be applied directly to RDF tracking problems. Because of the foregoing reasons, the references to be cited in the bibliography have been selected for their general availability rather than their concern with the tracking aspect in particular.

**QST**

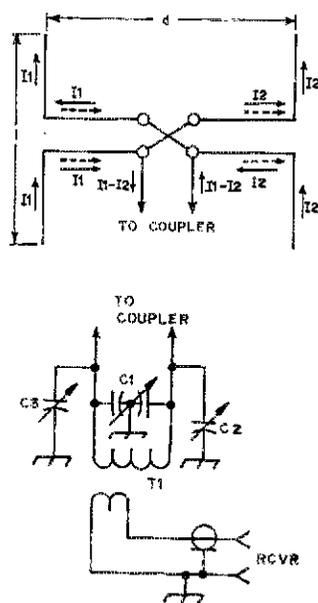


Fig. 7 - A simple Adcock Antenna and suitable coupler (see text).

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# RFI Bill

Introduced into the 94th Congress

Allegations of radio-frequency interference (RFI) have for years been a cause of concern to consumers and amateurs alike. Not without related lawsuits and violence, this so-called interference, more often than not, is due to the inadvertent interception of radio signals by otherwise well-designed home-entertainment equipment. While fewer than 1% of all alleged interference cases reported to the Federal Communications Commission (FCC) involve amateur stations, the public's image of "ham" operators is continually tarnished by the tens of thousands of alleged RFI cases related to the operations of stations in a variety of radio services.

With the number of RFI complaints submitted to the FCC now exceeding 42,000 per year, up over 20% from the number reported in 1970, demands that the FCC require manufacturers to reduce the rf susceptibility of their products have risen to fever pitch. However, for the FCC to take action requires that they have enabling legislation similar to that which gives them the right to regulate the level of incidental radiation from electrical appliances (Sec. 302 of the Communications Act of 1934, as amended). On 15 May 1975, the Honorable Charles A. Vanik, a consumer's advocate from Ohio, introduced such legislation into the 94th Congress. This bill, H.R. 7052, would amend Section 302 of the Communications Act to give the FCC the right to regulate the manufacture of audio and video home-entertainment equipment so that the susceptibility of these products to rf fields is reduced.

The bill has been referred to House Committee on Interstate and Foreign Commerce, and specifically to the Subcommittee on Communications. Here it must receive a hearing before it can be sent to the floor for a vote. You, your club, and your neighbors can voice your thoughts on the need for this legislation, and on the necessity to hold an early hearing on the bill, by writing to the Chairman of the Subcommittee:

The Honorable Torbert H. Macdonald  
Chairman  
Subcommittee on Communications  
Room B331  
Rayburn House Office Building  
U.S. States House of Representatives  
Washington, DC 20515

It is also important that you write your own representative in support of H.R. 7052. For the bill to pass into law will initially require a House vote, and it is at this point that your representative will call upon his or her constituent's comments for guidance.

There are indications that manufacturers of home-entertainment equipment have begun to fight the legislation embodied in H.R. 7052. Their arguments are that RFI cases are too few to call for such legislation, and further, that the costs for reducing the susceptibility of their equipment (which they will, of course, pass on to the consumer) are too high and may jeopardize the marketability of some products. Both arguments are fallacious! Mr. Raymond Spence, Chief Engi-

neer of the FCC, has estimated that between 50 and 70% of the home-entertainment products used today in urban and suburban areas are exposed to near-field radiation from radio installations. Further, with respect to the costs involved in susceptibility reduction, we estimate that even the inclusion of a high-quality, high-pass filter in a television receiver will cost the consumer no more than \$5, if the filter is installed at the time of manufacture.

The time is right for legislation such as that proposed by Congressman Vanik. We know that most alleged RFI cases are, in reality, due to the inadvertent interception of radio signals. We also know that the manufacturers have a responsibility to correct those deficiencies which lead to susceptibility problems, and to do so at the design stage. But does the Congress know? It will, if you write.

How about it? Have you sent your letters to the Congress? It takes just a few moments and will help to solve the RFI problem once and for all. --  
W4UMF

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It Seems...

(Continued from page 9)

would give the FCC the power to regulate the manufacture of electronic home entertainment devices to reduce the susceptibility of these devices to signals from close-proximity radio transmitters. Obviously, we would like to see this bill passed, and ARRL President Harry Dannals, W2TUK, has asked for the opportunity to testify before the Committee on Interstate and Foreign Commerce in favor of the bill.

We feel it's important that you know of the future-oriented activities in which your League is involved. Some of these activities are "behind the scenes," and perhaps we have been remiss in making the membership aware of what the League is doing to make the public aware of amateur radio. The above paragraphs present some good arguments that can be used when recruiting new members for ARRL. We hope you will use them, for they demonstrate that membership in the League is a way of supporting the future of amateur radio. When faced with the question, "What does the ARRL do to increase the public's awareness of amateur radio and to see that hams are represented before government agencies?", we hope you will say, "Plenty! . . ." - K1FHN

# Improved Wide Band I-F Responses from the Double-Balanced Mixer

BY EDWARD L. MEADE, JR.,\* KIAGB

**T**HE FOLLOWING information is in reply to several questions I have received concerning the March, 1975, *QST* article entitled, "Using the Double-Balanced Mixer in VHF Converters."

The usual application for commercially manufactured diode DBM in the dc to 500-MHz range is signal processing, and not low-noise front-end work for receivers. While the raw DBM with appropriate rf-port filtering would be adequate for local vhf receiving, weak-signal work demands a low-noise moderate-gain preamplifier. A paper by Tilton<sup>1</sup> presenting an overview of uhf diode balanced mixers and their problems in weak-signal work is recommended reading.

The term "nominal 50-ohm impedance" applied to diode DBM ports is truly a misnomer, as their reflective impedance is rarely 50 ohms  $\pm$  70 and a VSWR of 1 is almost never achieved. Mixer performance specified by the manufacturer is measured in a 50-ohm broadband system, and it is up to the designer to provide an equivalent termination to ensure that the unit will meet specifications. Appropriate matching techniques at the rf and LO ports will reduce conversion loss and low-power requirements. Complex filter synthesis can improve the i-f output match. However, if one does not have the necessary equipment to evaluate his efforts, they may be wasted. Simple, effective, easily reproduced circuitry was desired as long as the trade-offs were acceptable, and measurements indicate this to be the case.

The most critical circuit in the combined unit is the interface between mixer and i-f amplifier. It must be low-pass in nature to satisfy vhf signal component bypassing requirements at the mixer i-f port. For best mixer IMD characteristics and low conversion loss, it must present to the i-f port a nominal 50-ohm impedance at the desired frequency, and this impedance value must not be allowed to increase as i-f operation departs from midband. The impedance at the i-f amplifier end of the interface network must be in the optimum region for minimum cross-modulation and low

noise. In a paper by Trout<sup>2</sup> on rf design with MOSFETs, it is reported that a dual-gate device offers two important advantages over most bipolars. Very little, if any, power gain is sacrificed in achieving best noise figure, and both parameters (gain and NF) are relatively independent of source resistance in the optimum region. As a result, the designer has a great deal of flexibility in choosing a source impedance. In general, a 3:1 change in source resistance results in only a 1-dB change in NF. With minimum cross-modulation as a prime system consideration, this 3:1 change (reduction) in source resistance implies a 3:1 improvement in cross-modulation and total harmonic distortion.

Tests reported by Klein and Coers<sup>3</sup> on the 3N201 dual-gate MOSFET have shown device noise performance to be excellent for source impedances in the 1-k $\Omega$  to 2-k $\Omega$  region. For optimum noise and good cross-modulation performance, the nominal 50-ohm mixer i-f output impedance is stepped up to about 1500 ohms for i-f amplifier gate 1, using the familiar low-pass pi network. This is a mismatched condition for gate 1, as the device input impedance for best gain in the hf region is on the order of 10 k $\Omega$ . For this reason, network loaded- $Q$  values in the article are a bit higher than necessary, and a design for lower  $Q_L$  is preferred. Suggested modified component values are listed in Fig. 1. High-frequency attenuation is reduced somewhat, but satisfactory noise and bandwidth performance is more easily obtained. Coil-form size is the same, so no layout changes are required for the modification. Components in the interface must be of high  $Q$  and few in number to limit their noise contribution through losses. The 28-MHz values were generated by K3BR5, who measured satisfactory interface network performance over a 2-MHz bandwidth. A higher  $Q_L$  in the 28-MHz interface can be useful if one narrows the output network and covers only a few hundred kilohertz bandwidth, as is commonly done in 432-MHz weak-signal work.

Device biasing and gain control methods were chosen for simplicity and adequate performance.

<sup>1</sup> Tilton, "Hot-Carrier Diode Balanced Mixers in UHF Front Ends," *QST* for April, 1974, page 51. Technical Topics.

\* 92 Grove St., Plainville, MA 02762.

<sup>2</sup> Trout, "Small-Signal RF Design with Dual-gate MOSFETs," Motorola Application Note AN-478A.

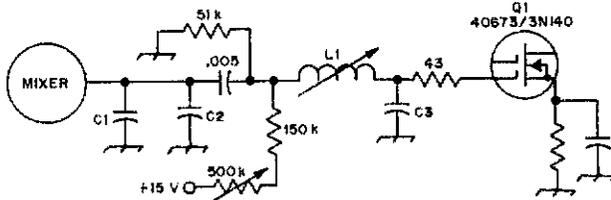
<sup>3</sup> Klein & Coers, "MOSFET FM Tuner Design," TI Application Report, CA-164, December, 1971.

Some sort of gain adjustment is desirable for drain-circuit overload protection. It is also a handy way to "set" the receiver S meter. According to Trout, the best method for gain adjustment is reduction of the gate-2 bias voltage from its initial optimum-gain bias point (greater than +4 V dc), producing a remote-cutoff characteristic (a gradual reduction in drain current with decreasing gate bias). The initial gain-reduction rate is higher with

a slight forward bias on gate 1, than for  $V_{G1S} = 0$ . Input and output circuit detuning resulting from gain reduction (Miller effect) is inconsequential as the gate-1 and drain susceptances change very little over a wide range of  $V_{G2S}$  and  $I_D$  at both choices of i-f. Best intermodulation figure for the 3N201 was obtained with a small forward bias on gate 1, and the bias-circuit modification shown in Fig. 1 may be tried, if desired.

QST

Fig. 1 — Suggested changes in the mixer-to 3N140 pi-network interface circuit, producing lower  $Q_L$  and better performance. See the original article for additional circuit details.



14 MHz

C1 — 300 pF (JFD 301).  
C2 — 51 pF S.M.  
C3 — 68 pF S.M.

L1 — 15t No. 24 enameled on 3/8-inch dia red-slug form, 1.5-2.5  $\mu$ H range, 1.95  $\mu$ H for network.

28 MHz

100 pF (JFD 101).

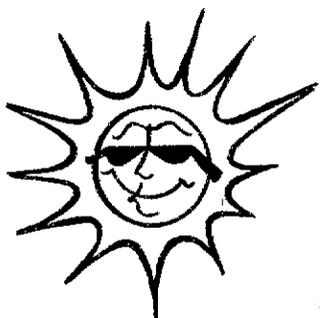
Not used  
7.5 pF S.M.  
19t No. 26 enameled on 1/4-inch dia red-slug form.

## Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

W1FSN, Robert J. Murray, Saugus, MA  
WA1FTY, William F. Faith, So. Boston, MA  
WA1IMN, Clifford W. Towner, Roylton, VT  
K1MFD, Horace L. Miles, Cromwell, CT  
W1PRR, James C. Marble, West Roxbury, MA  
WA1PVL, Morris "Murray" Hurvitz, Chestnut Hill, MA  
WA1RCO, Hans G. Rousayne, Braintree, MA  
K1UDT, Lawrence M. Wood, E. Norwalk, CT  
WA1UNM, Joseph P. Magee, Clinton, CT  
W2ANG, Alex Maybaum, Newark, NJ  
W2BW, A. Lafayette Walsh, New York, NY  
K2CAW, Harry Kaye, Roseland, NJ  
W2EUH, William Hannah, Trenton, NJ  
WA2IVZ, Dr. John J. Laurusonis, Gibbstown, NJ  
K2POH, Raymond Sauter, Sr., Amboy, NJ  
WN2YKJ, Paul D. Tucker, Baldwin, NY  
W3ACG, Thomas Patrick Dillon, Yeadon, PA  
W3DAN, Richard H. Braue, Huntingdon Valley, PA  
K3FWO, John E. Lukas, Mountaintop, PA  
W3GIUH, Kenneth G. Mattocks, Bowie, MD  
WN3PZL, C. Douglas Motley, Dover, DE  
K3WEU, Paul R. Behrmann, Philadelphia, PA  
W4FPH, Rolfe B. Hendrick, New Smyrna Beach, FL  
W4FZL, Henry Blessing, Sarasota, FL  
K4PXT, Alric E. "Red" Carr, Jacksonville, FL  
K4UU, Lauren D. Poer, Mount Pleasant, SC  
WA4YUI, Lane K. Fyler, St. Petersburg, FL  
W4ZAM, Harry A. Peters, Casselberry, FL  
W5MIO, Marion S. Muse, Kingston, OK  
W5NZP, William F. Young, Bull Shoals, AR  
W5VX, William M. Bruce, Jr., Little Rock, AK  
W5ZDU, Donald G. Bocko, San Antonio, TX  
Ex-W6ASJ, Charles L. Elvin, Piedmont, CA

WB6KBW, James Calvert Watson, Livermore, CA  
K6LG, Walter A. Hotz, Sun City, CA  
W6LYQ, Lucius F. "Pat" Preble, Corning, CA  
W6NXH, Frank C. Landefeld, Mountain View, CA  
W6OJU, William A. Peterson, Forestville, CA  
WA6ZAY, Arthur J. Johnson, Sr., Willows, CA  
Ex-W7CPL, Roy I. Miller, Sheridan, WY  
W7FHX, William L. Bach, Lakeview, OR  
WA7FUO, Leonard Byrd, Flagstaff, AZ  
W8CWV, Helen E. Taggart, Absecon, NJ  
W8DQ, Howard J. Beck, Sr., Martinsville, VA  
W8DRY, Elmer O. Shull, Cincinnati, OH  
W8FOL, Richard J. Miller, Grand Rapids, MI  
K8KRW, Charles E. Hall, Grafton, W. VA  
W8LME, William Schultz, Jr., Birmingham, MI  
WB8MGR, John H. Rosenfelder, Middletown, OH  
W8MMW, James A. Hewitt, Ypsilanti, MI  
W8NYG, William J. Koster, Huron, OH  
K8RGK, Vergil W. Underdown, Toledo, OH  
W8SDR, Murel Ballard, Battle Creek, MI  
K8UNS, David J. Raines, Livonia, MI  
W8WEE, Earl E. Gooch, Bloomingdale, OH  
W8WI, Robert S. Lohmann, Farmington, MI  
WB9CHP, Clifford J. Ritland, Whitehall, WI  
W9EH, Newell F. Stanfield, Hohart, IN  
W9EQO, Henry L. Zimmerman, Jeffersonville, IN  
W9ISH, Theodore C. Wheeler, Harrisburg, IL  
K9JSR, Roy E. Schooley, S. Holland, IL  
W9UAN, Lawrence R. Lange, Chicago, IL  
W9VLS, Cecil L. Robinson, Ashley, IL  
W9WBA, Dewey M. Darling, So. Bend, IN  
WB9FNE, Mark A. Junge, Waco, NE  
W9TIJ, Charles A. BrADBury, Sr., Denver, CO  
VE4PP, Rev. James H. Fitzgerald, Winnipeg, MB  
VE6ABC, Walter A. Blench, Edmonton, AB



# The DXer's Crystal Ball

Part II

BY EDWARD P. TILTON,\* W1HDO

**T**HE FIRST PART of this discussion dealt with effects of varying solar activity on the earth's ionosphere and magnetic field, particularly as to long-distance propagation on 21 and 28 MHz at the bottom of the sunspot cycle, now near at hand. Information given so far applies mainly to the ionospheric *F* layer, normally thought of as the principal medium for hf DX.

But DX is not always measured in miles. More often it is associated with "countries," especially areas of the world where propagation may be favorable, but ham population tends to be minimal, at best. Choice DXpedition sites are often tropical islands from which much of the world can be worked almost daily, regardless of the state of the sunspot cycle. For such idyllic locations and for some major land masses, classical *F*-layer propagation patterns are often modified by formerly unknown or little-known factors that tend to keep our higher frequencies interesting. Trans-equatorial paths have seen modified *F*-layer propagation on 52 MHz, for example, as recently as November, 1974. Optimum circuits for this mode<sup>3</sup> should have 28-MHz potential right through the bottom of any solar cycle.

Even in the higher latitudes our two highest hf bands should come alive well at times. A fine

\* Technical Department, ARRL.

<sup>3</sup> This and other footnote references are found at the end of the article.

example is the period of exceptional solar activity in October, 1974, discussed in Part I. The 2800-MHz solar flux for the period October 6 through 14 was higher than the statistical peaks of several solar cycles. The maximum reached in a cycle that peaked in 1905, for example, was 110 — a figure that can be taken from Fig. 1 or Fig. 4, since the sunspot-number equivalent is known to have been only 60. Another rise in solar activity in July, 1974<sup>4</sup> producing widespread auroral activity on the vhf bands, hit a solar-flux peak of 124, also well above the high points of several sunspot cycles.

To put our main message as simply as possible, frequencies above 14.35 MHz are not going totally dead this year, next year, or any year — unless we let them do so from lack of use. Anyone who writes 21 and 28 MHz off as useless until 1978 or so is going to miss interesting and exciting propagation events. He just might finish second — or worse — in a DX contest or two, as well.

## Working Near the *F*-Layer MUF

The maximum usable frequency (muf) can be determined approximately at any time with nothing more complicated than a general-coverage receiver of reasonable sensitivity and a random-wire antenna.<sup>4</sup> High sensitivity and antenna gain are not mandatory. High-gain antennas, in fact, may be misleading because their performance may be poor at other than the design frequency, resulting in a distorted view of the spectrum. With the BFO on, tune upward in frequency, going

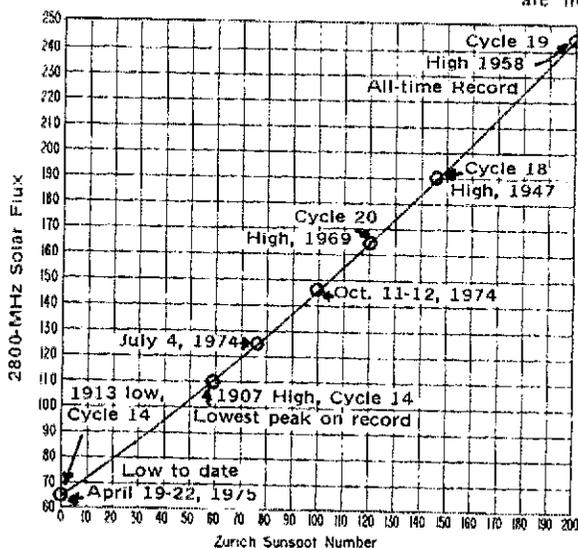


Fig. 4 — Solar-flux/sunspot-number curve of Fig. 1, with some significant highs and lows added. In a brief period in October, 1974, the solar flux reached 145, a level higher than the peaks of several solar cycles of the past. This was not far below the peak of Cycle 20, now hitting bottom, as indicated by readings of 67 in late April, 1975.

slowly when you begin to run out of signals coming in from distant points. The highest-frequency signals heard indicate the approximate muf, and their locations show the direction in which the muf is highest. This will tend to be easterly in the morning hours and westerly in the afternoon, though north-south propagation may tend to confuse this aspect of the search.

There is still code to be heard on many frequencies, and the international prefix table in any recent ARRL *Handbook* is helpful in identifying the source of such signals. Watch out for four-letter calls, which may be from ships far from home base. Some ship stations have very high harmonic content, and so may be heard on third or higher-order harmonics on occasion. Megawatt broadcasters also have harmonics at power levels that make for considerable DX at times. Music and other program material identifying the signals as those of shortwave broadcasting stations are often heard in the 10-meter band, coming from Africa. It is not unusual to hear some of these when no amateurs at all are heard on 10. They are *harmonics*, not spurious receiver responses.

Checks made at about the same time each day will show if the muf is rising or falling, and will help to identify exceptional days, both good and bad. The muf tends to be highest in the months of October, November, February and March in north-temperate zones. It will be observed to peak in the morning, local time, to the east and southeast, and in the afternoon to the west and southwest.

Though complete frequency coverage is desirable, a fair idea of the muf can be obtained simply by monitoring each progressively higher amateur band carefully, as the spectrum opens up for the day. There are many signals near the band edges, and in some of the bands, that are on the air continuously, and thus can serve as "beacons." DHJ, about 1830 kHz, is popular with the 160-meter fraternity. The 40-meter band has all-too-many such signals available. There are some good indicators just above 21.45 MHz, apparently of broadcast origin. The WWV frequencies and those of WIAW can be used at suitable distances.

Ten-meter sleuths should watch the IARU beacon frequencies between 28.15 and 28.2 MHz. DLØIGI has been heard by the writer many times before any communicating amateurs in Europe were aware that the band was open in this direction. 3B8MS, 28.19, star performer of the beacons, was heard on 26 of 28 observing days in November, 1973. It was fairly consistent in the spring and fall of 1974, and was in occasionally in the spring of 1975. GB3SX, 28.185, and 5B4CY, 28.18, were occasionals in 1974, not yet heard in 1975. VE3TEN, 28.175, is a good tip in this hemisphere, at suitable distances from Ottawa, and for sporadic-E skip at any distance over 300 miles. ZL2MHF, 28.17, recently reported running, was not heard by the writer through March. VP9BA, 28.165, a great *E*s warning signal in 1973, appears to have closed down — and is greatly missed. PY1CK, 28.16, a recent arrival, is heard well at WIHQ.

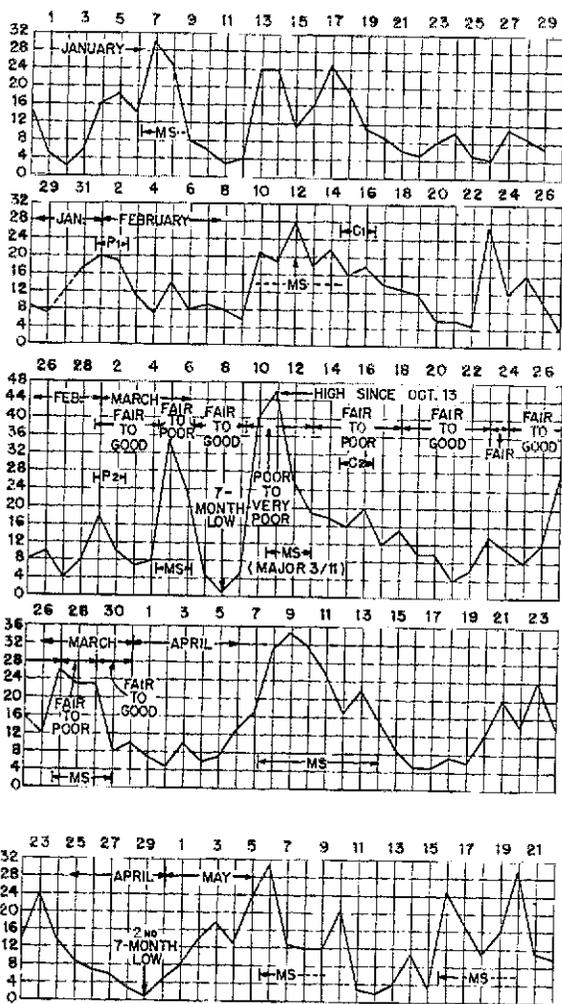
Looking for amateur beacons, WIAW, and other in-band evidence is best done with a good beam for the band in question. 3B8MS is often detected as the band opens to the east, merely by putting the receiver on 28.19 and waiting. Usually a barely audible whistle at first, it is advance warning of an African opening coming up.

Signals tend to be strong and free from the disruptive effects of selective fading, absorption, and noise on frequencies close to the muf. This accounts for much of the spectacular success with low power in DX work on 10 and 6 meters. At the peak of Cycle 19, in the late 1950s, the 6-meter band could have been excellent for world-wide communication, but for the lack of universal occupancy. Anyone who was on 6 then, or in the almost-as-good years between 1946 and 1950, will never forget such pleasures as having TVI in Europe, or listening to the babel of TV buzz, ship harmonics, and miscellaneous signals of such numbers and variety out of the east as to be almost unbelievable to anyone who did not hear it. One of the writer's favorite memories is reception of the BBC Channel 3 audio (53.25 MHz, a-m) coming through on a mobile Communicator II with "broadcast quality" as we drove in, often tardily, toward West Hartford.

The 21- and 14-MHz bands show this kind of strong-signal DX often in the low-sunspot years, particularly in the spring and fall months. When there are periods of above-normal solar activity, 28 MHz may also be very good, though the number and duration of 10-meter openings will not be great, and most will be confined to low-latitude or transequatorial paths. (See reference 3.) At times of low absorption (low K- and A-indices from WWV) the lower frequencies will also be fine for DX work, showing long skip and high signal levels.

If you were active in the period March 7 through 9, you had a view of this kind of propagation on the lower amateur frequencies. The voice of the WWV broadcaster was positively exultant when he gave the radio propagation quality on the March 9, 1300 bulletin as "Good!" The K-index had been "Zero, tending to remain the same" for several bulletins in a row, and never over 1, from 1200 March 7 through 1200 March 9. The solar flux was up a little from recent minima, running between 73 and 75, so there was some good high-latitude propagation on 21 MHz, too.

Unfortunately for DX contesters, this was the interval between the second phone and cw weekends. None of the four contest weekends (see Fig. 5) was notable for propagation conditions, but even they could have been worse. After hearing our first "good" on March 9, we heard our lowest quality reports in 6 months of listening, the next two days. "Poor-to-fair, disturbed, W4" was the order of the day the 10th, the K-index hitting a record high of 6 at 1200. The 1300 bulletin on the 11th was a pessimistic "Very poor, disturbed, W2" — the lowest assessment of conditions ever heard by the writer. Things *were* poor — the WWV voice was barely audible and repeatedly messed up by selective fading.



### Using 27-Day Recurrence Data

The writer keeps a monthly chart record of all available propagation information, which is much too dense to reproduce here. Two sheets of graph paper are pasted together to make a sheet 8-1/2 x 14 inches. The line interval is 5 mm (just over 3/16 inch). Days are two spaces wide, the long way. K-index and A-index information from WWV is plotted above a common zero line, using one square (vertically) per K unit and one-half square per A unit. These two lines cross now and then, so different colors are helpful in keeping the result readable. Occasional A-index peaks like those of March use up some two-thirds of the vertical space above the base line. The solar flux is recorded as a horizontal line in the upper portion of the graph, using one square vertically for each 5 flux units. (This general format would not work for a month like October, 1974, but it has served for all data since Dec. 1, when we settled on this condensed record.)

The WWV propagation-quality statements (example F U U5) are written vertically in the proper date-time line, using red for W or U bulletins and black for the N ones. The result, red entries over

Fig. 5 — Daily A-index information from WWV, January through May, arranged in 4-week periods instead of months to show recurrences due to solar rotation. ARRL DX Contest weekends are indicated by P1, P2 and C1, C2. Propagation conditions are those given in the WWV forecasts for the periods marked. MS indicates minor geomagnetic storm.

the peaks of the A-index "mountain range" and black over the valleys between, is no surprise but it makes a point visually. Notes on propagation observations, data on geomagnetic storms (beginning and ending times, if known), small sketches of visual sunspot observations, and any other relevant items are added at the proper date lines, using a form of shorthand which developed as we went along with this game. Sometimes we even sketch in a previous month's lines, lightly, to show recurrences more clearly. A sheet of graph paper is used to record the WWV information in numerical form, as it is first received, and this is put into the chart form later as described above.

What does all this recording and plotting accomplish? Mainly, it helps to make trends immediately obvious, and provides a quick reference for information that tends to get lost in written notes. Recurrence information, probably the most useful single factor in forecasting, practically stares you in the face. As the charts accumulate, you find your interest sharpening daily, until you can hardly wait for the next bulletin change to extend your curves. The chart form is also great for over-the-shoulder viewers — which you can count on having, as word gets around.

All this sprang from the writer's long-time casual interest in sunspot observation, but the amount of information one can draw from sunspot records, combined with observations of several other kinds, was never really apparent before our detailed records were started. The sun, being the source of all earthly life and energy, is the key to propagation forecasting. Using the backyard observing system (shown in January *QST*, page 85), and given a clear atmosphere, you'll see any significant sunspot activity, but you can't see the bright active areas called *plages*, in which sunspots

develop. These form on the sun before the spots appear and persist after the visible spots associated with them are gone.

Seeing the spots, particularly if you catch them as they first appear on the edge of the solar disk, gives advance warning of propagation events to come, and some indication of their magnitude. It also gives an indication of when to look next month, or possibly to explain gyrations in your data curves for a previous month, when there may not have been visible spot activity. Four months or more of recurrent activity is not uncommon. Such recurrences are apparent in the A-index records of Figs. 3 and 5.

The February-March sequence is a prime example, the more obvious because of the 28-day month, making March variations line up closely under those of February. What you don't know in advance is just what a given peak is going to look like this month, because the A-index information is a day or more old when you get it from WWV at 18 minutes after the hour. What put us all in the propagation forecasting business, potentially at least, was the transmission by WWV of K-index information, with expected trends, started last Nov. 22. With nothing more than the solar flux, its trend, and the K-index and its trend, all information updated four times daily, you can pretty well decide if today is the day to stick with the ham rig, or go fishing, skiing, or whatever else you may have for secondary interests. Reinforce this with 27-day recurrence data you can compile on your own, and you're about ready to take on the professionals in the forecasting business.

### Predicting the Predictions

Until fairly recently, NBS propagation forecasts for the North Atlantic path were compiled in part from data taken on actual communications circuits. This is no longer done. The forecasts are now made entirely by observation of natural phenomena and the trends they show. The old method works quite well, however, and you can use it. In listening for WWV information we soon noted marked differences in the

way the various frequencies came through, from one day to the next and from hour to hour. This led to using the ARRL Lab's Collins SIS-1, to check what all the WWV signals were *doing*, as well as what they were saying. Receiver calibration accuracy that makes listening on 5, 10, 15, 20, and 25 MHz, merely by operating the band switch, is quite an aid in this, but similar ends can be served with almost any receiver. More on this later.

The writer plays a guessing game with WWV. Before hearing the 0700 bulletin (given at 14 minutes after each hour until 1400), we check to see which WWV frequencies can be heard, and how well, usually just before the bulletin transmission at 1214 UT. If two or more frequencies (usually 5 and 10 MHz at this hour) are heard well, with little or no selective fading and distortion, the propagation quality will be fair or better, the geomagnetic field quiet, and the coded forecast N5 or N6. If only one frequency is strong enough for good copy and there is appreciable selective fading, the first term may still be "fair," but the geomagnetic-field statement will be "unsettled," "active," or "disturbed," and the coded forecast U4 or U5. If no signal is good copy, we look for "poor to fair," or worse, active geomagnetic field, and a W4 or worse forecast.

The approximate muf can be determined, at this distance from WWV, in much the same way, and the solar flux number can be guessed fairly closely from the highest WWV frequency that can be heard. On a high-flux-number day, 10 or 15 MHz will come through earlier than average, and on a low-number day, later than average. With solar flux numbers above 75, WWV-20 is heard early in the afternoon, for a short time. When the flux was running above 80 consistently last fall, the WWV-25 was often the best signal of the lot in the

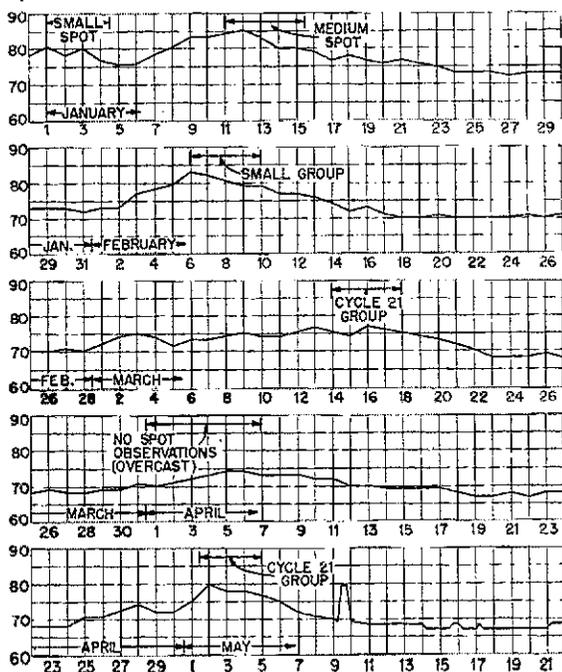


Fig. 6 — Solar-flux data from WWV, also arranged in 4-week periods. Effects of two sunspot cycles, the last vestiges of Cycle 20, and the early stirrings of Cycle 21 tend to confuse the recurrence evidence. In the trough period between two cycles, as at present, the A-index record, Fig. 5 tends to be the more useful of the two, except as an indicator of rising or falling muf.

afternoon hours. When the solar flux began running at 70 or lower in March, the 20-MHz signal was rarely heard.

Such information is soaked up by experience, and it applies only to the Newington-to-Boulder path, some 1700 miles. This is on the short side for F-layer propagation, so the actual muf will be somewhat higher for longer hauls, such as Los Angeles, on about the same beam heading. To put it another way, a higher solar flux number is needed to open the Boulder circuit than for the Los Angeles one, on a given frequency.

From observations made on a single circuit, it is easy to estimate muf for other circuits, keeping distances and great-circle bearings in mind. Great-circle paths traversing higher latitudes will have a lower muf under a given set of conditions. Those traveling lower latitudes, such as southwest instead of west, will have a higher muf. This statement is borne out by almost daily observation on 21 and 28 MHz between 1972 and 1975. The most favored direction from New England, within the United States, is to southern and western Texas, and the more southerly parts of New Mexico, Arizona and California. Typically, San Antonio, the same distance as Boulder, was heard regularly on 10 until this year, and it was common on 15, in March, 1975. Propagation to Boulder on 10 was rather rare, even two years ago, while 15 was good on this path until recently. El Paso and other areas in the same direction farther west, heard now and then on 10 in spring, 1975, were optimum circuits on 15 more often than not. The Pacific Northwest and adjacent Canada, fine areas for 10-meter work through early 1973, were rarely even heard on 15 this spring. The solar flux data show why. The mean solar flux for March, 1975, was 70.4. In March, 1974, it was just over 79. On March 23 the solar flux went below 70 for the first time in our 6-month record. It wavered between 68 and 69 the rest of the month.

How low in the cycle is a solar flux of 68? A look at Fig. 4 shows that we have almost no way to go but up, from here on! We may have already had some "up" from Cycle 21 activity. It may have been merely coincidental, but that big October weekend was preceded by the appearance of the first sunspots of Cycle 21 that this observer has seen. And the one appreciable rise in solar flux in March, 1975, came simultaneously with the passage of a Cycle 21 group of almost the same size as the group seen last October 8. A sizeable spot group seen early in May boosted the solar flux to 80, the highest in three months.

### Seasons and Modes

Throughout this discussion we've considered only F-layer propagation, this being the DX mode most affected by solar ups and downs. It should be emphasized that both seasonal and cyclical F-layer variations are most pronounced in the high-latitude and temperate zones of the world. North-south paths, and variations thereof up to 45-degree equatorial-crossing angles, are much less affected. This is the result of season reversal on opposite sides of the equator, the factor largely responsible

for spring and fall TE propagation, at and above the "normal" F-layer muf. (See reference 3.) Though low activity levels tend to blur the evidence, there is reason to believe our Latin American friends could be worked fairly regularly through the year on the higher hf bands, even at the bottom of the solar cycle.

We daresay that results in the ARRL DX Competition (February and March, 1975) will indicate that countries worked on 15 and 10 on such transequatorial paths were limited more by lack of stations than by lack of propagation, despite low solar flux numbers and relatively high geomagnetic activity in all the contest periods. For the record, here are the solar flux indices for the four weekends: Feb. 1 - 72-73; Feb. 15 - 74-72; March 1 - 70-73; March 15 - 74-77.

Some avid DXers in this area missed a fine shot at ZLs on 15, and possibly even 10, in the first hour of the second cw weekend of the DX Contest. They "knew" that 15 wouldn't be open for that kind of thing nearly three hours after sundown, so they were fighting it out on 14 MHz and lower frequencies at the start of the activity. Yet ZLs were in very well at W1HDQ, where only an end-fed 100-foot wire is used for listening on 15. We've never heard them better!

Even more of a surprise, at least to the writer, was the appearance of ZLs and VKs on 10, at least twice earlier in 1975. But all these events should not have surprised anyone; they were merely good examples of a principle enunciated earlier: *CONDITIONS AT THE HIGH END OF THE "OPEN" SPECTRUM ARE BEST AT THE ONSET OF A RISE IN GEOMAGNETIC ACTIVITY AND AS A DISTURBANCE IS BREAKING UP.* We go back to G6DH again for this, it being the writer's belief that Denis Heightman was the first to observe that the DX spectrum can "open from the top down," at such times. It definitely was no accident that G6DH was the British end of the first transatlantic vhf QSO, in 1946. He was a 10-meter pioneer 10 years earlier. (See reference 5.) George Grammer, W1DF, also was aware of the condition as a result of 10-meter schedules with ZS1H, back in the '30s.

F-layer backscatter of exceptional strength is a tip-off on 10-meter or 15-meter DX potential, even when no DX is being heard. Any two stations inside the skip zone, far enough apart so that their direct signals do not mask the backscatter, can find the direction in which a band is open best, by rotating their beams for maximum backscatter return. It may turn out that there are no land masses at the right distances in this direction, but a strong return is a sure indication that the band is open well to *somewhere*. The "King of Backscatter," W4IWZ, Nokesville, VA, has been raised by the writer with as little as 1.5 watts going into the W1HDQ antenna, aimed at the backscatter window. Harper has kept the 10-meter band alive for years, working almost solely via the backscatter route.

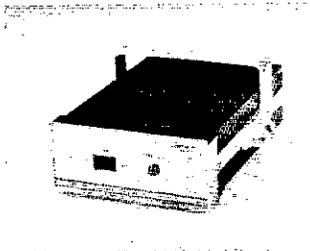
(Continued on page 88)



# Recent Equipment



To acquaint you with the technical features of current amateur gear.



## Regency AR-2 FM Power Amplifier

**I**F YOU HAVE a 2-meter fm rig of 5 to 25 watts output, this solid-state amplifier will boost the power by some 5 dB, at a total drain that will not severely tax a car battery. Thinking of what a Class AB1 vhf amplifier will do, 5 dB doesn't look very attractive, but in terms of total drain in a mobile system the overall efficiency takes on quite impressive proportions. The amplifier was tested with a Heathkit HW-202 (Recent Equipment, July, 1974, *QST*) delivering 9 watts to the AR-2, running at 13.6 volts. The measured output was 32 watts, a gain of just over 5 dB, with about 7.5 A of drain for transceiver and amplifier — a battery-watts for rf-watts efficiency of over 30 percent. Anyone remember drawing over 10 A to get 10 watts with one of the more efficient tube-type a-m transceivers of the 1950's? That's less than 8 percent on the same terms.

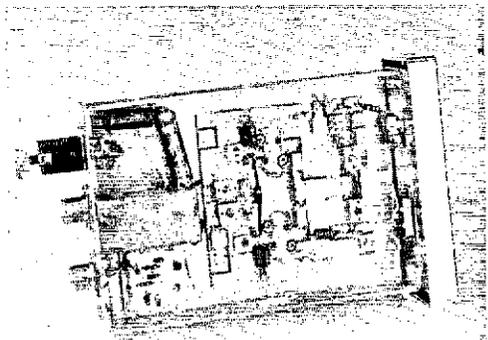
Further, battery drain with the solid-state system is directly related to the driving power used, so if your transceiver is one that offers the 2-watt or 10-watt choice, you can leave the AR-2 running and get either 5 watts or over 32 with a flip of the high-low switch on the transceiver. Total drain on "low" will be under 3 A. Then, if you want to go still lower, merely push the rocker switch on the AR-2, and the transceiver's normal output and drain will be obtained at either of its power levels. Because of the amplifier's rf-actuated switching, the receiving drain is essentially the same as that of the transceiver alone, usually well under 1 A. The amplifier output, gain, and current drain are given for various drive levels in Table I. Those below 10 watts were measured. At 10 watts

and above we took the word of the Regency manual, which is on the conservative side.

With fm, there is no linearity problem and this amplifier is certainly no "linear." Don't try to use it with an a-m or ssb rig. It is not critical as to applied voltage, the output dropping only slightly with as low as 10 volts from the supply. Check your headlight brilliance if you tend to talk for hours at maximum power — the performance of the amplifier won't warn you if the battery reserve is sagging a little!

### *Circuitry and Mechanical Details*

The amplifier uses two silicon pnp power transistors, apparently Motorola 2N6097s, rated at 40 watts output each, up to 175 MHz, using a 13-volt system. An rf-actuated switching system using two transistors and two diodes, capacitively coupled to the input line, develops the dc needed to drive a relay for switching the dc to the amplifier and the antenna between the amplifier and the transceiver input circuit. The transmitter circuit is very similar to that of a commercial fm amplifier arrangement shown in Motorola appli-



The "chassis" of the AR-2, which is also its heat sink, is 1/8-inch solid copper, bent in U shape. The small circuit board seen in the lower left is the rf-actuated means used to develop dc for operation of the switching relay.

**TABLE I**

Operating characteristics of the Regency AR-2 amplifier, running at 13.6 volts, dc.

Drive, Watts	Output, Watts	Gain, dB	Current, Amperes
2	5	4	1.8
4.5	16	5	3
7	25	5	4.7
8	28	5	4.9
9	32	5	5.2
10*	32	5	na
15*	48	5	5.5
20*	64	5	na
25*	80	5	9

\*From Regency Manual.

na - not available

ation notes for the 2N6097. Loading is by means of a series L/C circuit between the collector output tank and the switching relay.

Needless to say, an amplifier capable of handling in excess of 100 watts input at 175 MHz generates some heat. The method of handling dissipation of this in the AR-2 is a bit different from most practice in that the chassis itself is the heat sink. It is 1/8-inch solid copper, bent in a U shape, with the amplifier circuit board sitting in the U. The transistors being pnp types, the rf "ground" is isolated from the dc ground.

The case is open-ended, rectangular in shape, with clearance space between it and the edges of the back plate to allow for some circulation of air. The entire assembly is held together by the two large mounting bolts that go through the case side bars into the sides of the chassis. A simple antitheft device that mounts under one of these bolts can be seen in the photograph of the complete assembly. It is a simple U-shaped steel fixture having its top and bottom edges bent so as to fit over the case side bar and mounting bracket. The front and back edges are drilled to take the shackle of a padlock. It would not be very hard to make something like this yourself. Just the appearance of the thing, and contemplation of the time involved to jimmy it, would probably discourage most thieves, who tend

to take the easy way in removing gear from cars.

The Regency manual for the AR-2 is not exactly Shakespearean literature in quality. This old vacuum-tube man still doesn't like "power input" in place of "driving power," for example, but it tells the buyer how to use the amplifier, and what to expect from it. With an item that has only an on-off switch to operate (and even this doesn't really *have* to be turned off), what more can one ask? - *W1HDQ*

**Regency 2-Meter FM Power Amplifier,  
Model AR-2**

Dimensions (HWD) and Weight: 2-1/4 x  
5-1/2 x 8-1/4 inches, 4-1/4 pounds.

Power requirement: 12 to 14 V dc, 9 A  
max.

Power output: 5 to 80 watts, depending on  
driving power.

Frequency range: 144 to 148 MHz.

Price class: \$120.

Manufacturer: Regency Electronics, Inc.,  
7900 Pendleton Pike, Indianapolis,  
IN 46226.

## • New Apparatus

### AL'S ANTENNA'S QUICK UP SPIDER

When one contemplates the construction of a 2-element quad antenna, he usually thinks in terms of a boom and its necessary fittings for construction, items such as a boom-to-mast connector and a pair of end spiders. A number of amateurs, however, prefer to construct antennas that don't

require these particular fittings - boomless quads. This is possible with devices such as the Quick Up Spider from Al's Antenna's. No special fittings are required for construction, just worm-gear type hose clamps which can be obtained from a local hardware store or automotive parts supplier. The Quick Up Spider is rigidly constructed of 6061 aluminum. Angle joints are heliarc welded, and the welded sections are bolted together to form the complete assembly. The spider accepts mast sizes from 1-1/2 to 3 inches OD, and spreader arms from 3/4 to 2 inches OD. These spiders are available for either 0.12- or 0.15-λ element spacing (the spacing must be specified when ordering). For multiband quad arrays this type of construction offers the advantage of constant electrical spacing from band

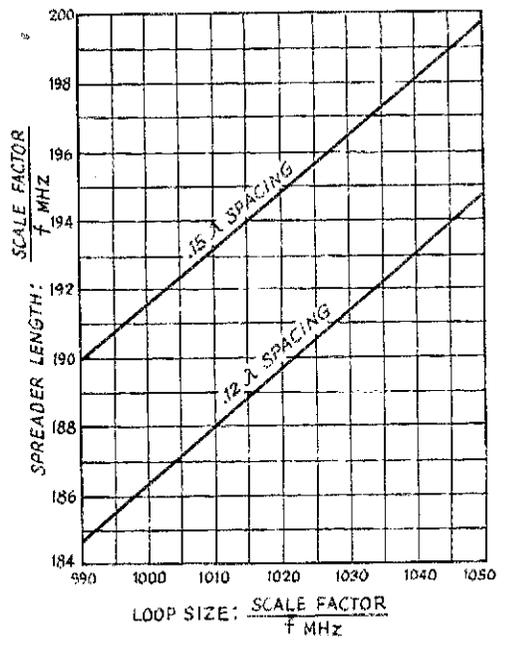
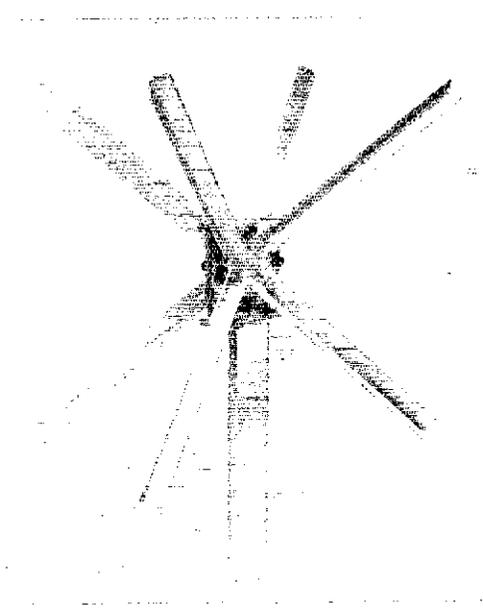


Fig. 1 — Graph for determining required spreader length, based on loop size.

to band. As a result, the driven-element feed-point impedances for each band are essentially constant, which may simplify the feed arrangement.

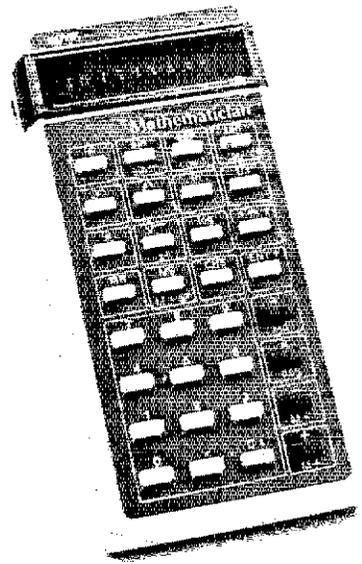
Of course the spreader arms must be longer with this type of construction than for a quad with boom having the same element dimensions. Literature included with the spider gives information on spreader lengths, but the prospective builder may find the graph of Fig. 1 to be helpful. The length in feet around the circumference of a resonant 1-λ wire loop is usually determined from the relationship  $1005/f$  (MHz). If a loop of this size is to be used with a Quick Up Spider for 0.15-λ spacing, the spreader length factor may be determined from Fig. 1 to be  $192.3/f$  (MHz). If the quad were being constructed for operation at 14.25 MHz, the

required spreader length would be  $192.3/14.25$  or 13.5 feet. Similarly, the spreader length may be determined for other loop sizes or for 0.12 λ element spacing.

Quick Up Spiders may be ordered directly from the manufacturer, AI's Antenna's, 1339 South Washington St., Kennewick, WA 99336. Price class is \$24 postpaid in the continental U.S. The spider weight is 5-1/2 pounds. Total height when assembled is 27 inches. *K1PLP*

QST ——— QST ——— QST

## NATIONAL SEMICONDUCTOR NOVUS 4510 CALCULATOR



When Art Fury, WA6JLJ, Marketing Manager of NS, handed me the Novus 4510 calculator during IEEE INTERCON-75 in New York, I did the classic "double take" upon viewing the keyboard! A cursory inspection suggested that he had placed one of the \$500-class products of another manufacturer in my hand. Certainly, most of the engineering functions needed by amateurs were available at the pushing of an appropriate button. The control panel had a certain "wholesome" look with its buttons clearly marked and spaced conveniently apart. A flip of the on-off switch caused the register to display a bright red zero and period as the LEDs illuminated. A few light touches on the numeral buttons brought the eight-digit display to the maximum information level. As we stood there admiring the product, the display flashed (20 seconds later) reducing the numbers to nine periods, or decimal points, as the automatic shut-down circuit set about reducing the battery drain. The previously displayed information was brought

(Continued on page 88)



# Hints and Kinks

## For the Experimenter



### ECONOMY POWER SUPPLY

In these days of transistorized equipment and digital logic, no workbench is complete without a power supply capable of delivering 12 and 5 volts dc with reasonably good regulation. The schematic diagram of a power supply that will answer this need is shown in Fig. 1. The circuit was derived, with suitable modifications, from power supplies that have been featured in the ARRL *Handbook*. Many of the parts needed to construct the power supply can be found in the average junk box or may be purchased from Radio Shack or a similarly stocked parts emporium.

The output current from each supply is limited to approximately 500 mA. Above this level, the output voltage drops sharply. Within the 500-mA load range, the regulation is approximately 4% as

measured from no load to full load. Not all Zener diodes provide equally good regulation, so it may be necessary to try several units or to increase the Zener-diode current-limiting resistor to obtain the indicated value of regulation. Better regulation could probably have been attained by increasing the ac input to the bridge rectifier to 18 volts. This was not done because it would increase the power dissipation in the transistors, necessitating the use of heat sinks. In its present configuration heat sinks are not required. The transistors are insulated from the chassis by the use of rubber grommets through which the mounting screws pass. With the power supply operating under full-load conditions, the power transistors do not become noticeably warm to the touch. This dual-voltage power supply has proved to be a most valuable addition to the workbench. — *Herbert L. Ley, ex-W3VYN*

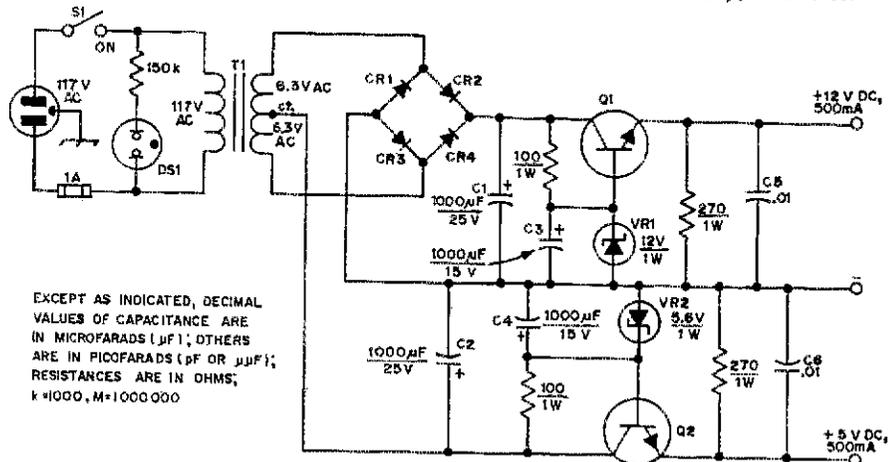


Fig. 1 — Schematic diagram of the economy power supply.

- CR1-CR4, incl. — Silicon diode, 50 PRV, 3 A.  
 DS1 — Neon indicator lamp.  
 Q1, Q2 — Npn power transistor, 40 W (Radio

- Shack 276-592 or equiv.).  
 S1 — Spst switch.  
 T1 — 117-V pri., 12.6-V ct sec., 1.2 A (Radio Shack 273-1505 or equiv.).  
 VR1 — Zener diode, 12 V, 1 W.  
 VR2 — Zener diode, 5.6 V, 1 W.

### HOMEMADE VHF TOROIDAL INDUCTORS

The self-shielding property of a toroidal-wound inductor, whether it's air-wound or contained on a toroid core of some variety, can be beneficial in circuits where unwanted interstage coupling is to be avoided. Some amateurs believe that in order to qualify as a toroidal-wound inductor the coil must be wrapped around a doughnut-shaped object made of ferrite, powdered iron, or some other material that has a mu factor. Not so, for by bringing the ends of any solenoid-type coil together (by bending the coil into a circular configuration) the ends of the inductor, each being of opposite polarity, are now in close proximity. Thus

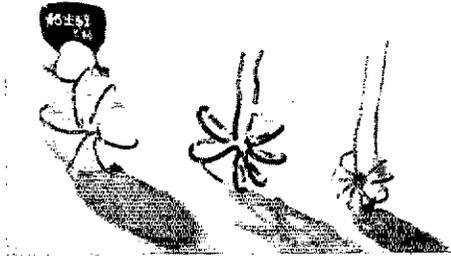
the magnetic fields are converted to closed loops within the toroidal geometry, and a self-shielding characteristic results.

By employing core materials which have specific permeability factors, the number of turns for a given value of inductance can be reduced, as can the mass of the assembly. However, one can use a variety of materials for constructing a toroid core, provided the dielectric property of the substance used is suitable for the frequency of operation.

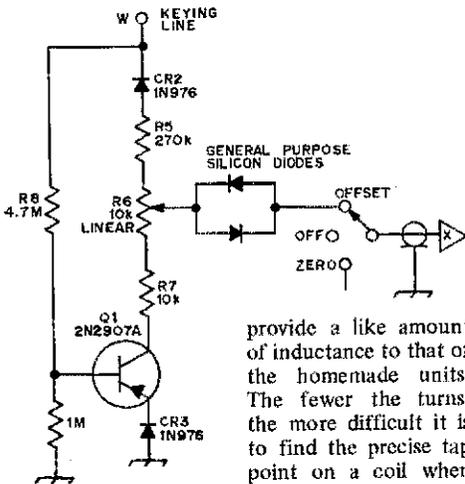
The photo shows three homemade toroidal inductors for vhf use. Each unit is wound for operation at 144 MHz (0.12 $\mu$ H), to resonate in the band with a shunt capacitance of 10 pF. The

toroid on the left is made from a slice of 1/2-inch diameter Plexiglas rod with a hole drilled in the center. The unloaded  $Q$  measured 150. The center toroid is wound on a polystyrene washer, and its measured  $Q$  checked out at 160. The smallest toroid (far right) was fashioned from a piece of 1/4-inch diameter Teflon rod. The  $Q$  measured 130.

Proof of the self-shielding properties of the inductors came when a dip meter was used to check the resonant frequencies of the coils (10-pF capacitor across the windings). No dip could be obtained, and this is characteristic of any toroidal inductor.



Test inductors were made using vhf toroid cores (ferrite) of commercial origin. Using the same  $I-C$  ratio, unloaded  $Q$ s between 70 and 90 resulted. Still pretty good, but fewer turns were needed to



provide a like amount of inductance to that of the homemade units. The fewer the turns, the more difficult it is to find the precise tap point on a coil when matching impedances. Therefore, the non-

ferramic cores may be preferred at vhf.

Those wishing to lessen the need for shielding in vhf solid-state transmitters and receivers, or to cut down on the size of the tuned circuits, may be interested in this information. — *WICER*

#### CATV TVI

This information should be of interest to any ham operating in a community or condominium complex served by cable television. After being informed that I was causing TVI on several

occasions, some investigatory work seemed necessary. The problem stemmed from the loss of continuity in the outer shield conductor on the CATV feed line from their main feeder to the subscribers' sets. In each case, the connectors joining the feed line to the main line had corroded to the point where the resistance between the feeder and the main line was on the order of 40,000 ohms. The subscribers still received reasonably good quality pictures, but ignition noise and other forms of interference were also present. The CATV people were advised of the situation and have been most cooperative in resolving the problem. — *Richard M. Purinton, WISX/4*

#### HW-101 MODIFICATION UPDATE

Several hams have reported to me after making the offset tuning and keying modifications described in March 1975 *QST*, that their transmitters had key clicks when operated in the offset mode. Although I was not aware of the problem, a close inspection of my transmitted signal revealed that I had key clicks also. The following changes were made to correct this problem. Connect a one-megohm resistor from the base of Q1 to ground. Prepare two silicon diodes by connecting them in parallel, with the anode of one diode connected to the cathode of the other. The back-to-back diodes should be connected between the wiper arm of R6 and the offset switch, S1. The circuit changes are shown in the accompanying diagram. — *Glen Carlson, W6KVD*

#### PROTECTING TRANSISTORS IN THE HW-202

Two-meter fm operates using the Heath HW-202 transceiver should be mindful that while the rf output transistor is rather tolerant of operator mistakes, the audio output stages are not so forgiving. Keep the audio output properly loaded into a speaker or earphones. You will save more transistors that way. — *Hilary McDonald, W5UNF/6*

#### LONGER LIFE FOR CIRCUIT-BOARD ETCHANT

Storing ferric-chloride etchant (the type used for etching printed-circuit boards) in a refrigerator will prolong the usefulness of the solution. Chilling the etchant causes precipitation of free copper to the bottom of the container as "mud." The clearer liquid can be poured into another vessel and the "mud" then washed out of the original container with clean water. — *W.H. Fishback, W1JE*

#### RUBBER FEET FOR EQUIPMENT

Many hobby shops stock a large supply of rubber stoppers intended for use with test tubes and flasks. They come in many sizes and are usually slightly tapered. Some have holes drilled through them lengthwise, which would facilitate mounting with sheet-metal screws. The type without holes could simply be glued to the bottom of the piece of equipment. — *Ray Bass, W7YKN*

# ★ Communications ★

## ★ Interstellar ★



BY R. P. HAVILAND,\* W3MR

**H**AMS HAVE BEEN steady contributors to radio astronomy. In fact, the first radio telescope in the world was built by an amateur, Grote Reber, in the back yard of his Chicago suburban home. Today many hams continue the work — as heads of observatories, as researchers and as technicians.

While hams continue to contribute, it is as professionals, rather than as amateurs. Partly, this is due to the size of the facilities needed and the cost of the precision required. Multi-hundred foot diameter radio telescopes, helium cooled front ends and IBM-7090 digital computers are common astronomical tools, but don't quite fit amateur capability.

Oddly, hams as a group have already missed one major astronomical discovery which they could have made, since the phenomenon is well within amateur capability. This was the discovery of radio emissions from Jupiter. These high energy pulses, similar to lightning stroke bursts, are confined to a narrow band centered on 20 MHz, and re-occur with a period of 9 hours, 55 minutes. They appear to be due to thunderstorms, with frequency filtering done by the ionosphere. There is indication that the timing of the bursts is related to the position of the Jovian satellites, just as there is indication that solar activity is related to the positions of planets.

The reason amateurs missed this discovery did not lie in equipment. The bursts are readily detectable, using typical 21 MHz installations on a

quiet night. True, the average amateur antenna installation does not give direction very accurately. But the real reasons for missing the signals seem to lie in lack of curiosity — curiosity to ask, where does this noise come from. Of course, this must be coupled with perseverance and time. But these three qualities are easy for amateurs. In fact, amateurs can outshine professionals in these. That's why so many new fields are opened by amateurs.

This article is an inquiry into some possibilities for amateur opening of another new field, that of interstellar communications. To get an idea as to the difficulty of this task, let us use an amateur EME (earth-moon-earth or "Moonbounce") station operating on 1296 MHz as a reference point. Suppose that this installation is putting out 500 watts, and that the moon has a reflectivity of seven percent. A receiver with a band width of 100 Hz, and a noise figure of about two dB, and a twenty-foot antenna for transmission and reception will be needed to make up for the path loss of about 242 dB.

For one way propagation, the standard expression for path loss can be rewritten to express distances in light-years, which are more suitable for discussing interstellar communications. This gives

$$L_{FS} = 292 + 20 \log F_{\text{MHz}} + 20 \log d_{\text{L.R.}}$$

Or, for 1296 MHz and the closest star, some 366 dB of loss. Thus, the amateur EME installation, working to a similar installation at the nearest star, would be about 74 dB below what is needed for communications. A few dB could be gained with a larger antenna and a better receiver, but it is

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evident that, if amateurs are to do any work in interstellar communications, they will have to work with very narrow bandwidths, or to search for high-power signals, or both.

High-power interstellar signals are by no means impossible. An earth type civilization would have no difficulty in generating a 5-Megawatt signal, 40 dB above the amateur installation. Thirty-five more dB of antenna gain would mean an antenna just over 1000 feet diameter, again no great problem. If a nearby civilization exists, and wishes to communicate, the signals will be within amateur detection and communication capability. There are also some other high-power signals, but let's look at these later.

Narrowing the bandwidth is the technique usually used by radio astronomers to work with weak signals. They call it integration. Commonly, two separate integrations or averagings are done, one of the receiver output when the input is connected to the antenna, and the second of the receiver output when the input is connected to a noise generator. This is a scheme of post detection filtering. With an integration time of ten hours, the noise in the receiver bandwidth is about 45 dB below that of a typical EME installation. This still would leave some 30 dB to be gained before two-way communication between two such installations were possible. This might be reached by a better front end, a larger antenna and by restricting the data rate to one dot element per day. Amateur interstellar communications will not be easy, but it is not impossible. And, of course, amateur communications within the solar system, where distances are measured in light-minutes at most, is easily within the capability of amateurs, since the one-way path loss is much less than the two-way loss of the EME Path.

However, before two way communication can be considered, signals must be detected. It seems that there are six possibilities for detection of signals, three of the signals being artificial and proof of a civilization, two being natural and possibly indicative of conditions favorable for development of a civilization, and one being a combination of artificial signal and natural effects, for which artificiality may be difficult to detect.

Specifically, these are

- Power line hum — Artificial
- Channel structure — Artificial
- Star noise — Natural
- Spherics — Natural
- Planet leakage — Mixed
- Beacons — Artificial

Let us look at the origin of these, and consider where they might be found, and what technique would be best for search.

Hum at some level is present on any ac power line operated transmitter, typically 40-60 dB below maximum output. However all transmitters operated from a single power system, or from synchronized systems, will be radiating a coherent signal, so the total hum power level can be large. Also, the signal is stable, and may be extremely stable if it is used for timekeeping, as on earth. The laws of transmission lines and ferro-magnetics indicate that the signal would be low frequency, between about 20 and 120 Hz., and probably at about 50 Hz. Detection techniques are simple: a receiver with a wide band front end, a detector and a tunable filter. Any rf frequency band should be suitable, say 500-600 MHz or so. Even bands as low as

10-50 MHz would seem possible. The integrator of the filter can have a very long time constant, of the order of hours, and can be very simple, such as the chemical integrator used on the first earth-moon-earth tests. A well-made tape recording of the receiver detector output could be used as the input to the filter, repeated to allow search at many individual frequencies.

Channelization is a powerful method of reducing interference problems, and is also a convenience. It seems likely that any civilization using the radio spectrum to any extent will find the technique necessary. Channel spacing, of course, depends on the type of signal and modulation mode, but the most likely ones would seem to be a few kilohertz, for audio, and a few MHz for video. Both values are based on the assumption that life forms have response times similar to earth forms. Techniques for detection of such channelization are the same as for power line leakage, extended in frequency. The signals should be stable, so integration times can also be long.

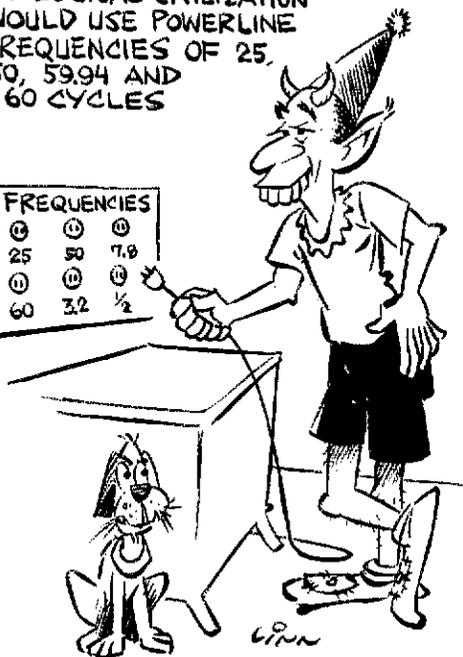
High solar noise seems to be a phenomenon of "almost variable stars", such as the sun, which show a considerable range of variation of output over part of their spectrum; for the sun the major variation is in the ultra-violet and radio bands. It is interesting here because there is reason to suspect an association with planets. Such signals have not been detected for other stars, but this may be due to the fact that the signals are likely to be cyclic, with a period on the order of tens of years. There also may be a modulation due to rotation, with a period of days to months. The optimum band for search would seem to be from about 30 to 100 MHz. The usual noise measuring techniques of radio astronomy would be used, with integration times as long as possible.

Spherics, or rf radiation from lightning strokes seems to be the signal source for Jupiter, and a potential for any planet with "weather". Detection of individual strokes does not seem likely. Instead, it appears that the best detection technique is to look for the "annual" modulation imposed on the total spherics emission from the planet by the rotation of its ionosphere in inertial space, caused by motion of the planet around its sun. Unlike a planet surface, an ionosphere keeps its maximum



**NO LOGICAL CIVILIZATION  
WOULD USE POWERLINE  
FREQUENCIES OF 25,  
50, 59.94 AND  
60 CYCLES**

FREQUENCIES		
⊕	⊕	⊕
25	50	7.9
⊕	⊕	⊕
60	3.2	$\frac{1}{2}$



the frequencies to be searched for would be on the order of cycles per day. See the table for optimum and usable bands for an earth type planet.

If a beacon of sufficient power has been established, it will be possible to detect it. Work so far has looked at the hydrogen line, with negative results. Use of the hydrogen line frequency as an indicator seems logical. However, a beacon on the exact frequency of the line seems illogical, partly because the natural signal would reduce the range of detection, partly because the resulting interference would prevent further study of the natural signals. This interference factor indicates that the beacon should not be harmonically related to the natural signal, so it should not be an exact integral multiple or sub-multiple. This immediately suggests search at the frequency of the hydrogen line divided by  $\pi$ , or at  $1420.4/3.14159$ , or around 448 MHz. Some other possibilities arise if the constant  $e$  is used, or multiples, such as  $2\pi$ ,  $e/\pi$ , etc. The ratio  $e/\pi$  gives a frequency of 1230 MHz, very close to the optimum frequency for space propagation. Search of these various possibilities seems indicated.

One of the interesting things about this list of possible signals is that so many lie in the hf range. Just about every ham can take part in the search. Of course, those with high-gain antennas, low-noise extra-stable receivers, and plentiful auxiliaries (such as tape recorders) have somewhat better chance of detection. However, the key to detection

Source	Optimum Band	Usable Band
Ionosphere Modified	15-20 MHz	8-40 MHz
Day-Night Modulated	15-20 MHz	8-40 MHz
Geography Modulated	100-300 MHz	100-10,000 MHz
Direct	500-1000 MHz	10-10,000 MHz

ionization towards the sun, so does not show daily rotation. This assumes an ionosphere, and search at a frequency between the critical frequency and the maximum usable frequency, or between about 8 and 25 MHz for an earth type planet. The technique would again be noise measurement, with very long integration time.

Artificial signal leakage from a planet should be detectable by several means. One is by ionosphere modulation, as for spherics. In fact, if total noise power is measured it would be difficult to separate natural and artificial sources. Another possibility is modulation of the total radiated power by the day-night cycle, which can show as an annual cycle to some outside observers. Still another is the daily modulation due to rotation coupled with geographic distribution of transmitters. (For earth, this produces a signal with a period of 7 hours, 58+ minutes, due to transmitter concentrations in Europe, America and Japan). There is also the possibility of direct detection of super power transmitters, of the type used for defense, radar astronomy, on wide-band interplanetary communications. The possibility of direct detection does not seem to be very good, since it is unlikely that the antenna would be aimed along the line to earth for more than a short time. The other signals should be relatively easy to detect, since they are formed of an appreciable fraction of the total power radiated in a band. The techniques would be similar to those for power line hum, except that

probably lies in a combination of luck, perseverance, and skill in signal processing. None of these require acres of antennas.

If the idea is attractive, spend some time reading up on the techniques of signal processing used by the radio astronomers. Arrange some method of integration, or filtering, say by the simple chemical integrator, or perhaps by arranging "out-of-hour" use of a computer. Pick out a target, a nearby star system if you have managed the very narrow band-widths of long integration, or a planet if the simpler filters are all you can manage. A practice session on the known signals of Jupiter or the sun might be a good idea. Then to work.

Suppose you are fortunate, and do detect some signals. What should be reported, and to whom. Probably the best procedure would be to notify the Center for Transient Phenomena, Smithsonian Astrophysical Observatory, Cambridge, Mass., giving a description of the signals, their apparent azimuth, elevation, frequency, time of occurrence, repetition pattern and so on. The purpose is two-fold: to claim credit for discovery, and to enable others to repeat and extend the work. Articles for scientific and amateur magazines and journals are another way of announcing discoveries. In fact, good articles describing techniques used and frequencies searched would be helpful even though no signals are detected.

No promises are made of success. But my, wouldn't it be interesting if . . .

QST

# Transformers Tubes Transistors

Part V-A -- Transformers and Tubes†

BY MARGARET KOERNER,\* WBØBEM

**I**N THE FIELD of sports, a good coach not only knows the physical characteristics and capabilities of his players, but also knows and understands (or attempts to know and understand) their personality characteristics as well. He needs this information in order to predict a player's performance under varying conditions, or when he has to decide how best to use a player in a particular game.

In the field of amateur radio, operators must have a comparable fund of information and understanding concerning the circuit-team members they are either working with, are hoping to recruit, or may be asked about on an FCC exam. The capabilities and personalities of these circuit-team players vary greatly, ranging all the way from the comparatively uncomplicated resistors, capacitors and inductors (discussed in previous installments) up to dual-personality transformers and finally to those complex characters, the vacuum tubes and transistors. Individual and circuit-team files on these last three players, and particularly on the last two, are voluminous and difficult to wade through. However, Novices and would-be Novices need to know something basic about each one of them and need to understand, in a beginning way, what makes them behave as they do.

So standby (QRX) for information on this important T-formation in amateur radio -- Transformers, Tubes, and Transistors.

## TRANSFORMERS

The following facts about transformers have been arranged in what is hoped is a logical sequence, and should help you understand the part transformers play in circuit games.

1. A transformer is a component consisting of two (or more) inductors or coils wound on a common core. These coils require alternating current or pulsating direct current for their operation,

\* 2133 9th Street, Boulder, CO 80302.

†Part V of a series. Previous installments appeared in the April and August, 1973, and the January and November, 1974 issues of QST.

and if subjected to a steady direct current may be transformed into uselessness and retired to the bench.

2. Although the two coils are of equal importance, one of them is called the **primary** and the other the **secondary**. The primary is connected to a source of alternating current energy such as a wall outlet; the secondary is connected to a circuit in the equipment. The main purpose of a transformer in radio work is to make changes in voltage levels, either by decreasing (stepping down) or increasing (stepping up) the amount of voltage from the primary to the secondary.

3. The coils are *electrically separated* from each other by insulation and are not connected by wires except in a few special types of transformer. However, they are *magnetically coupled* to each other by means of their **mutual inductance**. Inductance, the electrical effect of coils, was discussed in the preceding installment.

4. **Mutual inductance** in a transformer is achieved by the interaction of two coils placed within the range of each other's magnetic fields. First the primary coil, connected to the source of energy, induces an electric current in the secondary. Almost simultaneously, the secondary, prodded into activity by the induced electric current now flowing through it, creates a magnetic field of its own which spreads out and induces a voltage and resulting current in the primary. The two coils, therefore, have mutual inductance.

5. The main purpose of a transformer in amateur radio work, as was stated earlier, is to increase or decrease the amount of voltage on the secondary as compared to the primary. This change of voltage depends on the *relative number of turns* or windings on the two coils. The comparison, called the **turns ratio**, is usually stated as the number of turns on the secondary compared to the number on the primary. If the secondary has two times as many turns as the primary, the secondary to primary turns ratio would be 2:1, the secondary would have twice the voltage of the primary, and the transformer would be a step-up transformer. If the secondary has only a third as many turns as the primary, the ratio would be 1:3, the voltage a third as much on the secondary, and the transformer a step-down one.

If you know the number of turns in each coil, and know the voltage on the primary, you can figure out the voltage on the secondary by using

the following formula:  $E_s = \frac{N_s}{N_p} \times E_p$ , where  $E =$  voltage,  $N =$  number of turns,  $s =$  secondary, and  $p =$  primary.

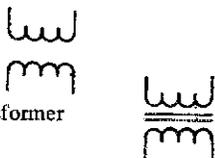
**Problem:** A transformer has a primary winding ( $N_p$ ) of 500 turns, a secondary winding ( $N_s$ ) of 1000 turns, and a primary voltage ( $E_p$ ) of 120 volts. How much voltage is there on the secondary ( $E_s$ )?

**Answer:**  $E_s = \frac{1000}{500} \times 120 = 240$  volts.

The same problem could be stated in other ways. For example, it might state that the transformer had a primary voltage of 120 volts and a 2:1 turns ratio, in which case the secondary voltage would be twice as much as the primary; or it might state that the primary had 120 volts and 500 turns, and the secondary a voltage of 240 volts. In that case, you would be asked for the number of turns on the secondary, which would be 1000 since the voltages indicate a 2:1 ratio.

Transformers usually have only one primary but may have more than one secondary. The voltage on each of these secondaries can be computed individually by using the above formula.

6. The circuit symbol for a transformer indicates the coils and their core material. The symbol for an air core transformer is



for an iron core transformer

The coils are usually mounted on a common core — either side by side, one on top of the other, or elsewhere on the core. They are separated by insulation on their wires and additional insulation between the coils.

7. Transformers are used in a variety of places in amateur radio equipment and vary greatly in size, weight, and type of construction. Transformers for power supplies (including filament transformers) are the heavyweights on any circuit team, a fact not always evident from their appearance. The "power supply" in amateur radio work usually refers to a section of the rig in which the transformer changes the incoming house voltage to voltages needed for the various circuits, and a rectifier and filter change the alternating current to direct current so it can be utilized properly in the equipment. Other transformers used in rigs include audio transformers and radio frequency transformers.

Enough on transformers. Let's change frequency (QSY) now and tune in on vacuum tubes. **VACUUM TUBES**

In many ways, the history of vacuum tubes is also a history of radio. For over fifty years — from 1907, when Lee DeForest patented a tube called a triode, and up to the time when transistors began their meteoric rise to fame — tubes were the star

players on almost all radio circuit teams. Recorded in their history we can find long lists of contributions which tubes have made to the radio art; we can trace the genealogy of the Tube Family through many generations, and can read biographies of men like DeForest who developed the potential of various tube types.

In private conversations, radio QSOs, and in print, vacuum tubes have been and still are a favorite subject of discussion by radio amateurs. For the most part, tube performance has been greatly praised, but it has also been blamed, sometimes in words which — if used on the air — would violate Section 97.110 of FCC Regulations. The most recent comment concerning them (a strange one, heard only a week ago), stated that tubes in general are more forgiving than transistors.

In this section we will look at tubes very briefly, but books and periodicals containing extensive files are available to everyone, and information here is expected to serve only as a launching pad from which you can take off. We'll start with an over-all description in verse form, sort of an ode to the "odes" (and in QST, yet!).

Diodes, triodes, tetrodes, pentodes,  
Cathodes, grids and anodes,  
Modulate, generate  
Oscillate, regulate,  
Rectify, amplify, detect  
Currents, voltages, carriers and sigs  
In rigs.

### Physical Description

Vacuum tubes are sealed electronic components which have electrical parts put into them and air pumped out of them. They have glass or metal covers, and illustrations of tube types can be seen in handbooks, textbooks, commercial catalogues and ads.

Each tube contains at least two electronic "working" parts called **electrodes**: a cathode, which emits electrons, and a plate or anode which collects them. There may also be one or more additional electrodes called grids, which, according to their particular kind, control, screen, or suppress the electrons on their journey from cathode to plate. The tubes themselves are called **diodes, triodes, tetrodes, and pentodes**, depending on whether they contain two, three, four or five electrodes. Tubes containing more than three electrodes (some specialty types have as many as seven) are called **multi-electrode tubes**. **Multi-unit** tubes may have two or more complete tubes within a single cover.

Each electrode is part of an electric circuit which bears its name (plate circuit, grid circuit, etc.) and each one has conducting wires which usually exit through "pins" at the bottom of the tube or exit from the top of the tube into a metal cap. Each circuit, in turn, contains a source of energy from which operating currents start out and to which they return. This source may be a battery, a generator, or any other source of electrical energy. In general, and largely for the sake of convenience, each circuit is connected to a

common point or common conductor called **ground** – usually the **chassis** or metal plate on which the various components are mounted. It is also common practice to have the chassis connected to **earth ground**. This connection is made for safety reasons and at times for proper equipment operation. There are two symbols for ground:



However, there seems to be a difference of opinion as to which one refers to chassis and which to earth. A.R.R.L uses



for chassis ground, but there are other sources which use



so watch it and check the publication's list of symbols.

### The Electrodes

1. **Cathode.** A cathode can be defined as a vacuum-tube element whose chief purpose is to emit electrons. The cathode of a *directly-heated* cathode tube is a special wire or filament usually made of tungsten, thorium and tungsten combined, or nickel with an oxide coating. When an electric current, alternating or direct, runs through this wire, the wire gets hot and emits electrons. If it gets *too* hot, it will burn out like electric light bulbs eventually do. An *indirectly-heated* cathode tube contains a metal cylinder or "sleeve" with a heater wire inside of it but electrically separated from it. This cathode sleeve is coated with chemicals that emit great quantities of electrons when heated by radiation from the heater wire. Circuit symbol for heater or filament



for indirectly heated cathode



Because radio tubes use heat for the emission of electrons, they are called thermionic tubes – the word **thermal** meaning heat. Under operating conditions, the electrons, having been emitted by the cathode in a cloud of electrons called a **space charge**, head for another electrode, the plate. Whether they get there or not is another matter.

2. **Plate.** The plate (anode) of a vacuum tube has the assigned job of pulling toward itself the electrons emitted by the cathode. By so doing, it causes **current** to flow, and this **plate current** plays one of the most important roles in radio transmitting and receiving.

To exert the necessary pull, a plate needs outside help, and this help is obtained by connecting the plate to the positive terminal of a source of dc power while *at the same time* the cathode is connected to the negative terminal of the source. Such a connection creates a *difference of potential* between the plate and cathode, and puts what we refer to as a **positive charge** (technically a *positive potential*) on the plate. It also puts us at the beginning of a long rough detour.

DETOUR →

The detour caused by the mention of "differ-

ence of potential" and "positive charge" is one we've been trying to avoid but one we'll have to take if we are to get even close to where we want to go. So slow down (QRS), be prepared to stop (QRT) and above all, watch the signs along the way. They will be marked either + or –.

In electronics the words positive and negative appear repeatedly. Theory says that atoms contain electrons, particles of electricity which exert an influence referred to as a **negative charge** (–). An accumulation of electrons *at a particular point* can give that point a negative charge; a deficiency of electrons can give that point a positive charge (+). Good conductors such as copper can easily lose electrons from their atoms, and these freed electrons either move into nearby ions (atoms which have lost electrons or gained extra ones) or else flow along the conductor as a current. (See "Current" *Theories of Electricity*, January, 1974 QST.)

Electrons have the "potential" for accomplishing work. If one point has a greater electrical potential than another (due to a larger number of electrons gathered there but unable to escape) a **difference of potential** – also called **voltage**, **electromotive force** or **EMF** – is developed between the two points. If the two points are then connected by wire (instead of being insulated from each other) this voltage or force results in a current of electrons flowing from the point having more electrons and therefore greater electric pressure, to the point having fewer electrons and less electric pressure. The objective of the electrons during all this moving process is purely socialistic; they are determined to even things out.

On circuit diagrams, the positive and negative terminals (which we can think of as pulling and pushing points) of dc sources are indicated by + and – symbols. The short line on a battery symbol is the negative side; the long line, the positive side.



The flow of **electron current** in circuits is always from a *comparatively* negative point with an excess of electrons to a *comparatively* positive point with a deficiency of electrons. It is a relative or comparative deal, *one point always being considered with respect to another*. (Note: If you have trouble remembering which is which as far as positive and negative are concerned, remember that "positive" and "poor" both begin with the letter p, and that positive points, though not necessarily destitute, are poor in electrons compared with their more affluent neighbors.)

END DETOUR

Back on the highway, with the detour behind us, we can say – and hopefully have it mean something – that the pulling or collecting power of the plate is achieved by a positive charge from a dc power source. As a result of the pulling and pushing action of this dc source, electrons get pulled to the plate and pulled off of the plate, thus creating the plate current. The plate is *positive* with respect to the cathode (that is, it has fewer electrons than the cathode, which – pushed or

(Continued on page 74)

# ARRL National Convention 1975

BY EDWIN DALLAS KENNEDY,\* W3GPI

**T**HE TWENTY FIRST ARRL National Convention will be held this year in the Washington, D.C. area during the period September 12 through 14.

The role of public service by amateur radio is thematic to this convention. Another aspect will be stressed during an ARRL Technical Symposium, one very germane to amateur operations in the mid '70s: *Radio Frequency Interference - Reaching For Improvement*. This symposium will be devoted entirely to papers on RFI and electromagnetic compatibility (EMC). All technical programs promise to be state-of-the-art. In general, the weekend is intended to serve the interests of all amateurs and will insure a diverting time for the ladies as well.

Honored guests and speakers at the Saturday night banquet will include Commissioner Robert E. Lee of the Federal Communications Commission; keynote speaker Major General Robert E. Sadler, Director, Communications-Electronics, Organization of the Joint Chiefs of Staff; and Astronaut Dr. Owen K. Garriott, W5LFL, Deputy Director, Science and Applications, NASA.

The convention will encompass numerous technical forums and symposia; meetings conducted by AMRAD, AMSAT, FCC/WARC, MARCO, MARS,

\* 4806 Harvard Road, College Park, Maryland 20740.



QCWA, WAYLARCS, and others; luncheons, banquets, and receptions; entertaining programs for the ladies; and a variety of other functions including the nerve-rattling Wouff-Hong Ceremony at the witching hour of midnight on Saturday (local time).

This diversified schedule begins with pre-convention activities on Thursday and extends through Sunday afternoon. The rendezvous is set in the beautiful foothills of the Blue Ridge Mountains at the International Conference Center of the Sheraton Inn at Reston, VA, a suburb of Washington, DC adjacent to Dulles International Airport.

The complete roster of weekend speakers comprises a list of those whose empathy for amateur radio runs deep, activists who have made significant contributions not only to the amateur effort but to the science of electronics as well.

The 1975 ARRL National Convention is sponsored by the Northern Virginia Amateur Radio Council (NOVARC) with the cooperation of the Foundation for Amateur Radio (FAR).

## Pre-Convention Activities

The first two days of the weekend - Thursday and Friday will be devoted to pre-convention activities, including meetings, forums and symposia, and other programs.

### Thursday

At least two meetings will be convened on Thursday prior to the convention proper.

**QCWA DIRECTORS MEETING** - The Quarter Century Wireless Association will hold its annual Directors Meeting. Frank A. Gunther, W2ALS, will chair.

**MARCO DIRECTORS MEETING** - Outgoing President Dr. Walter Shriner, W9CBG, will preside over a Directors Meeting of the Medical Amateur Radio Council when matters relating to internal affairs, policy, and next year's program will be considered. In addition, guidelines will be discussed regarding meetings, communications, and logistics for the next two years. President-elect of MARCO is Dr. J. Charles Jordan, K4IEP.

### Friday

A second day of pre-convention functions on Friday will include meetings, symposia, luncheons, and other activities.

Dr. Owen K. Garriott, W5LFL, Astronaut.



Commissioner Robert E. Lee, Senior Member, FCC.



Major General Robert E. Sadler, U.S. Air Force.

**FCC/WARC '79 FULL COMMITTEE MEETING** - There will be an FCC/WARC Full Committee Meeting chaired by A. Prose Walker, W4BW, Chief, Amateur and Citizens Division, FCC. This meeting will be devoted solely to the complex preparations relating to the 1979 World Administrative Radio Conference. Mr. Walker will make a progress report at the convention during the weekend.

**MARCO OPEN MEETING** - A fellowship breakfast will begin the MARCO open membership meeting early Friday morning. Discussion will consider the integration of MARCO with other network operations such as the International Mission Radio Association (IMRA) and handling emergency traffic, particularly in terms of procurement and transportation of medication, relations with customs officials, the International Red Cross, and airline formalities.

**QCWA OPEN MEETING** - On Friday morning, QCWA will hold its annual membership meeting when newly elected National officers will be introduced. The Board of Directors Meeting held on September 11 will be reported on. The floor will be thrown open to the membership for discussion and a question-and-answer period.

**ARRL RFI TECHNICAL SYMPOSIUM** - The ARRL Technical Symposium will be held Friday afternoon with John B. Johnston, K3BNS, of the FCC moderating. Speakers to address this session will include W. Brendan Harrington, Legislative Assistant to The Honorable Charles A. Vanik of the Congress. Mr. Harrington will talk on "RFI and the Congress," a progress report emphasizing and updating the nature of this problem for members of the legislature. William E. Cory, President of the IEEE EMC Group will describe its activities regarding EMC. Harold R. Richman, W4CIZ, Technical Advisor to the ARRL RFI Task Group, will offer "A Survey of Manufacturers Who Produce Electronic Home-Entertainment Devices." There will be three papers presented on several aspects of "RFI Susceptibility Tests" in terms of various kinds of electronic equipment with emphasis on

home-entertainment products. Contributors will include Doug DeMaw, W1CER, Technical Editor of *QST*; Donald R. Gerue, K6YX of the Santa Barbara Electronic Interference Assistance Committee; and a representative of the Amateur Research and Development Association (AMRAD). Frank L. Rose, W3RO/W3OWU, Chief, Technical Standards Branch, Office of the Chief Engineer, FCC, will speak on "The Regulatory View of RFI and EMC." In addition, Egbert M. Tingley, K4FKX, Staff Engineer with the Electronic Industries Association will speak on "Minimizing Interference Susceptibility of Consumer Electronic Entertainment Products." All in all, this symposium ensures a thorough coverage on a subject of vital concern to the amateur.

**ARRL TECHNICAL SYMPOSIUM, GENERAL SESSION** - An ARRL General Technical Symposium will convene Friday evening under the moderation of Doug DeMaw. James R. Fisk, W1DTY, will speak on "Practical Design Techniques for Helical Resonators." Discussing "Short Range Propagation Predictions" will be George F. Jacobs, W3ASK. "Information Processing Techniques to Increase the Effective Capacity of Programmable Memory Keyers" will be presented by Howard F. Batie, W7BBX/4. Included in this evening session will be John R. True, W4OQ, who will offer "Universal Shunt Feed for Amateur Towers." Also, D. J. Healey III, W3PG, will speak on "Frequency Synthesizers for VHF Amateur Service." The symposium will include other papers to be announced in the final program.

**QCWA LUNCHEON** - The Quarter Century Wireless Association will hold a luncheon on Friday when there will be a presentation of Golden Anniversary awards for those licensed more than 50 years, as well as other awards and certificates.

**MARCO DIRECTORS LUNCHEON** - A Directors luncheon will be sponsored by MARCO. Featured speaker will be Dr. Walter A. Shriner, W9CBG, whose topic will be "The Freedom of Constitutional Rights." This paper will concern international communications, in the light of rights

guaranteed American citizens, *vis-a-vis* the privileges afforded other nationals.

**MARCO SCIENTIFIC SESSION** - On Friday afternoon, the MARCO Scientific Session will take place with Dr. Christine Haycock, WB2YBA, President of the Young Ladies Radio League, speaking on "The Flying Doctors Service in Australia." Drs. Donald Ore, WB9CMT, and Walter Shriner, W9CBG, will jointly discuss "Ambient and Iatrogenic Cardiac Pacemaker Interference." Dr. Ted Cohen, W4UMF, secretary of the ARRL RFI Task Group will give a presentation on the current status of RFI. A panel of suppliers will discuss the interference problems inherent to telemetry in emergency service, both mobile and base. The scientific session will also include a paper by Dr. William D. Harms, XE3JE/HR1, on "Medical Care and Amateur Radio in Remote Areas."

**MARCO RECEPTION AND BANQUET** - Friday evening, MARCO will hold an open reception and cocktail party for its membership and those guests who are to be singularly honored. Following the reception, there will be an open banquet for the MARCO membership. The featured speaker will be Dr. J. Stanley Carp, K1EEG, whose topic will be "China and Its Environment." He will discuss his 1975 trip through China in terms of both medicine and communications. There will be a presentation of awards.

**QCWA VARIETY PROGRAM** - Also, QCWA will present a variety program. Featured will be Ed Redington, W4ZM, who will demonstrate spark-gap operation with his very authentic replica. Other entertainment is planned.

#### Ladies Weekend Program

Before going into the events of Saturday and Sunday, in general, it is appropriate to describe the activities scheduled for those ladies who are not active hams - with no restrictions, however - arranged by Rita Des Roches, XYL of Joe Des Roches, W4WKT. It promises to be a busy weekend.

**COSMETIC SHOW & DIET WORKSHOP** - On Friday evening, a cosmetic show will be held, lasting one hour. A representative of the Estee Cosmetic Company will speak. A diet workshop will follow, conducted by a Washington, DC

authority, which will include a 20-minute slide show and a question-and-answer period.

**KOFFEE KLATCH AND FLOWERS** - On Saturday morning, a coffee klatch will be the occasion for a general meeting of the ladies for chatting and getting acquainted. "Taming the Wilderness," a slide show, will be put on by a local florist. He will also speak on the care and feeding of house plants and flowers; a question-and-answer period will follow.

**LADIES LUNCHEON** - Kay Anderson, W8DUV, will be the featured speaker at a special luncheon for the ladies on Saturday. Kay is a very versatile personality who squeezes life for all it's worth. She will give her hilarious talk called "Forty Hours A Day," a laugh-in account of the role she plays as housewife, mother, and active amateur.

**FASHION SHOW** - Also, on Saturday afternoon, a fashion show will be given by Bee Line Fashions of Washington, DC. A complete wardrobe of ladies apparel will be featured.

#### Saturday

Saturday will be given over to numerous forums, a WAYLARCS meeting, and that big event of the weekend, the banquet.

**ARPSC FORUM, 1ST SECTION** - Harry Daniels, W2TUK, President of the ARRL will be the honored speaker when the Amateur Radio Public Service Corps (ARPSC) convenes its first section of a special program on Saturday morning. Harry's subject will be "Amateur Radio Today and Tomorrow; Its Foundation Rests on Its Service Aspects." This speech will be followed by one by Don Waters, Public Relations Consultant to the League, on the subject of "Public Relations Aspects of Emergency Activities."

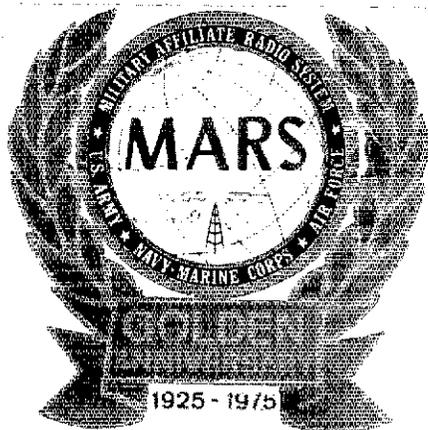
**DX FORUM, 1ST SECTION** - On Saturday morning, the National Capitol DX Association (NCDXA) will present its first section of a two-part DX forum moderated by Ray Johnson, K4DXO. Speakers will include Al Hernandez, LU1ZC, on "DXing from the Antarctica," illustrated with slides. Dr. Allan Schneider of the MITRE Corp. will discuss "Ionospheric Disturbances," and Ron Delcourt, ET3ZU/A-F5QQ, will speak on operating from "Jabal at Tair and Points East."

**FM FORUM** - Also on Saturday morning, the Northern Virginia FM Association will sponsor an fm forum with QST staff member Lew McCoy, W1ICP, on hand to discuss repeater regulatory matters and answer pertinent questions. This session will be of particular interest to repeater owners and users.

**RTTY FORUM** - A radioteletype forum will be held on Saturday morning with speakers on hand to talk on RTTY technicalities and operation. There will also be a demonstration of an RTTY repeater now in operation in the Washington, DC area. Fm equipment used in RTTY operations will be on display. This effort will be coordinated by Jeff Brennan, WB4WLW.

**MICROPROCESSORS FORUM** - A recent state-of-the-art development in solid-state technology - microprocessors - will be dealt with during a forum on Saturday morning under the sponsorship of AMRAD. This program will demonstrate what the devices are all about; that is, how they can be exploited in amateur design applications. A well-known authority will speak.

**DX FORUM, 2ND SECTION** - The second section of the DX Forum kicks off Saturday afternoon with an informal presentation by the DX



MARS Commemoration.

Advisory Committee, chaired by Lynn Lamb, W3BWZ. Speakers will include Chris Perham, G4BTY, Chief Operator of G3UBR, who will present a slide show called, "DX Contesting from Europe." Bill Rohrer, VK0WR/W4LHA, will describe "Operating from Heard Island." (One long pile-up!) In addition, the session will include a talk by Maurice Caplan, VS5MC, called "The View from Brunei." Bob White, W1CW will speak on DXCC.

**MARS FORUM** - Also on Sunday morning, the Armed Forces will conduct tri-service forums in commemoration of the 50th Anniversary of the MARS-Amateur association. As part of the overall MARS program, a USAF facility will be in operation by Friday afternoon with operators on hand from each of the three services. There will be a line hook-up through MARS operations to illustrate message-handling circuits. Qualified personnel will be on hand during the entire weekend to answer questions and provide general information.

**SPACE AND EME FORUM** - On Saturday afternoon, the Amateur Satellite Corp. will host a forum on space and earth-moon-earth operations with Tom Clark, WA3LND/W0IUF, chairing. Officers and other representatives of Amsat will be on hand. A summary of Oscar 6 and 7 performance will be given and future projects and activities such as Amsat Phase III will be discussed. A new series of satellites designed for high altitude orbits promises a big step forward in the Oscar program. This session is also aimed at the serious vhf operator with topics which will include EME, amateur radio astronomy, and biological hazards associated with high powered vhf transmitters. Oscar hardware will be on hand for viewing.

**T-MARC MEETING** - The Middle Atlantic Repeater Council (T-MARC) will hold a meeting Saturday afternoon with President Jerry Horwitz, W3EZT, presiding. This annual affair is for the general membership and elections will be held. T-MARC is an organization of repeater owners and operators in the areas of Delaware, Maryland, Virginia, and the District of Columbia which provides coordination for frequency options to preclude interference between repeaters.

**TEACHING FORUM** - Ralph Lee, WB4YUY, who wrote "College Credit for Ham Licensees," published in the February, 1975, issue of *QST*, will host a forum on his highly successful technique in organizing and teaching amateur classes. Any club which plans such courses should have a representative at this informative session.

**ARRL FORUM** - An open meeting with League representatives will convene on Saturday afternoon with opening remarks by President Harry Dannals, W2TUK. This is an opportunity to meet regional representatives, including Roanoke Division Director Phil Wicker, W4ACY and Atlantic Division Director Harry McConaghy, W3SW, as well as Headquarters staff members in a roundtable discussion. Dick Baldwin, W1RU, recently appointed General Manager of ARRL, will be present among others.

**SPECIAL FCC PROGRAM** - During a special FCC program on Saturday afternoon, Prose Walker will speak on '79 WARC. The thrust of his talk will concern amateur preparation for the 1979 World Administrative Radio Conference, what has been done to date, and what recommendations have been tentatively considered in terms of the hf problem.



U.S. Air Force MARS installation.

**HOME BREW FORUM** - The convention will feature a Saturday afternoon home brew contest and forum under the sponsorship of NOVARC. As noted in the May issue of *QST*, the closing date for entries is August 1, but late entries will be accepted at the convenience of the committee. For those prone to innovate on the work bench, here's an opportunity to swap notes with people of a similar mind. Paul Rinaldo, K4YKB, will moderate.

**WAYLARCS MEETING** - The Washington Area Young Ladies Radio Club will meet in the afternoon to discuss amateur activities in general and, in particular, the future of YLRL, contesting, and the promotion of DXing. Chairing will be Clair Bardon, W4TVT. Others attending will include Christine Haycock, WB2YBA, President of YLRL; Louise Moreau, W3WRE, who writes the monthly column "YL News and Views" for *QST*; and Ethel Smith, K4LMB, Executive Secretary of QCWA and founder of YLRL.

**WOUFF-HONG CEREMONY** - Following the Saturday night banquet, at midnight local time, the Ole Curmudgeon of PVRC, Ed Redington, W4ZM, will play the role of The Old Man in the brain-hogging Wouff-Hong ceremony and initiation. All the while he will straighten out the Young Squirts regarding operating procedures and such outrageous practices as "QR Zedding."

### Saturday Night Banquet

On Saturday evening, the highlight of the weekend comes with the banquet. Keynote speaker will be Gen. Saddler whose career in the Air Force has included a deep involvement in communications and electronics. Other speakers include senior FCC Commissioner Robert E. Lee (appointed by President Eisenhower in 1953) and Astronaut Owen Garriott. Dr. Garriott was science pilot for Skylab 3 and spent nearly 60 days in orbit between July and September of 1973. Owen was first licensed in 1945 and has been active ever since, space activities permitting.

### Sunday

**RELIGIOUS SERVICES** - Religious services will be held on Sunday morning. Father Dan

Linehan, W1HWK, will conduct Catholic Mass while Rev. Bill Hall, K3CQ, will offer a non-denominational service.

**CONTINENTAL BREAKFAST** - A Continental breakfast, buffet style, will be available in the conference area during the morning.

**FCC FORUM** - With Bill Grenfell, W4GF, moderating, an FCC Forum will be convened early in the morning. In attendance will be Prose Walker as well as Assistant Chief Richard H. Everett who will answer questions on rules and licensing procedures. Frank Williams, K4GTS, of the Office of the Chief Engineer will be in attendance to handle queries regarding frequency allocations, intruders, etc. Representing the Field Operating Bureau will be Vernon P. Wilson, W4MA, and John W. Reiser, W4ARE; they will respond to questions on monitoring operations and exams. A working mobile facility will be on view during the weekend.

**ARPSO FORUM, 2ND SECTION** - On Sunday morning, ARPSO will conduct its second section in the National Convention with three notable speakers. The topic to be addressed by George Hart, WINJM, Communications Manager for the League, will be "History and Development of Emergency Operations." Bob Dixon, W8ERD, member of the Emergency Communications Advisory Committee (ECAC) of the League, will speak on "The Xenia Disaster: A Model for AREC." And George W. "Bud" Hippisley, K2KIR, will address the group on the subject of "The National Traffic System: A Vehicle Poised to Serve the Nation and Our Neighbors."

**AMRAD MEETING** - A membership meeting of AMRAD will take place Sunday morning to hear the Director's report. The meeting will be chaired by Paul Rinaldo, K4YKB.

**PVRC CONTESTING SEMINAR** - The Potomac Valley Radio Club will host a three-part Contesting Seminar; the theme will be "Success in Contesting." (They should know!) There will be a presentation by Len Chertok, W3GRF, on the mechanics of putting up effective antennas. Len will show how with a time-lapse slide show to demonstrate construction details. The Contest Advisory Committee (CAC) will meet to discuss such matters as a Bicentennial Contest Celebration;

Gene Zimmerman, W3BQV, will moderate. In attendance to represent CAC will be Pete Chalmalian, W1BGD, and Ellen White, W1YL, Deputy Communications Manager of ARRL and Headquarters liaison to CAC. A third part of the seminar will be a panel discussion on "optimizing the operator and the station for contesting," which will be moderated by Len. Subjects will include design of a contest station, the psychology of contest operating, and operating techniques.

**AMSAT MEETING** - There will be an Amsat meeting in the morning to review the past year's activities and make plans for the coming year. Elections will be held for the Amsat Board of Directors. The meeting is open to all interested and will be chaired by President Perry Klein, K3JTE.

**ANTENNA FORUM** - Lew McCoy, W1ICP, of League Headquarters, well known for his interest in antenna design, will chair a forum on the subject during the morning. He will speak on "Multi-Band Antennas: The Pros and Cons," illustrated with slides.

**ATV FORUM** - The Metrovision Amateur Television Club of Washington, DC will run a forum on fast-scan amateur TV during the afternoon with Terry Fox, WB4JFI, President, moderating. Speakers will include Terry as well as Bruce Brown, WB4YTU, who will talk on technical details and demonstrate a closed-loop system. Emphasis will be on solid-state amateur TV transceivers. There will also be a discussion on video tape, film use, and the ATV repeater now in operation for the Washington, DC area.

**RADIO CLUB OF AMERICA** - The oldest radio technical society in the world, the Radio Club of America, will meet on Sunday for luncheon, during which the first Washington chapter of RCA will be inaugurated. The members of the Washington area are hosts; Fred Link, ex-2ALU and President of RCA and other officers and directors will be present.

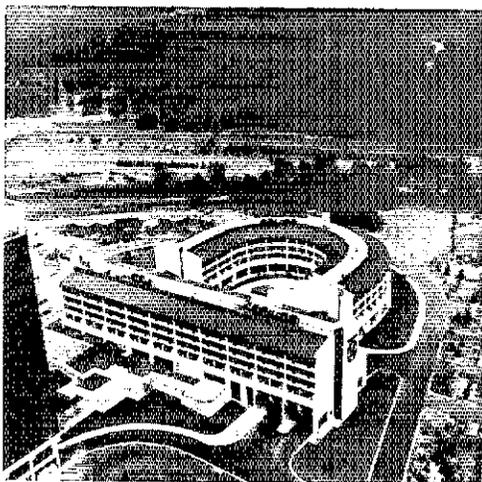
**FRANKFORD RADIO CLUB/PVRC ANNUAL BANQUET** - On Sunday afternoon, those old contesting rivals, the Frankford Radio Club and the Potomac Valley Radio Club will meet at a luncheon affair that has been mutually passed back and forth annually for about 15 years. PVRC is hosting; an interesting program and a speaker is planned.

#### Other Convention Details

**FCC EXAMS** - The FCC will conduct exams for the General license and higher at 10:00 A.M. on Saturday. Applications must be submitted with check or money order in the amount of \$4.00 to The Federal Communications Commission, 1005 U.S. Custom House, Philadelphia, PA, 19106 in time to reach there before Sept. 5. Anyone intending to take an exam at the Convention is advised to be in the FCC area at or before 10:00 A.M.

**TALK-IN** - The Northern Virginia FM Association will provide talk-in to the Convention building on the 34/94 repeater located nearby using the special call KR4QST. Also, the Sterling Park Amateur Radio Club of Virginia will be operating on the site on all bands between 10 and 80, both phone and cw, with the call K4QST. A special card will be available for QSLing contacts; please include a s.a.s.e. Visitors may operate the HF position but please remember to bring the original copy of your present license.

**ACCOMMODATIONS** - Worth noting is the



The Sheraton Inn, Reston, VA.



Organizing a National Convention is no small task. Unfortunately, space does not permit enumerating the names and calls of the host of volunteers who are laboring hard to make this one of the most rewarding Nationals ever. Shown above are some of the key members of the NOVARC committee. Standing (l. to r.): Ed Kennedy, W3GPI; Bill Miller, K4MM; Joe Des Roches, W4WKT; Ray Johnson, K4DXO; Paul Rinaldo, K4YKB; Vic Clark, W4KFC; Stu Meyer, W2GHK/4; John Pich, K3AKR; Harry McConaghy, W3SW; Ray Porter, K4OMR; Hugh Turnbull, W3ABC; Vern Mann, WA4EJH; John Manning, WB4MAE; Dick Jordan, W4UM; Glen Starkey, K4PUJ; and Tex DeBardleben, W4TE. Seated (l. to r.): C.C. Atkins, WB4CKB; Ed Redington, W4ZM; Rita Des Roches; Bill Grenfell, W4GF; Irene Akers, W3RXJ; Bud Cone, WA4PBG; and Bud Smith, W4YZC.

fact that this 1975 ARRL National is being held in a single building enclosing forum rooms, exhibit spaces, and banquet room, as well as personal accommodations. There is ample free parking in a security-patrolled area.

**REGISTRATION DETAILS** — For final details on the Convention, write NOVARC, P.O. Box 682, McLean, VA. 22101. Please note that special rates are available for early registration as well as accommodations. In all cases, Master Charge and BankAmericard credit cards will be accepted both in advance as well as at the Convention.

### Sponsorship

**NOVARC** — The Northern Virginia Amateur Radio Council comprises a group of 21 clubs active in Northern Virginia, Washington, DC and Southern Maryland. The highly successful 1973 Roanoke Division Convention was sponsored at the Reston site by NOVARC. As a matter of fact, the concept of ARRL technical symposia was first initiated at that convention.

**FAR** — The Foundation for Amateur Radio is cooperating in the sponsorship of this convention. The FAR is devoted exclusively to promoting the interest of amateur radio and is noted for its annual awards of three scholarships to worthy students of a technical aptitude who are pursuing studies in accredited collegiate institutions. The Foundation composes 40 amateur radio clubs located in Washington, DC and its environs. 

A superb piece of test equipment has been donated to ARRL, a Rhode & Schwarz XSA frequency standard. The generous donation was made personally by Mr. Ulrich Rhode, DJ2LR/W2. Frequency stability and accuracy of the XSA approaches that of WWV. The gift is being used at W1AW — just the unit for use as a standard during FMTs and general W1AW frequency checks. — *WICER*

### FEEDBACK

Dr. George Steber, WB9LVI, writes that considerable interest has been shown in his article, "Slow-Scan to Fast-Scan TV Converter" (in two parts, *QST* for March and May, 1975). He mentions that somehow a number of errors managed to appear in the schematic diagrams he sent along for publication.

**Fig. 10** — Eliminate the .01- $\mu$ F capacitor between pin 5 and pin 10 of U8. Label pin 5 of U2C as SSTV HORIZ. SYNC OUTPUT. Relabel pin 8 of U2D as "S." Insert a 330- $\Omega$  resistor in place of the direct connection between pin 6 of U2C and pin 9 of U2D. Add a feedback capacitor of 220 pF from pin 9 to pin 8 of U2D. Change the value of the 27-k $\Omega$  resistor connected between pins 10 and 4 of U7 to 10 k $\Omega$ .

**Fig. 11** — Connect pins 3 and 9 of U13 to pins 2 and 12 of U14. Change the value of the capacitor on pin 12 of U12 to 0.5  $\mu$ F. Replace the 1500- $\Omega$  resistor connected between pins 2 and 6 of U16 with a direct connection. Also note that a 741 op amp may be used for U16.

**Fig. 15** — Pin 13 of U42 should be connected to pin 13 of U33, with no connection to U32 or U41. Pin 14 of U42 should be connected to pin 13 of U37 (this pin not shown), with no connection to U36 or U41. Pins 2 and 4 of U42 (pins not shown) should be grounded. Pin 3 of U42 (pin not shown) should be connected to +5 volts. Re-identify pin 3 of U36 as pin 13. Relabel pin 13 of U39 as "S."

**Fig. 16** — Relabel pin 6 of U48 as CLOCK BB. Relabel pin 6 of U49 as CLOCK AA. At pin 13 of U46, the 7.68-kHz input (coupled through the 12-pF capacitor) is suitable for a 128-line display only. For a 256-line display this input should be 15.3 kHz, and may be obtained from pin 13 of U31 (shown in Fig. 15).

Pc-board layouts for this project have been prepared by a group of persons, and boards are offered at the cost of materials plus handling. Write to Ed Arvonjo, W3LY, 35 Franklin St., Feasterville, PA 19047, for further information. This group may also be in a position to offer the memory ICs at prices for large-quantity purchases.

— . . . —  
The Field Day log of WA4ECY was erroneously listed as a check log instead of being listed with the ID stations. They had 1118 QSOs and a final score of 2236 points.

— . . . —  
A clerical error resulted in the single operator September VHF QSO Party log of WA1NGR being left out of the results. He had 299 QSOs and 66 multipliers for a final score of 22,176. This places him third in the nation and first in the New England Division and in CT.

# ● Technical Topics

## Parts-Procurement Headaches Continue

There has been a marked increase in the number of letters received from bewildered and distraught ARRL members concerning the ever-worsening parts-procurement situation. Many of the letters urge the League to "do something about this mess." Others feel that the Hq. staff isn't doing enough toward choosing easy to obtain components for *QST* and *Handbook* construction projects.

Although it will provide little consolation to those who enjoy building amateur equipment, the folks at Hq. are being confounded by the same problems in obtaining component parts . . . and on a somewhat larger scale. In most instances the person who duplicates an ARRL-published project is struggling to secure a reasonably small number of parts, dependent upon the complexity of the circuit in question, while the technical crew in Newington is engaged in finger-nail gnawing respective to parts orders for several projects. Many of the items are needed by a certain date to fulfill a publication-deadline requirement. Of course, the latter can cause a great deal of nervous finger-drumming on the desk tops here!

For the record, the staff has tried many times to change the course of events by writing letters to manufacturers and distributors, and through more direct contact by telephone. We have pleaded (practically begging at times) with suppliers to eliminate, or at least reduce to a *reasonable* level, the minimum-billing fees. A frequently voiced or written response is, "The cost of processing a small order (paper work and such) often exceeds the amount of the order." We believe this to be true, and from a business point of view it makes sense to at least break even on mail orders. Another common statement is: "The amateur market is simply too minuscule to warrant stocking specialized small parts. Our market lies in the TV service and industrial fields." Again, we appreciate that outlook, for any businessman who has his head screwed on correctly would cater to the major market of interest in order to survive in this time of high competition and skyrocketing inflation.

From a purely philosophical vista, some of us feel bitter about the seemingly impersonal attitudes of the parts suppliers, remembering those "good old days" when any order, large or small, was important to the vendors in the interest of cementing good customer relations. Sadly, the customer nowadays is the *big* organization — the research laboratory, the TV repair shop, the two-way radio service agency, and similar. The little fellow, and notably the radio amateur, is regarded by some as the pest who keeps wanting immediate service on his all-too-small order. A \$25 minimum-order fee tends to shut him off, thereby eradicating the pest that is neither needed nor wanted.

### Parts Selection

Some correspondents have suggested that the Hq. staff specify more surplus components in published articles. Others have been critical of our efforts when we have listed surplus items. Frankly, we'd like to recommend surplus equivalents to new parts, but there is no assurance that the supplier of

the particular component will have the material in stock when *QST* or the *Handbook* reaches the reader. Therefore, it would be unfair of us to rely on that solution to high cost and poor availability. At least the reader has a reasonable chance to obtain a specific item when it is called out in the parts list as a new unit. Then, if the builder is astute he will scan the surplus flyers and flea-market counters for a surplus equivalent. It's not a happy alternative, but the most practical one open to us at the present time.

There was a time in the history of amateur radio when constructors of homemade gear were anxious to innovate. It was an exciting challenge to some when they could attempt to garner the parts for a project from surplus houses and through judicious swaps with amateur friends. That was an important part of the game. Somehow, things have changed. Perhaps it is because we have become too much a kit-oriented technical society. We like to have everything delivered in a package, replete with full instructions concerning assembly, tune-up, and operation. Admittedly, that approach is an expedient when wanting to use a piece of equipment as soon as possible. But, the true flavor of achievement is somehow missing, and becoming totally reliant upon the convenience of kitted projects can deprive us of our usefulness as technical hobbyists, and can inconvenience us materially when we must fall back on our intuitive capability to "make do" with what is available to us.

Amateurs have long been regarded as achievers rather than mere duplicators. As achievers we can use a published circuit as a *pattern* to follow, and can sidestep the otherwise confining boundaries set by absolute duplication of a project. A larger-than-specified chassis can be used, a different make or style of op amp can be employed, a war-surplus variable capacitor (physically larger, or with approximately the same capacitance) can be utilized, or a 600-volt tubular capacitor can be used instead of the 100-volt one listed. It isn't necessary to be an engineer when making substitutions. All that is required is plain old amateur horse sense! A little pioneering courage is helpful, too.

### What Does the Future Hold?

Doomsday isn't lurking on the horizon, although it may seem that way at times. Things *are* tough, and all of us know it. We may be suffering from deteriorating enthusiasm, but that's no reason for withdrawing our hats from the ring. We must shop with greater diligence, exercise patience, and be imaginative in finding substitute parts.

At the local level we should try to encourage capable people to take on the small-parts mail-order business, even if only as "moonlight" enterprises. We at ARRL Hq. would appreciate being advised of *reliable* businesses of that kind. Certainly, there is a great deal of money to be made by anyone wishing to start a small business in amateur components. The ARRL technical staff is willing and anxious to offer advice to interested persons. We seek a solution to the parts-procurement dilemma, and your help is needed!

There is no magic formula the ARRL can use to solve the crisis. We are constantly trying to encourage distributors to stock popular small parts, and shall continue our efforts. If all of us can work together to help dispel the myth that "hams don't build much anymore" (and we've heard that one *many* times), maybe the complexion of things will improve.

(Continued on page 99)

# Results: 1975 NOVICE ROUNDUP

REPORTED BY JIM CAIN,\* WA1STN

**H**IGHLIGHTS of the 1975 Novice Roundup include: a new national record score; close races in WPa, SFla, Va, and Miss; 38 entries from Ohio, including 20 over 10,000 points; and last but not most important, reported participation by 442 Novices and 164 non-Novices.

The new record belongs to Mike Rosenfeld, WN1WJ, who put it all together in both total contacts and multipliers. Mike missed only one state, North Dakota, and one Canadian province, VF8, among the ARRL field organization's sections. Thirteen DX countries accounted for the remainder of his multiplier. The new record surpasses the previous one by over 9000; WN3UTA's 1974 record score lasted a scant one year.

The difference between numbers one and two in Mississippi was 675 points, the telling factor being a 15 wpm ARRL Code Proficiency certification for the winner. Matter of fact, 170 Novices out of 442 entries used such certification to boost their scores. The highest claimed (and verified) was a 35 wpm decoration on the wall of WN3VJK, followed by WN1TBY and WN2TVU at 30 words per.

WN8RUO led the tough Ohio section, one which has a history of high contest activity at all levels; it is hard to imagine anyone ever not working that section in any contest! To be fair, however, Ohio does have more licensed amateurs than any other single ARRL section, followed closely by Illinois. Perhaps there is a pattern, because Michigan had two-thirds the entries of Ohio this NR, and has almost exactly two-thirds the amateur population of Ohio.

Through 1971, the Novice Roundup lasted 40 hours; the record was established that year at 74,000 points, by WN7OTT/7. It looked as though it might be a long time before that number of points would be topped, after the activity was shortened to 30 hours in 1972. Indeed, 1972 and 1973 top scores were "down" into the 60K range, but in '74 and '75 it was back up the ladder to new highs. VFO availability to Novices starting with the 1973 NR have undoubtedly had much to do with the rising scores; ten-meter band privileges, as can be seen from the "Top Ten" box, have had no effect. Activity by non-Novices *has* made a difference, though; over 50% of this year's winners' contacts were with W, K, WA, and WB stations.

Still a problem is CQing by the non-Novices. A tongue-in-cheek suggestion in our write-up for the

\* Asst. Communications Manager, ARRL.

1974 was a "dis-Honor Roll" for stations doing such CQing. Happily, there was almost no support for such a drastic move. A few Novices (and a couple of others) did bother to make up such lists. The common complaint was not necessarily that such stations take up so much room on the band, but rather that they tend to "steal" a Novice's frequency. To this, as to any controversy, there are two divergent points of view. The non-Novice can make contacts faster if he calls CQ, and after all, he is there to make contacts. To the Novice tuning the band looking for a spot to CQ, though, it may appear as though his slot in the spectrum is overrun with non-Novice CQing.

Some suggestions were in favor of writing into the rules a clause that non-Novices are prohibited from CQing; that would be about as effective (and sensible) as ordering Grand Prix drivers not to "draft" during a race. Even if such a rule were written and generally complied with, where would we be when we *need* the higher-class licensees CQing, on an empty ten-meter band for instance? A knotty problem it is.

On a brighter note, most everyone enjoyed the 1975 NR, as usual. The enthusiasm of neophyte Novice contesters is contagious . . . many of the non-Novices comment that the NR is their favorite operating activity. Every operator in the NR is a youth, no matter what his or her age. — WA1STN

## Soapbox

Higher-class licensees gave me 50% of my score. — (WN6HDR). How about a power limit on those higher-classes? — (WA2SNE). NR for me meant "No Reply." — (WN1STJ). I practice Kung Fu in my spare time so I often operate wearing my outfit. — (WN8QFW). I like the one-week format since 24-hour straight contests are "out" for me. — (WN1TYT). I like the shorter time period, since I



If we had a Golden Pencil award for the Novice Roundup, it would probably go to this gent — WN5MCJ, S. Texas.



Top left is WN8PAF, who came in eighth this year in the highly competitive Ohio section. Bob used a dipole and triband beam outside to augment the vintage Collins gear shown here. WN1SSL, pictured above right, managed 373 contacts in a single-band 80-meter effort from East Mass.

### TOP TEN

Call	Section	Score	Bands Used	Transmitter	Receiver	Antenna(s)
WN5IWJ	NTex	86,688	80, 40, 15	Tempo 1	75A1 SX101	6 ele. (15) 3 ele. quad (40) dipoles, vert. quad (15) vert (40)
WN4KKN	Ala	57,442	80, 40, 15	SB101	75S1	dipole (80) 3 ele. (15)
WN6DUF	LA	55,695	80, 40, 15	T4X	R4A	dipoles (80, 40) 3 ele. (15)
WN0OED	Mo	51,714	80, 40, 15	32V2	75A1	dipoles (80, 40) 3 ele. (15)
WN3WUI	EPa	48,450	80, 40, 15	Galaxy 5	Galaxy 5	18 AVQ 14 AVQ
WN9ONN	Ill	48,096	40, 15	2NT	R4B	40-meter dipole
WN1TAI	WMass	46,176	80, 40, 15	FT101B	FT101B	Beam (15) vert, dipoles
WN3USW	Mdc	45,866	80, 40, 15	DX60A	SB303	Zepp
WN5LXJ	NTex	42,976	80, 40, 15	FT101B	FT101B	dipoles
WN6VWR	LA	42,780	40, 15	T4X	R4B	inverted "V"



### DIVISION LEADERS

Atlantic	. . . . .	WN3WUI
Central	. . . . .	WN9ONN
Dakota	. . . . .	WN0MKR
Delta	. . . . .	WN4FZU
Great Lakes	. . . . .	WN8RUO
Hudson	. . . . .	WN2TVU
Midwest	. . . . .	WN0OED
New England	. . . . .	WN1TAI
Northwestern	. . . . .	WN7WWL
Pacific	. . . . .	WN6WKZ
Roanoke	. . . . .	WN4IVR
Rocky Mt.	. . . . .	WN0JUG
Southeastern	. . . . .	WN4KKN
Southwestern	. . . . .	WN6DUF
West Gulf	. . . . .	WN5IWJ
Canadian	. . . . .	

WN4FNZ faced a handicap most of us don't have to worry about . . . coming in out of the hot South Florida sun to do some operating. Marc managed 13 hours and 198 contacts out of the rays.



WN6HH 34,293-482-69-30  
 WN6AIT 27,050-340-63-30  
 WN6ARP 21,220-313 65-29  
 WN6CJW 21,318-223 64-29  
 WN6EJW 21,180-353-60-29  
 WN6DVE 20,971-303-67-29  
 WN6CUM 20,945-355-59-30  
 WN6DZW 15,196-262-58-30  
 WN6GLC 14,198-229-62-28  
 WN6ZUL 11,055-201-55-26  
 WN6HTY 10,455-205-51-19  
 WN6EWF 9,240-188-51-29  
 WN6CJO 3306 87-38-6  
 WN6GXQ 1488-62-24-7

Orange  
 WN6YJX 4585-126-35-15

Santa Barbara  
 WN6CZV 18,420-297-60-25  
 WN6EJO 8120-31-20-8  
 WN6HIA 6120-31-20-8

Santa Clara Valley  
 WN6EMR 24,635-664-65-30  
 WN6WBF 20,328-288-66-26  
 WN6EUA 20,234-002-67-30  
 WN6CTW 19,278-286-63-26  
 WN6YFA 13,719-254-51-23  
 WN6TLD 7350-165-42-12  
 WN6HHD 5236-140-20-29  
 WN6CDY 8236-119-44-20  
 WN6BYO 4080-110-34-28  
 WN6AKZ 3348-93-36-18  
 WN6YCF 1440-60-24-  
 WN6HLF 920-46-20-3  
 WB6WSL (WN6e AKZ YIR)  
 1674-62-27-12

San Diego  
 WN6ENP 3135-95-33-16  
 WN6HDR 2992-73-34-6  
 WN6HND 836-44-11-8  
 WN6HLY 330-30-11-7

San Francisco  
 WN6EUG 946-43-22-10

San Joaquin Valley  
 WN6VFN 7480-155-44-28  
 WN6IPG 6751-157-43-16

Sacramento Valley  
 WN6WKZ 30,861-381-81-13  
 WN6LYP 7452-162-46-27  
 WN6HSD 6613-147-45-5

Hawaii  
 WH6IMI 2635-85-31-26  
 WH6HJ 2232-62-36-16

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Arizona  
 WN7ZNL 19,152-304-63-30  
 WN7YON 7560-168-45-11  
 WN7ZVO 5455-130-39-23  
 WN7YHF 4773-129-37-12  
 WN7YHL 1820-85-28-15  
 WN7ZGY 608-32-19-7

Idaho  
 WN7ZBY 18,291-273-67-21  
 WN7ZVJ 15,860-260-61-17  
 WN7WVU 364-26-14-3  
 WN7VKE 16-4-4-1

Montana  
 WN7ACT 14,575-275-53-23  
 WN7VXW 10,368-192-54-29  
 WN7YNU 1380-46-30-13

Nevada  
 WN7WLM 13,038-246-53-30

Oregon  
 WN7ZSD 7182-171-42-14  
 WN7VGM 3530-100-320-30  
 WN7ZUG 1700-40-34-7  
 WN7ZWP 884-52-17-10

Utah  
 WN7ZJK 1820-60-26-6

Washington  
 WN7WVL 21,960-340 61-30  
 WN7ZTN 14,666-274-59-25  
 WN7WET 14,094-261-54-25  
 WN7YFP 9275-175-53-30  
 WN7ZLR 890-7-18-49-20  
 WN7YFH 6556-149-44-11  
 WN7AEA 5658-145-39-27  
 WN7ALT 3495-117-47-28  
 WN7WIZ 4485-115-39-20  
 WN7VOI 4378-115-38-13  
 WN7ZLS 360-3-11-33-14  
 WN7ZLV 2791-79-29-16  
 WN7ZYS 1254-57-22-14  
 WN7AGN 288-24-12-10  
 WN7ZLQ 15-5-3-3  
 WN7ZLQ 9-3-3-1

Alaska  
 WL7IEP 170-17-10-6

8

Michigan  
 WN8SQA 24,180-357-65-30  
 WN8SEN 22,912-358-64-26  
 WN8RTB 17,160-310-52-23  
 WN8QVW 16,298-266-58-28  
 WN8SVA 15,500-295-60-29  
 WN8KIC 14,640-220-61-23  
 WN8RJC 13,650-230-51-12  
 WN8BRC 11,050-231-50-28  
 WN8TOK 9272-152-61-26  
 WN8SDG 8924-194-46-14  
 WN8TMY 7803-153-51-20  
 WN8QOL 7770-222-35-28  
 WN8TLP 6222-183-34-20  
 WN8TLD 3762-134-43-14  
 WN8TRD 3593-109-47-35  
 WN8STW 5124-122-42-15  
 WN8RJV 5000-115-40-25  
 WN8RVS 4960-109-40-16  
 WN8RJV 4650-135-31-22  
 WN8TJQ 2945-95-31-9  
 WN8TOK 2484-82-27-20  
 WN8TLD 244-73-13-9  
 WN8TVD 238-17-14-13

Ohio  
 41,814-606-69-24  
 16,432-506-72-30  
 14,505-500-67-30  
 13,395-468-67-27  
 13,238-428-66-28  
 28,035-445-63-50  
 WN8RST 27,072-423-64-25  
 WN8PAF 26,750-515-50-28  
 WN8SVP 25,344-381-64-28  
 WN8TFL 22,490-331-65-30  
 WN8RDN 22,254-366-69-15

WN8RYZ 21,995-415-53-24  
 WN8RUO 21,480-358-60-28  
 WN8OU 17,836-245-52-73  
 WN8RJE 14,040-245-52-26  
 WN8RUC 12,190-250-46-16  
 WN8RUB 11,025-310-49-25  
 WN8RSP 10,272-199-48-21  
 WN8RSV 10,044-166-54-20  
 WN8SZN 10,011-203-47-15  
 WN8RRG 9696-202-45-14  
 WN8RXC 9126-154-54-18  
 WN8RDU 8918-182-49-24  
 WN8RFL 8105-133-42-28  
 WN8RTU 6216-138-42-10  
 WN8STF 5922-141-42-17  
 WN8SKV 5753-117-49-9  
 WN8SPS 4794-102-47-6  
 WN8TFS 4720-108-40-20  
 WN8RVM 4570-113-40-15  
 WN8TLE 3774-102-37-9  
 WN8R(D) 3758-89-42-24  
 WN8SHX 3511-107-33-19  
 WN8TIW 2883-93-3-1  
 WN8QPV 1408-49-22-8  
 WN8TGO 897-29-23-5  
 WN8TWK 814-37-22-6

West Virginia  
 WN8SNO 21,960-350-61-30  
 WN8ROA 18,256-326-56-30  
 WN8TLE 17,618-383-46-16  
 WN8SAW 2875-105-25-8  
 WN8SXE 2378-67-24-13  
 WN8RVL 1584-64-51-15-7  
 WN8RSL 646-44-19-5  
 WN8TGT 646-44-19-5

9

Illinois  
 WN9ONN 48,096-668-72-30  
 WN9OLF 27,743-361-63-19  
 WN9OPR 16,014-114-51-20  
 WN9OUL 11,016-206-51-17  
 WN9NEY 8950-164-50-21  
 WN9NXQ 8400-200-42-70  
 WN9NEH 5320-150-53-24  
 WN9OZK 8211-151-51-19  
 WN9PSQ 7298-178-41-  
 7014-167-42-16  
 WN9NEH 3737-101-37-16  
 WN9OPL 3732-125-35-19  
 WN9OFL 1708-61-28-14  
 WN9NUL 1650-50-13-9  
 WN9PIC 1620-60-27-16  
 WN9NPR 1224-51-24-3  
 WN9NIO 1210-40-22-8  
 WN9PTQ 1026-34-27-6  
 WN9MJJ 760-30-19-4  
 WN9PIQ 656-41-16-2

Indiana  
 WN9ODH 23,200-380-58-24  
 WN9NFW 15,456-102-48-30  
 WN9NFW 14,036-232-58-28  
 WN9NPR 13,362-225-58-19  
 WN9QDU 13,362-225-58-19  
 WN9NLU 12,210-222-55-23  
 WN9NOO 10,200-200-51-12  
 WN9PEX 5764-121-44-10  
 WN9OHX 4200-114-44-13  
 WN9OJS 2100-60-30-10  
 WN9MGG 1512-54-28-3  
 WN9DWD 522-33-16-5  
 WN9MAM 450-25-18-2  
 WN9OWA 416-26-16-6  
 WN9PFL 286-12-13-6  
 WN9OSZ 28-8-4-10

Wisconsin  
 WN9NRK 19,459-318-61-29  
 WN9PKZ 18,483-303-61-10  
 WN9OWJ 17,324-284-61-20  
 WN9NJC 16,124-258-58-  
 15,254-263-58-  
 WN9ODG 10,512-209-48-20  
 WN9MPA 7599-139-51-29  
 6594-157-42-6  
 WN9OTM 6106-142-43-30  
 WN9MFE 5851-135-15-16  
 WN9MRF 3148-86-33-9  
 WN9PTX 2010-67-40-6  
 WN9PGY 924-44-21-9  
 WN9PZY 900-35-20-5  
 WN9OCS 273-21-13-1

Colorado  
 WN9JIG 32,000-500-64-22  
 WN9JKP 16,200-270-60-17  
 WN9NHA 780-143-51-8  
 WN9MFE 5076-108-47-11  
 WN9MFA 5065-105-44-10  
 WN9MVA 1300-50-23-15  
 WN9NLA 432-24-18-2

Iowa  
 WN9NVB 22,910-395-58-30  
 WN9OHE 18,724-282-62-29  
 WN9NEX 9631-177-51-16  
 WN9LBN 5628-119-42-10  
 WN9SSN 4884-138-33-27  
 WN9NCK 2666-86-31-7  
 WN9GTH 2190-63-10-16  
 WN9JTG 2074-61-24-25  
 WN9LTS 786-42-18-6

10

Kansas  
 WN9NHZ 17,700-261-63-11  
 WN9OCK 9450-100-54-23  
 WN9MCM 4305-105-40-21

11

Minnesota  
 WN9OEH 3290-94-35-11  
 WN9MFE 1298-44-22-2  
 WN9OFO 325-25-14-6  
 WN9NCL (+WN9NCE)  
 100X 48-21-16

12

Missouri  
 WN9OED 51,714-663-78-24  
 WN9JXE 11,484-453-68-25  
 WN9MZY 12,154-206-59-12  
 WN9MZY 10,335-195-83-10  
 WN9MZY 8272-176-47-24  
 WN9MZY 2880-80-32-12  
 WN9MZY 2184-78-28-26  
 WN9MZY 2175-60-38-9  
 WN9MZY 2075-70-29-5  
 WN9MXX 2176-63-42-6  
 WN9OFL 1551-47-33-14  
 WN9LSN 144-13-11-5

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Nebraska  
 WN9JNH 24,684-374-66-20  
 WN9MOM 21,000-300-70-22  
 WN9MRV 7995-175-41-29  
 WN9MTE 6681-131-51-23  
 WN9MIA 368-23-16-4  
 WN9MFP 261-19-9-1

14

North Dakota  
 WN9MKR 11,820-188-60-17  
 WN9KZT 589-31-19-3

15

South Dakota  
 WN9MLL 5815-135-41-22  
 WN9LSZ 12-4-3-1

Non-Novices

W3ARK 28,842, K8HWV 25,193, W4CHK 24,400, WA9JGN 24,318, WA9PYQ 24,192, KP4EAJ 23,511, K0WQY 22,980, WBSKYZ 21,004, K8CVJ 20,216, WASTEE 19,997, WA9KUI 19,380, WB8FUO 19,256, WA3LMY 17,875, VE2BYR 17,803, W2HSF 17,334, WB2THS 16,692, W7WMY 16,461, W2EQK 15,510, WN9LNH 15,344, W4KFC 15,224, WB2RKF 14,994, W7YF 14,868, W9WV 14,715, K4ADT 13,720, W4QKX 13,566, W8AMEC 12,972, VE3RCP 12,810, W4MVE 12,512, W8KHL 12,031, W9OWM 11,990, K5PKV 11,244, W8KJG 11,171, WB8NAB 11,596, WB2KNZ 11,328, WA3VJL 11,322, WA6LJL 11,515, W7SJJ 11,223, WB9CLB 11,118, K9OWC 10,400, W46FWF 10,200, WA6KKA 10,098, W7H0I 9216, K3TFI 9045, K8HLR 9000, WA1UKF 8756, WA1PZM 8648, WB0ALF 8352, W4BRKA 8307, W2PVS 8274, K4LNC 8250, W4SHJ 8160, W4KZG 7290, W0WR 7200, W4KMG 7200, WR2WQA 7056, K3HPF 6900, W8SAYV 6696, W4SQPA 6672, W4QGM 6660, WB2RJJ 6204, W4ACTC 6144, WA2IDK 6084, WB9NME 5940, K8QKT 5904, W4YOK 5863, W4KFB 5490, K4YFH 5372, W3JNK 5106, WA2EJZ 4992, WBSKWU 4920, WB9EWR 4680, W6OEL 4636, WA3MOY 4600, VE7BU 4420, WBQJXR 4400, W4HU 4000, W4ERUO 3774, WA2SNE 3572, WA1SHU 3564, WB4PXP 3330, W2ECW 3286, W8WVO 3240, VE1SH 3136, W4B4PT 2997, W7FCD 2880, WA1TFC 2880, W4E5V 2789, W2WSE 2738, WA2YQY 2592, K7GGU 2581, W9KHH 2175, W2WSE 2108, W4LEK 1953, K0HG 1872, WAZTB 1829, WB0BPH 1699, WA1IOX (K1ZND, opt.) 1680, WA2VPA 1656, K4YHR 1650, WB9OLR 1612, KX6BB 1577, K5LZJ 1500, W0QZJ 1495, W4OZT 1488, W89DXU 1484, WA1PTK 1150, W4AGX 1200, W3EHT 1160, W88NW 1080, K8SWW 960, W6KYA 911, W43VNO 920, W9PFC 840, W4PJR 840, W4GRO 846, W4JPAZ 630, W4LERI 528, WB8ICG 520, W4PJR 352, WB9HZL 520, WBSKUJ 166, W4JUDS 162, WB6CKW 90,

WA9UCUJ 62, WA1FKF 1. Multioperator WB9IUF (K9WQY WB9GZV (NH WN9S MYL NYA OXK PHV PYR) 4714, W1DHI (WA1SHM WN1SAQ) 3420, WA3GYE (WA3JS JIA RBN VRR WN3A WMG YJ) 498, WA1TIO (WA1RGA WN1S TAK (UMO UMU) 444, DX CT2BN.

Check Logs

VE1RH, VO1AW, W4IKR, VE2SHX, VE1JT, W1AM, WA1MKP, WA4TJ, WB2UJ, WA2LHM, WB2FY, WB2HSG, W2MPL, K3YBU, W4DH, W3JJD, K4EJO, K4ROJ, W4RAK, W4ZRI, W4KPK, W4S1P, K6TG, W4DOR, K6JJA, W4TRXJ, W4VIV, W4B9V, WN8TS, W9LNO, W96LV, WN9GQ, WN9DGY, W9PA.

QST

**ARE YOU LICENSED?**

- When joining the League or renewing your membership, it is important that you show whether you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.

# VE/W Contest Announcement

September 20-21, 1975

**T**HE MONTREAL Amateur Radio Club, Inc., invites all W/K and VE/VO amateurs to participate in the 1975 VE/W contest to be held the weekend of September 20-21. Two changes this year will be in effect to make the contest more interesting and to allow all stations to participate in both the cw and phone classes.

A 10x multiplier has been instituted for W/K participants in an attempt to equate U.S. and Canadian scores, thus encouraging more competition between the two countries.

In addition, stations should look for each other in the "General" segments of the phone and cw bands and are reminded to check all bands for openings.

Log sheets, regardless of score, will be of definite interest in preparing the contest summary. They will also be of use in the preparation of "Soapbox" comments. Finally, don't forget to include photos of yourself and your station with your logs.

1) **Eligibility:** The contest is open to all licensed amateurs located in the ARRL sections listed on page 6 of any *QST*.

2) **Classes of Entry:** The contest is divided into two classes: cw and phone. Cw and phone scores must be logged, tabulated and submitted separately.

3) **Types of Entry:** There are two types of entry - single operator and multioperator. A single operator station is one manned by an individual amateur who receives no assistance from other persons during the contest, such as log keeping or spotting stations.

Stations where two or more amateurs operate a station or where a single operator receives assistance in operating the station must be placed in the multioperator category.

#### 4) Contest Period:

**Cw Class** - All cw contacts must be made during the period 0000 UTC Saturday, September 20 and 0000 Sunday, September 21. Only 18 hours total operating time may be used during this period. Times on and off the air must be shown in the log. Minimum time-off period allowed is 15 minutes. Listening time must count as operating time.

**Phone Class** - All phone contacts must be made during the period 0000 UTC Sunday, September 21, and 0000 Monday, September 22. Only

18 hours total operating time may be used during and off the air must be shown in the log. Minimum time-off period allowed is 15 minutes as operating time.

5) **Bands:** All bands a participant is licensed to be worked once on each classification. The use of repeaters for contest exchanges is not permitted.

6) **Exchange:** W/K and vice-versa. W/K to QSOs do not apply. V contactings stations on exchanges are made. V or RST report, year, station and the ARRL geographical areas list

Area	Prefix	Abbr.
Newfoundland	VO1	NFLD
Labrador	VO2	LAB
P.E.I.	VE1	PEI
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE
Ontario	VE3	ONT
Manitoba	VE4	MAN
Saskatchewan	VE5	SASK
Alberta	VE6	ALTA
British Columbia	VE7	BC
Yukon	VE8	YUK
Northwest Territories	VE8	NWT

Example cw exchange VE4YYY 579-63 M. change might be VE: report 5 and 9 and 60

7) **Scoring:** Each time the number of contacts on each band, plus a 10-time multiplier for U.S. stations participating. E.g.: 21 MHz, 10 contacts and 20 contacts in 10 + 20 = 55 contacts + 10) 30 = 3300 points = 33000 for U.S. station

8) **Contest Summary Sheet:** Each entry showing net and total scores. Any

time may be used during and off the air must be shown in the log. Minimum time-off period allowed is 15 minutes as operating time.

and modes for which the band is used. A station may be worked once on each classification. The use of repeaters for contest exchanges is not permitted.

all work VE/VO stations W/K and VE/VO to VE/VO points can be scored by the contest if complete exchange consists of RS first license held by the section for W/Ks and below for VE/VOs.

Prefix	Abbr.
VO1	NFLD
VO2	LAB
VE1	PEI
VE1	NS
VE1	NB
VE2	QUE
VE3	ONT
VE4	MAN
VE5	SASK
VE6	ALTA
VE7	BC
VE8	YUK
VE8	NWT

Example phone exchange W9XXX DE W7ZZZ. Your logon go ahead.

Completed contact is 2 points for U.S. stations worked on each section in 10 sections on 10 sections on 14 MHz, 10 sections on 3.7 MHz = 25 + 2 = 110 points x (10 + 10) = 3300 for U.S. station or Canada, but 3300 x 10 = 33000 for U.S. station

9) **Contest Summary Sheet:** Each entry showing net and total scores. Any

(Continued)

on page 104)

## September VHF QSO Party

1900 UTC Saturday September 6 - 0600 UTC Monday 8

Rules the same as the June event (page 73, May *QST*). Log forms available from Hq. (38). Mailing deadline October 4. Good luck!

# 1974

# VE/W

## Contest Results

**T**HE MONTREAL Amateur Radio Club Inc., is pleased to announce the results of the 1974 VE/W Contest.

In spite of sporadic conditions, there was a very good turnout of 301 stations submitting results. This is one of the best years of this entertaining event. VE3ABN took high cw score for Canada with W5LUJ grabbing off top cw score for the U.S. An encouraging factor was the large number of non-qualifying entries submitted to assist in the cross-checking procedure.

### Soapbox

Enjoyed contest very much. Will be around for next year's also. - (WA1FCN). Put up an inverted "V" for 7 MHz and gave it a good trial. It measured up to specifications. A FB contest. Had a ball. - (W2EA). I am very glad to participate in your fine contest this year. I worked all provinces VE1 to VE7 and VX1, but no VE8 or VO2. Were there any in the contest? I plan to be in the 1975 contest. - (K2SBW). I had a whale of a good time in the contest. The Canadian ops were impressive in their contest proficiency and courtesy. Also they seem to keep an ear out for the weaker sigs like mine, HI - (WA4CZM). First time I entered contest in 10 years. I won't miss it again; lots of fun. - (K4FHF). Enjoyed the contest very much. Brought back memories of Field Days past except that it was a bit more comfortable around the house. - (WA5MGC). Conditions rather poor in W6 land. VE3s seemed to be more in strength than other areas, and no VE1s heard. Still same FB contest with many fine ops. Many thanks. - (W6KZJ). Murphy didn't strike but old Sof did Saturday nite. The flutter and echo on the Canadians made it next to impossible to copy, especially at 25 to 35 w.p.m. Where were Alberta and NWT? The VE's are excellent contest ops. - (W8CUL). Again a very enjoyable contest. Conditions seemed rather poor on Saturday nite but they picked up considerable on Sunday. To paraphrase the baseball managers, "Just wait till next year." - (W9HE). First contest ever. Had so much fun that I put the "bug" away and went straight key. Worked much better and got more contacts. - (WB0JDS). Great fun. Intend to do this more often. Too bad that 20 meters was dead as a doornail. - (VE6CZ). Thought I had something at 100 contacts. Sure knocked the wind out of my sails when another VE3 calls out for one more contact to make 500. Last hour was really the whole contest. - (VE3DDD). Enjoyed contest again this year and I hope you will continue to sponsor it. Maybe next year I will be able to spend more time operating if the weekend doesn't coincide with anniversary date. - (VE3DAC). [It does - ED.] The activity seemed down out here but I heard the VE3s working stuff we couldn't touch. Maybe next year the conditions will favor the west coast like they have in the past. Thanks for the contest. - (VE7WJ). After an absence from the VE/W contest for one year, I am pleased to enclose my logs for the 1974 contest. Conditions being somewhat poorer than in previous years, primarily on 15 and 10 meters; this year's score is somewhat lower than

1972. Good luck with your task of sorting and checking logs. - (VE4SW). Had to QRT early because of neighbor. Great fun but had thought contest was on September 28th. Imagine my shock when I saw that the contest was 2 hours started. - (VE5ZW). The contest was a riot and I really enjoyed it. It was my first contest and one thing for sure is that it increased my code speed immeasurably. Be seeing you next year. My parents thought I was nuts spending a weekend down in the shack just trying to work as many stations as possible. - (VE2DPP).

### HIGH SCORES

CANADA		U.S.A.	
CW			
VE3ABN	343,980	W5LUJ	20,880
VE7WJ	314,414	W4YWX	20,000
VE3LUE	313,200	WB4OGW	16,482
VE3GFY	214,476	W3ATX	13,532
VE4SW	168,000	K4IAF	13,328
PHONE			
VE3AC	76,792	WA6EPQ	7524
VE4QD	72,240	K5SGJ	7020
VE3FFA	71,280	W6HX	6384
VE3BLK	64,200	K0LUZ	6080
WB8JUI/VE3	62,228	WB0GZR	5092

The station first listed in each section, is the certificate winner for that section. Examples of listings: VX1HP 29,678-209-71 or final score of 29,678 points, 209 contacts, 71 band sections.

VE CW		VE2PZ 9108 99-46	
Newfoundland		VE2DPP	7700 77-80
VX1HP	29,678-209-71	VE2GA	3510 68-27
VX1KE	20,992-164-64	VE2DMP	988 76-19
VX1AW	13,216-112-59	VE20TN (multiop)	74,400-365-102
Labrador		Ontario	
VO2AG	6580 94-35	VE3ABN	343,980-882-195
New Brunswick		VE3LUE	313,200-783-200
VE1AXT	41,982-276-76	VE3GFY	214,476-586-183
Nova Scotia		VE3BPK	134,088-483-148
VE1EK	11,300-113-50	VE3DUS	115,625-463-125
Prince Edward Island		VE3DQK	96,600-345-140
WA1LNH/VE1 (multiop)	56,650-275-103	VE3MI	87,340-397-110
Quebec		VE3CPU	68,452-314-109
VE2WA	158,746-493-161	VE3EK	66,930-325-103
VE2AXW	147,862-517-143	VE3CUI	44,640-248-90
VE2AH	106,123-396-134	VE3BQL	26,992-241-56
VE2DRC	91,868-386-119	VE3HIS	17,766-189-47
VE2BYR	86,460-393-116	VE3DCK	16,900-130-65
VE2HY	29,796-191-78	VE3OCU	16,092-144-54
VE2BWL	27,738-207-67	VE3DVK	13,392-124-54
VE2DTB	10,608-104-51	VE3GVH	11,400-114-50
		VE3ECP	8704-136-32
		VE3DDP	8036 98-41
		VE3EZO	6864 78-44
		VE3FFW	3618 67-27
		VE3FVS	3100 50-31
		VE3ADH	1408 32-22
		VE3HM (multiop)	230,832-687-168



# AMATEUR RADIO PUBLIC SERVICE

## NTS RACES AREC

*In the Public Interest, Convenience, Necessity*

CONDUCTED BY BILL MANN,\* WA1FCM

### *Refugee Traffic: A Synopsis*

**T**HE STREAM of Vietnamese refugees coming to the U.S. after the downfall of South Vietnam put such a great strain on normal communications facilities coming out of reception camps hurriedly set up for them that supplemental amateur facilities were called for to absorb the overload. At this writing, the need is still with us and growing.

It all started in May, when a contact with the U.S. State Department indicated the need, initially at Ft. Chaffee, Ark. SCM W5UAU was called upon and an amateur facility arranged within the camp, using equipment and operating services volunteered by local amateurs. State officially asked the other two centers (Eglin AFB, Fla., and Camp Pendleton, Calif.) if they needed such facilities, but received no immediate answers. The Guam refugee center politely declined. An additional refugee center was set up at Indiantown Gap Military Reservation (Pa.), and amateur facilities have been established there through the good offices of Lebanon County EC WA3REY and area amateurs. Northern Florida SCM W4RKH is spearheading the effort at Eglin AFB, with good prospect of progress. Nothing much yet from Camp Pendleton, but by the time you read this it may be in operation. These things move fast, once they get started.

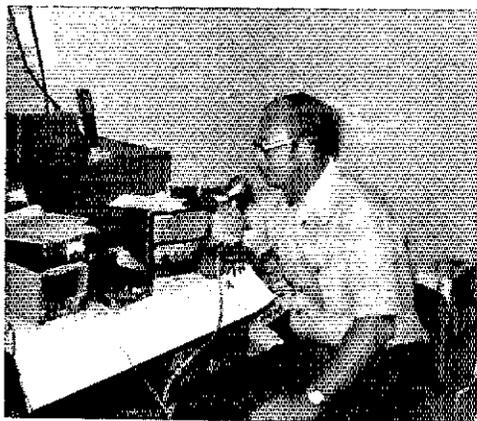
In fact, by the time you read this the whole thing may be history. Our concern right now is in

\* Assistant Communications Manager, ARRL.

making sure the amateur radio part of that history is a proud one. In that context, there have been problems. The refugees, naturally enough, are pretty confused, what with being uprooted from their homes (often separated from families) and faced with making a new life in a new and strange country, complete with language barriers and different customs. They need to be reunited with families who may be scattered about the four U.S.-proper camps (with more being planned, we understand). One of the biggest communications needs is among individuals in the four camps, and "hot line" circuits for this purpose are in the planning stages. Some of the amateur organizers have run into problems with camp officials, with getting volunteers, with equipment, with getting interpreters, and with setting up the wherewithal to handle the large volumes of traffic being generated - traffic of a difficult nature, since the Vietnamese names are far from the Smiths, Joneses, Millers and Johnsons we traffic men are accustomed to.

Also, sad to say, a few personality problems have developed involving amateurs who personally disapprove of the whole thing.

Whenever an unaccustomed load of traffic is dumped onto an amateur facility, this tendency is to try to speed up the handling, and this results in garbles. It shouldn't, but it does. WA3IWX, EC for Lower Bucks County, Pa., has reported difficulty in this respect. Some of the handling operators



Within 15 minutes after a tornado touched down in Duncan, Okla., (Feb. 22), the Stephens Co. AREC Net was activated and handling traffic for Red Cross, c.d., and law enforcement officials, and later handled health and welfare. WB5MOX (left) was net control at the command station at c.d. Later, K5ASW (right) assumed NCS.

Amateurs representing the Univ. of Pittsburgh ARC and the Greater Pittsburgh VHF Society used WR3ADK to provide communications for the annual community walkathon in the Pittsburgh area on March 15. Participants were: (Front, l. to r.) WA3JBQ, WA3YMT, WA3TGR; (back) K3MOB, WA3RVJ and WA3PMT.



have referred to the refugee traffic as "junk" and have refused to become involved with it. But by and large the amateur traffic fraternity is handling the load in stride and not getting too excited about it.

We don't know, at this point, how long the need will continue, but we should gear ourselves for the possibility that it will do so indefinitely — or at least for an extended period of time — and arrangements with the refugee centers should continue with that in mind. After all, that's what traffic nets and traffic men are for — to handle the traffic, whatever traffic exists, and to handle it as well as possible. Anything less than our best efforts when a special need arises is less than standard. So let's not worry, or stop worrying, about whose traffic we are handling or why we are handling it, and give our first attention to *how well* we can do it. And let's bear in mind that the more difficult (i.e., unusual) and numerous the traffic is, the greater is the tendency to guess at names, telephone numbers, signatures, etc., so you can get on with it — but this is the very reason why you should *not* guess. The time when the garble is the most likely to occur is the time when we should take the greatest care that it will not occur. If this means slowdown in the midst of overload, so be it. Any communications system is subject to slowdown under overload conditions. Let's take extra care that what traffic we do handle is handled well and reflects full credit on our amateur service. —WINJM

**SET Glitches.** If you're wondering how Southern Florida became part of the Delta Division and how Southwestern Division came number five in the alphabetical listing of divisions under Local Activity in the Simulated Emergency Test results (July, 1975, *QST*), it's because of a goof-up. Correct position for this section is between Northern Florida and West Gulf Division.

Under Delta Division, Area 8 should be under Louisiana. This raises Louisiana's point total to 2653. Obviously, Louisiana should have been listed as one of the sections which garnered over 2000 points. — WA1FCM

### On Emergency Communications

"CB'ers? Bah-h-h." How many times has each of us as amateurs said this at one time or another? Are we justified in our stand? The fact is that not all CB'ers are inconsiderate and irresponsible "mic-pushers" just as not all amateurs are their antagonists. It is quite possible to find a CB'er going out of his or her way to help the general public when such help is needed. Various CB REACT (Radio Emergency Associated Citizens

Teams) groups have been set up in many areas of the country to supply emergency communications where amateurs have not taken the initiative to do the same thing.

There are a few areas of the country where REACT combines with the AREC in times of disaster. Some of these combined efforts have been very successful especially with cooperation on the part of both parties. The issue here is not to combine AREC with REACT but that in times of emergency much can be gained if both groups work together toward one purpose, that of helping the public. Is not the aid given to the average person more important than the petty prejudices we both as separate emergency groups often seem to share? — WA1QME.

■ For April, 39 Section Emergency Coordinators reported a total AREC membership of 13,439. At this time in 1974, 40 SEC reports were received with a membership of 12,855. Those sections reporting were: Ala, Alaska, Ariz, Colo, Conn, Del, EMass, Hawaii, Ill, Ind, Kans, Ky, Mar, Mich, Minn, Miss, NLI, NC, NFla, NNJ, NTex, Okla, Ont, Org, SV, SDgo, SJV, SBar, SCV, Sask, SFla, SNJ, STex, Utah, Va, Wash, WMass, WNY, WPa.

■ May reports were received from 40 SECs, covering 14,238 members. This compares to May, 1974, when 39 SECs reported 12,964 AREC members. Sections reporting: Ala, Alaska, Alta, Ariz, BC, Colo, Conn, Del, ENY, EMass, Hawaii, Ill, Ind, Kans, Ky, Mich, Miss, Mo, Mont, NLI, NC, NNJ, NTex, Okla, Ont, Org, Oreg, RI, SV, SDgo, SCV, Sask, SFla, SNJ, STex, Utah, Va, Wash, WMass, WPa.

### Traffic Talk

While tuning around 75 meters the other night, we heard several good traffic nets. However, there were a few instances which caused us to perk up our ears and reflect upon the *Operating an Amateur Radio Station* we received from ARRL. Let me relate a few examples.

"Can you handle one for Smithville?"

"Aw gee, normally I could. But tonight I promised to take the XYL to bingo. I'll be leaving right after the net and won't get home until too late to call it in tonight. I leave early tomorrow for Afghanistan for six weeks, so that won't be any help either. Sorry."

(Suggested reply in the above case: "No.")

"...End of message. No more. Over."

"Let's see now . . . 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18. Okay. Roger your message number 52 routine."

(Suggestion: Write in groups of five words to a line — or 10 per line on the typewriter — to facilitate the check at a glance. Then a quick, simple "Roger message," will suffice.)

"Calling the Atlantic Phone Net, Calling the Atlantic Phone Net, Calling the Atlantic Phone Net. This is WX1GGG. Calling the Atlantic Phone Net, Calling the Atlantic Phone Net. This net meets on this frequency at 1600 seven days a week. Stations not interested in the net are asked to move off frequency to give us a clear channel. Calling the Atlantic Phone Net, Calling the Atlantic Phone Net, Calling the Atlantic Phone Net. This is WX1GGG. The handle is Oscar and location is . . . (On and on.)"

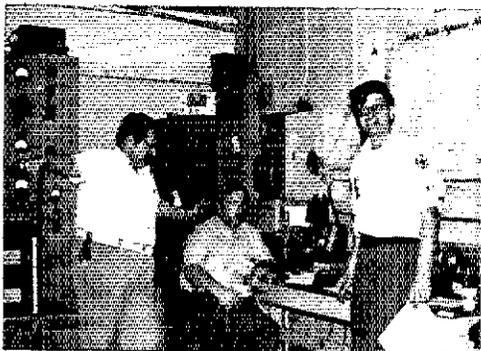
(Suggestion: Time can be saved for more meaningful net business if the net call-up is brief. "Calling the Atlantic Phone Net. This is WX1GGG. This is a directed net. Stations for the Atlantic Phone Net, this is WX1GGG, go ahead.")

Brevity is the key for snappy net operation. It comes rather naturally on cw because everything is spelled out. Yet, with a concerted effort on the part of net stations, phone net operation can also be snappy.

■ *National Traffic System.* The Pacific Area Staff — one of the three groups made up of NTS Officials who advise the Communications Manager on NTS matters within their respective areas — held a meeting in Tucson, Ariz., on June 14. Members in attendance were: K7NHL (Chairman, Pacific Area Net Mgr.), W7KZ (Seventh Region Net Mgr.), WØHXB (Twelfth Region Net Mgr.), K5MAT (TCC-Pacific Director) and W5RE, W6BGF (Members-at-Large). Observers were: WA1FCM (ARRL), WA7KQE (PAM, Ariz.) and WA7JCX (former PAM, Ariz.)

Informal discussions were held the previous evening. The formal session began about 0800, Saturday morning. K7NHL explained that when a higher-level NTS managership becomes vacant or when a Member-at-Large slot opens, he welcomes nominations from other NTS officials within the area as well as suggestions from active NTSers as to who should be the staff's recommendation for appointment by the Communications Manager. All names of nominees, along with a short biography, are circulated to all PAS members. ARRL CD is advised of the person receiving the most votes from PAS.

Reports were given by each manager on his net's status. Members present advised on opera-



tions of other nets whose managers were unable to attend.

A question was raised on assistant manager certificates. It was determined that the net managers had the option of designating an assistant manager and if ARRL CD is advised, an appropriate certificate would be forwarded to the assistant manager along procedures set up for manager certificates.

K5MAT proposed a meeting of all three TCC Directors to discuss numerous topics of mutual concern such as further utilization of DNTS for TCC traffic.

The PAS moved to change their Terms of Reference to include both Daytime and Evening net managers. Also, the staff recommended that the proposed NTS Region Coordinator not be established at this time. It was pointed out that some limitations on numbers of members attending staff meetings may have to be made for future meetings.

Functions of Members-at-Large were discussed.

A motion was made that members should consider section-level and multi-mode experience when electing MALs and that such participation be included by the Chairman in candidate descriptions. The Chairman shall ascertain that the MAL candidate is an ARRL member.

After a discussion on full implementation of DNTS, including establishment of daytime area nets and goals of the Continental Traffic Net operation, the staff unanimously voted general approval of the proposal for full implementation of NTS as stated in the March, 1975, NTS Newsletter. Concern was also expressed for an early input net in the morning and the possibility of CTN being restructured for peak traffic loads.

PAS dismissed the idea of defining DNTS and ENTS so as not to call attention to any distinction.

In connection with emergency planning, PAS discussed cooperation with the Emergency Communications Advisory Committee and establishment of NTS hotlines. The PAS moved that the emergency plan outlined in the March, 1975, NTS Newsletter merits a try in the 1976 Simulated Emergency Test.

W5GHP's proposal for offshore operation of NTS in the Atlantic, Caribbean and Pacific was considered with the general feeling that it sounded like an idea that the PAS could go along with.

It was unanimously voted that ARRL CD investigate the usage of the present QN signals.

Other topics discussed include: TCC statistics, releasing Station I at the end of the hour on PAN, PAN operating procedures, and rate statistics (feeling was expressed to stick to net closing time in determining rate).

Resolutions of Appreciation were extended to retiring net managers and MALs: W5TLK, W6LRU, W6IPW/K6HW, W7DZX and WØLRN.

WØHXB presented an extensive plan to encourage Novice and higher class operators to participate in NTS. PAS unanimously recommended WØHXB's plan to ARRL Hq. for consideration.

This month's Public Service Diary relates an account of amateurs assisting during flooding in Shelby Co., Tenn., on March 12. Operators at W4EM in the Red Cross Building are: WN4JDX, WA4EAV and WB4CIW.

The meeting was adjourned at 1807.

The above was taken from rough notes kept during the meeting and does not constitute minutes of the meeting. —WAIFCM

■ **May reports.** Only ECN had perfect representation on EAN. An 8th Annual 2RN certificate was awarded to W2FR, 2nd Annuals to WA2s DSA DVE ICB and 1st Annuals to W2HVA, W2JRX, D3RN certificates went to WA3s WRN ZAS. W4HFU reports severe QRN all but wiped out a few RN5 sessions and really hampered most of the others. Skip conditions affecting both DRN5 and DRN6. D9RN stations eligible for certificates are W9HOT, K9HXH and WB9s JSW MDS NKC NME. DTWN certificates were issued to WSTWZ, W7BE, K7s NTG VVA, WA7VTM, WA0YNQ.

Net	Sessions	Traffic	Avg.	Rate	%Rep.
EAN	31	1712	55.2	1.183	95.7
CAN	31	1170	37.7	.818	99.5
PAN	31	1020	32.9	.755	94.1
DEAN	31	433	14.0	.534	85.5
1RN	60	618	10.3	.586	90.3
D1RN	31	130	4.2	.318	74.7
2RN	62	569	9.2	.854	98.4
3RN	62	710	11.4	.526	95.2
D3RN	30	303	10.1	.511	99.2
4RN	52	513	9.8	.361	79.4
D4RN	31	29	.9	.185	76.6
RN5	61	697	11.4	.304	84.2
DRN5	31	91	2.9	.135	73.4
RN6	22	417	19.0	.389	67.7
DRN6	62	296	4.8	.165	60.0
RN7	62	340	5.5	.400	80.2
DRN7	40	50	1.3	.142	41.1
8RN	600	345	5.8	.334	91.9
D8RN	28	92	3.2	.396	61.3
9RN	62	546	8.8	.362	87.1
D9RN	31	72	2.3	.228	83.9
DTRN	51	94	1.8	.133	81.5
ECN	62	270	4.4	.321	84.0
DECN	29	26	.9	.049	45.0
TWN	62	286	4.6	.175	91.6
DTWN	21	65	3.1	.116	48.4
TCC Eastern	113 <sup>1</sup>	661			
TCC Central	81 <sup>1</sup>	523			
TCC Pacific	114 <sup>1</sup>	743			
Sections <sup>2</sup>	2948	11818	4.0		
Summary	4084	24369	6.0		
Record	5310	29677	18.4		

<sup>1</sup>TCC functions not counted as net sessions.

<sup>2</sup>Section and local nets reporting (93): AENB AENI AEM AENR AENW AENX (AL), ASN (AK), ATEN HARC (AZ), OZK (AR), NCN NEN NTN SCN (CA), CCN SSN (CO), CN CPN (CT), DEPN DTN (DE), FAST FMTN FPTN GN QFN QFTN TPTN VEN (FL), IMN (ID,MT), ILN (IL), TLC (IA), KPN KSN QKS (KS), KNTN KTN (KY), LAN LSN LTN (LA), MDCTN MDD (MD), WMN WMPN (MA), MACS QMN (MI), MSN-1 MSN-2 MSPN-E MSPN-N PAW (MN), MSBN MSN MTN (MS), NHVTN (NH,VT), NJN NJSN (NJ), NLI (NY), CN NCSSBN THEN (NC), BN MASER OSSBN Q6Mtr (OH), OAN OPEN OTWN STN (OK), LBAREC PFTN WPA (PA), TEX TEX-SS TTN (TX), BUN UCN (UT), VN BSBN VSN (VA), NSN WSN (WA), WEN WEN-CW (WV), WSSN (WI), MTN (MB), APN (Mar.), CMN GBN ODN OPN OQN WOEN (ON), WQV/UHF (PQ).

**Transcontinental Corps**

After 12 years, W4UQ had to drop his Central/Eastern sked on Sundays. Annual TCC-E certificates went to W1s NJM QYY, W2s GKZ KAT/3, W2RKK, K3s CH MVO, W4UQ, K4KNP, WB4SGV, W8PMJ, K8KMQ, VE3SB. First-timers to WA1s MSK POJ.

Area	Functions	%Successful	Traffic	Out-of-Net Traffic
Eastern	124	91.1	1896	661
Central	92	88.0	1080	523
Pacific	124	91.9	1535	743
Summary	340	90.6	4511	1927

The TCC roster (May): Eastern Area (W2FR, Dir.) - W1s NJM QYY K1GMW, WA1s MSK POJ SJR, W2s FR GKZ KAT/3, WA2s DSA ICB PJL UWA, WB2s PYM RKK, W3EML, K3s CB D7B MVO, WA3RBS, W4UQ, K4KNP, WB4SGV, W8PMJ, K8KMQ, WA8HG, WA8HT, VE3SB. Central Area (K0AEM, Dir.) - W4OGG, WB4DXN, W5s GHP MI QU UGE UIJ, WB51QU, W9s CXY DND NXG, WA9EED, WB9KPX, W0s HI INH LCX QMY ZHN, K0CVD, WA0s MLE TNM. Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, W6s BGF BYB EOT DJF QAE RSY VZT, K6HW, WA6s DEI TLV, WB6s AKR IRL OYN, W7s BQ DZX GHT KZ, K7s IWD NHL NHV QFG, W0s LO LRN, K0DRL, WB0s AXW HC'K, VE7ZK.

**Independent Nets (May)**

Net	Sessions	Traffic	Check-ins
Hit & Bounce Slow	18	103	202
1MRA	27	430	1020
North American Traffic	27	338	385
Mission Trail Net	31	181	1267
Central Gulf Coast Hurricane	31	66	1785
20 Meter ISSB	21	644	238
75 Meter ISSB	31	642	1173
Hit & Bounce	31	862	348
7290 Traffic	42	413	1504
Washington Region PON	14	41	159
Northeast Traffic	19	55	114

**BRASS POUNDERS LEAGUE**

Winners of BPL Certificates for May Traffic

Call	Orig.	Recd.	Rel.	Del.	Total
W3CUL	249	1002	924	46	2221
W0WYX	29	719	191	523	1467
W3VR	233	398	325	14	970
W6RSY	32	494	436	4	966
K0ZSO	0	452	0	452	904
K9CPM	35	274	67	451	807
WB0HOX	135	310	293	7	745
WA3JZAS	36	300	292	6	634
W44AVN	32	282	264	18	596
W430VB	146	212	208	4	570
KH6IAC	98	260	182	30	570
W3MQP	0	246	278	0	524
W3ULI(Mar.)	298	1209	1101	73	2681
W3VR(Mar.)	241	366	306	19	932
W3WRE(Mar.)	37	255	234	11	532
W3UHF(Feb.)	233	1791	1601	71	3696
W3VKT(Feb.)	195	471	421	21	1114

**More-Than-One-Operator Station**

WA3PHO	66	575	400	50	1091
WA0KHI	100	289	186	101	676

**BPL for 100 or more originations-plus-deliveries**

K4KDI	284	WA3WRN	111	WB0KTI	101
WA3HW	265	W0FER	110	W430UD	100
WA3ATQ	187	WB2UJD	108	WB5HVV	100
WB8BZX	186	K5TTC	102	WA3ATQ(Apr.)	172
K6JAO	148	WA0AUX	102	WB4DZL(Apr.)	101
WA1QMF	147	K0CVD	101	WA3AQT(Mar.)	191
K1PNB	115			WA3AQT(Feb.)	160

BPL Medallions (see December, 1973 QST, p. 59, have been awarded to the following amateurs since last month's listing: W1DMH, K4AIZ, W44AVN, WB61IG, W6JXK, K6RPN, W01R, WB0HHC.

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.

(Continued on page 142)

"egged on" by the negative terminal of the dc power supply — is emitting electrons; but it is *negative* with respect to the other side of the power source (the positive side), which has relatively fewer electrons and therefore is pulling electrons off the plate to even things up. The resulting plate current can be made to flow through a load, where its energy can be utilized. The load may be an antenna, earphones, resistors, transformers, other tubes, or whatever you want it to be.

3. **Control Grid.** A grid is basically a mesh or coil of fine wire placed between cathode and plate. Grids are often designed with beautiful, intricate patterns, and may look (at least to this YL) like silver ladders, silver spider webs, or filigree. In tubes containing a grid or grids of any kind, electrons emitted by the cathode must pass through the grid openings if they are to reach the plate, and a **control grid** is placed in some tubes to *control the number of electrons* passing through. This control, which is necessary if the tube is to perform certain desired functions, is partially achieved by putting a suitable *negative charge* referred to as a **negative bias**, on the control grid. This negative bias (negative, that is, with respect to the cathode) causes the grid to repel some of the on-coming electrons (like charges repel each other) and send them back to hover around the cathode like moths around a street light.

Complete control of the current from cathode to plate involves not only this negative bias placed on the control grid by a dc power supply, but also involves a small voltage from radio signals coming in onto the grid from the antenna. The alternating current of the incoming radio signals changes the total amount of voltage on the grid, and causes the grid to regulate the flow of electrons in a manner that has been compared to Venetian blinds regulating the amount of light coming into a room. It is important to know that *a very small change of bias voltage on the control grid can cause a very large change in the number of electrons flowing toward the plate* — a phenomenon which is the basis for amplification.

4. **Screen Grid.** This electrode is placed between the control grid and the plate, and acts as a kind of shield between them to keep them from interacting like the plates of a capacitor and creating unwanted capacitance within the tube.

5. **Suppressor Grid.** The suppressor grid can be thought of as a protector of (or a protection from) overly-exuberant electrons. As electrons rush to the plate at approximately the speed of light, they may bounce back from the plate like tennis balls off a wall, or they may hit the plate with such force that they knock off many of the electrons already there — a phenomenon called *secondary emission*. The suppressor grid, placed between the screen grid and the plate, and with a negative bias (negative with respect to the plate) placed on it, repels the retreating electrons and sends them back

to their original destination — the plate.

### Types of Tubes

1. A **diode**, the simplest type of vacuum tube, has only two electrodes — a cathode and a plate.

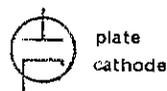


plate  
cathode

(The prefix "di", meaning two, is also found in the term *dipole*, which refers to a kind of antenna made up of two separate conductors.) Diodes are commonly used in power supplies to *rectify* alternating current and change it into pulsating direct current. Current in diodes can flow in only one direction, and when the alternating current being used as a source of energy reverses direction from negative to positive (from pushing electrons to pulling them) the diode current must stop and wait for the next negative half of the cycle before starting again. The wait, of course, isn't a long one, since current from wall outlets changes direction 120 times per second. In addition to acting as rectifiers, diodes are also used to *modulate* carrier waves by adding information to them, and to *detect* or *demodulate* carrier waves by subtracting information from them.

2. A **triode** has three electrodes — cathode, plate, and control grid.



control  
grid

Triodes, like diodes, are used as *detectors*, but their chief use is to *amplify* or increase the strength of radio signals.

3. A **tetrode** has four electrodes — cathode, plate, control grid, and screen grid.



screen  
grid

It is used to *amplify signals*, and has an advantage over a triode because it usually does not have to be *neutralized* — an involved process needed to offset the problems occurring when the plate and the control grid interact like the plates of a capacitor.

4. A **pentode** has five electrodes — cathode, plate, control grid, screen grid and suppressor grid.



plate  
screen grid  
control  
grid  
suppressor grid  
cathode

It is chiefly used as a high-gain or high-power amplifier.

Vacuum tubes are still the *star players* in many pieces of amateur radio equipment. However, they are gradually being supplanted by another component, the transistor, a circuit team member with *superstar* status.

Part V-B on transistors will appear in a future issue.

# Happenings of the Month

## ELECTION NOTICE

To All Full Members of The American Radio Relay League Residing in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and South-eastern Divisions:

Nominations are now in order for director and vice director in these eight divisions of ARRL. Only ten Full Members need to join together in naming a candidate by a petition which must reach the Secretary of ARRL by noon EDST September 20.

Democracy within our League starts with these nominations. If more than one candidate is nominated, and each meets the requirements explained below, then all Full Members of the League in the division will have a chance to choose from among the candidates by secret ballot between the week of October 7 and noon of November 20.

The election procedures, outlined briefly here, are specified in the Articles of Association and Bylaws; copies will be sent to members free upon request. An informational pamphlet generally outlining duties and responsibilities of elected League officials is also available for the asking.

Any eligible Full Member of the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Divisions can be nominated for either director or vice director. If one person is nominated for both offices, his nomination for director will stand and that for vice director will be void; no person may simultaneously be candidate for both positions.

Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the Division, or inability to serve, careful selection of candidates for vice director is just as important as for director. The following form for nomination is suggested:

*Executive Committee  
The American Radio Relay League  
Newington, Conn. 06111*

*We, the undersigned Full Members of the ARRL residing in the . . . . . division, hereby nominate . . . . . of . . . . . as a candidate for director; and we also nominate . . . . . of . . . . . as a candidate for vice-director from this division for the 1976-1977 term.*

*(Name Call City Zip Date)*

The Hon. Dale Milford, Congressman from the 24th District of Texas, (left) gets reacquainted with amateur radio at an informal ham get-together near Dallas. Dale used to be DL4AD. (Pix from WBSHIG)

The signers must be Full Members in good standing. The nominee must be the holder of at least a General Class amateur license, or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a Full Member of the League for a continuous term of at least four years at the time of his election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communications, is commercially or governmentally engaged in frequency allocation planning or implementation, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in Newington, CT, by noon EDST of the 20th day of September, 1975. There is no limit to the number of petitions that may be filed on behalf of a given candidate, but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice director. To be valid, a petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures since nominators are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates for both director and for vice director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function.

Voting by ballots mailed to each Full Member will take place between October 8 and November 20, except that if on September 20 only one eligible candidate has been nominated, he will be declared elected.

Present directors and vice-directors for these divisions are - *Atlantic:* Harry A. McConaghy, W3SW and Jesse Bieberman, W3KT; *Canada:* A. George Spencer, VE2MS and Ronald J. Hester, VE1SH; *Dakota:* Thomas M. Kulas, WA0IAW and Garfield A. Anderson, W0KE; *Delta:* Max Arnold,



W4WHN and John H. Sanders, WB4ANX; *Great Lakes*: Richard A. Egbert, W8ETU and William E. Clausen, W8IMI; *Midwest*: Paul Grauer, W0FJR and Richard W. Pitner, W0F7O; *Pacific*: J. A. Doc Gmelin, W6ZRI and Albert F. Gaetano, W6VZT; *Southeastern*: Larry E. Price, W4DQD and Ted R. Wayne, WB4CBP.

Full Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

July 1, 1975  
JOHN HUNTOON, W1RW  
*Secretary*

## ARRL FOUNDATION ADOPTS FUND-RAISING GOALS

At its Annual Meeting in Dayton, Ohio, on April 25, the Board of Directors of the ARRL Foundation adopted a project schedule for the coming year which is based on a fund-raising goal of \$300,000. The following statement of objectives was adopted as a guide for Foundation activities:

It is the objective of the Foundation to provide financial assistance through a system of grants for extraordinary projects that are beneficial to and advance the Amateur Radio Service. It is not the intention of the Foundation to support activities that would normally be funded by other amateur organizations such as the ARRL. Projects that warrant Foundation support should have specific end products and a recognizable and advantageous cost/benefit ratio.

The Foundation authorized a grant to the Radio Amateur Satellite Corporation (Amsat) in the amount of \$20,521 for operations management of Oscars 6 and 7, which are now in orbit. In addition, the following project schedule was adopted:

\*An Oscar exhibit similar to the one established at Kennedy Space Center (see *QST* for February, page 76) for Houston or another NASA installation; \$10,000 sought.

\*Two other Oscar exhibits for other locations; \$20,000 sought.

\*Follow-through personnel in support of the Oscar education program; \$150,000 sought.

\*Program to investigate ways of orienting new amateurs to amateur radio; \$6,000 sought.

\*Replacing of the popular film *The Ham's Wide World* with a new, updated version; \$30,000 sought.

Foundation officers for the coming year are Peter J. Schenk, WA4GFY, president; Douglas Watson, W6VM/W6DW, vice president; Larry E. Price, W4DQD, secretary; and Larry J. Shima, W0PAN, treasurer. At the time of the Foundation's Annual Meeting, all of the Foundation officers were also serving as directors. However, at the ARRL Board Meeting on May 16, Mr. Shima submitted his resignation as a director of the Foundation, though he continues as its treasurer. His place on the Board has been filled by Max Arnold, W4WHN, ARRL Delta Division Director. Other members of the Foundation Board are Lloyd D. Colvin, W6KG; Richard A. Egbert, W8ETU; L. Phil Wicker, W4ACY; Harry V. Williams, W1MBK/WB4YGE; and Stan Zak, K2SJO.

The ARRL Foundation is a charitable organization under the provisions of Section 501(c)(3) of the Internal Revenue Code. Contributions are tax-deductible under Section 170 of the Code.

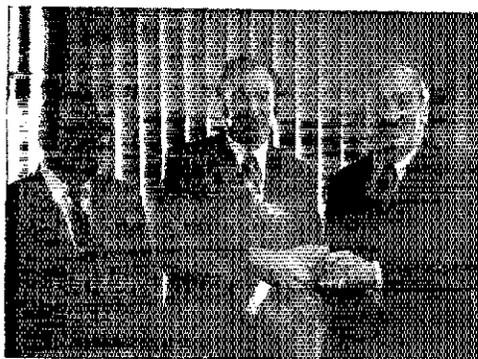
## COWLING RESIGNS; HESLER VICE DIRECTOR

Howard R. Cowling, VE3WT, vice director from the Canadian Division since January 31, 1974 has resigned; a change in his work poses a possible conflict of interest, he feels.

In accordance with the ARRL Articles of Association, President Dannals has appointed Ronald J. Hesler, VE1SH, of Sackville, New Brunswick vice director for the term ending at noon, January 1, 1976; the appointment was effective June 24. Ron is 54, retired from full-time business, but active in music publishing. Among his amateur radio activities: assistant director, Canadian Division, ARRL 1974-1975; Section Emergency Coordinator, 1974-present; co-founder, past secretary, past editor, VE1RPT, Association, past president, Sackville Amateur Radio Club; past district manager, Canadian Amateur Radio Operators Association; past phone activities manager, OPS, OBS; life member ARRL, QCWA; former VE1KS and VE2QF; licensed since 1937. Ron shares the avocation with his wife Donna, who is VE1YX.

## CANADA ADOPTS MULTIPLE CHOICE TEST

New, multiple choice type examinations for prospective Canadian amateur and advanced amateur radio class operators are being introduced this year by the Department of Communications.



The Hudson Amateur Radio Council (HARC) contributed \$1500 of the proceeds from the 1974 National ARRL Convention to the ARRL Foundation's fund for the amateur satellite program. Here, Stan Zak, K2SJO (center), ARRL Hudson Division Director and also a director of the Foundation, accepts a check from Sy Schlitt, K2BM, HARC president, while George Diehl, W2IHA, Hudson Division vice director, looks on.

The new amateur exam was introduced in January, while the advanced class test will be in use by early summer.

Revisions to existing procedures for testing the proficiency of ham radio enthusiasts include:

- An up-dating of the content of the written, theory and General Radio Regulations sections of both classes of exam;
- Adoption of the multiple choice format;
- Increased emphasis on such state-of-the-art communications devices and techniques as transistors and solid-state circuits, single sideband and frequency modulation (fm) theory;
- A change in the pass mark for the written part of both exams to 70% from 75% and
- Improved Morse code tapes for testing proficiency in code reception.

A new syllabus of examination is being prepared and will soon be available in departmental field and regional offices coast-to-coast. Prospective amateurs, or those studying for their "advanced" certificate tests, who have based their preparations on the current syllabus should have little difficulty with the new-look exams.

Basic standards of knowledge required in the various sections of the two exams (written, oral, diagrams and Morse transmission and reception) are not changed. They continue to be based on the minimum knowledge the department considers necessary to satisfy Radio Act and international requirements.

The present amateur class examination requires the candidate to draw and be prepared to explain seven simplified schematic diagrams of basic electronic circuits. It is proposed to replace this requirement with a new provision requiring knowledge of eight more detailed schematics - many of them different from the old seven. The DOC examiner would select two to be drawn and explained by the candidate.

The Department now plans to update its amateur examinations annually, to delete questions found to be poor and to keep content in phase with the state-of-the-art in amateur communications technology.

DOC believes adoption of the multiple choice format will greatly streamline examinations, making them less time-consuming for candidates and examiners alike.

There are about 15,000 amateur radio operators in Canada, one of the world's leading nations in total "ham" population.

## REPEATER LINKING PERMITTED

The Federal Communications Commission has deleted Section 97.89(c) of its rules which had prohibited tandem operation or linking of more than two repeater stations. Licensees/trustees of each station to be linked must submit a system network diagram showing all related stations in the system, including any auxiliary link stations which may be used to effect the interconnection.

Linking became permissible on July 11, 1975, provided that the revised network diagrams had been submitted as required in Section 97.47(c):

- (e) Should the licensee desire to effect changes to his station which would significantly change the system network diagram or other technical and operational information on file with the Commission, revised showings for the proposed alterations shall be submitted for approval. An application for modification of the station license is not required.

The deregulation of repeater linking had been requested by ARRL in RM-2349, and was the subject of Docket 20073, for which the Notice of Proposed Rulemaking had been adopted on June 4, 1974. The Commission pointed out that this rules deletion did not of itself authorize crossband repeater operation, which is separately under consideration in Docket 20113.

## AUTOMATIC CONTROL OF REPEATERS

Additional deregulation of repeaters occurs effective July 28 under the Report and Order, Docket 20112. In July, 1974, the Commission proposed a number of changes in its regulations to permit automatic control of amateur repeaters. The text, together with the new rules, appears below:

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554

In the Matter of

Amendment of Part 97  
regarding the automatic control of repeater stations  
in the Amateur Radio Service.      DOCKET No. 20112

### REPORT AND ORDER

By the Commission:

1. On July 17, 1974, the Commission adopted

We've run a lot of pictures about a lot of amateur service awards, but this one has to be the most unique. The award's physical form is the low-powered transmitter first described in the 1929 edition of *The Radio Amateur's Handbook* - and it actually works! The QCWA Public Service Award to Eunice Bernon, K8ONA of Cleveland Heights, Ohio, was built and presented by Chapter President Werner Sauber, W8KC. Eunice is guiding light of the Apricot Net and a regular columnist for the *Cleveland Plain Dealer* on amateur radio. (Photo tx to WA8QFK)



a Notice of Proposed Rule Making in the above-entitled matter which was published in the Federal Register on July 31, 1974 (39 FR 27705). Proposals in this proceeding contemplated amendment of Part 97 of the Commission's Rules to authorize the automatic control of repeater stations and auxiliary link stations used in repeated systems in the Amateur Radio Service, i.e., the operation of such stations whether or not a control operator is on duty at a control point. Comments as to these proposals were submitted by the parties listed in Appendix A. Each of these comments has been carefully considered as indicated in the following discussion.

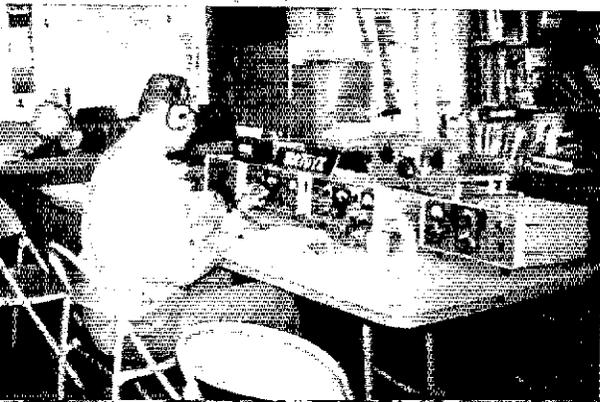
2. By way of background, in 1972, the Commission formalized specific rule provisions for the operation and technical development of amateur radio stations which can receive and automatically retransmit the signals of other amateur stations. (See the Report and Order in Docket No. 18803, 37 FCC 2d 225, 1972.) Prior to these rule changes, repeater stations had been authorized in the Amateur Radio Service under limited general rules that related primarily to any remotely controlled station. The new repeater provisions took cognizance of many of the special requirements for these stations and led to tremendous increase in the interest, use, and sophistication of repeater facilities for amateur radiocommunications. In many areas, this demand for repeater capability necessitated a 24-hour per day operational schedule. However, the number of persons available to serve as duty control operators for repeater systems on an around-the-clock basis is limited, and where these people could not be found, repeater stations had to shut down, sometimes for extended periods. To relieve this situation, amateur licensees are developing techniques for use of repeater stations that are automatically controlled and do not require a control operator to be on duty. The Commission has examined these recent advancements in technological capabilities and improvements in methods for remotely controlling amateur stations and we have found that these developments justify rule provisions to permit automatic control of repeater stations and auxiliary link stations used in repeater systems on a regular basis, provided that certain conditions are met. Essentially, the conditions proposed in the Notice of Proposed Rule Making would require: (a) control operators to employ devices and procedures that would reasonably assure compliance with the technical and operational standards for amateur radio stations; (b) all transmissions of an automatically controlled repeater station to be monitored in real-time, or be recorded and reviewed within a reasonable period by the station control operator for improper operation (c) procedures to be implemented for discontinuing operations in the event of malfunction or improprieties.

3. The comments substantially supported proposals to allow automatic control methods as being timely and in general conformance with today's practical requirements for amateur repeater operations. There was concern, however, with certain of the requirements related to the responsibility of the station licensee and the control operator for monitoring transmissions by licensees who utilize the repeater facility. Here, a number of parties argued that recording and reviewing transmissions over an automatically controlled repeater station when they were not monitored by a control operator would involve expense and time which were not warranted since "user" violations could be controlled by the long-standing self-policing mechanism which prevails in the amateur bands. It was recommended, therefore, that this requirement be modified by eliminating or relaxing the recording and review procedure we had proposed, and by relying, instead, upon other amateurs to monitor the repeater operation and report violations to the control operator. The delayed review procedure is not mandatory since other options are available. Accordingly, it is retained to permit use of this method for late hour emergency repeater access.<sup>1</sup>

4. The Commission recognizes that it is often not feasible to follow-up effectively on transmissions that will have occurred hours earlier and that in these instances the amateur self-policing effort could be beneficial. In the Notice, we acknowledged that the success of an automatic repeater control program would depend to a great extent upon the Amateurs' demonstrated ability to monitor and effectively control their group. In light of these factors, it is felt that an exception is warranted to apply to the operation of "closed repeaters," i.e., repeaters used only by persons specifically authorized by the control operator with means provided to limit use of the repeaters. This will afford amateurs considerable flexibility in the operation of automatically controlled repeaters. A control operator can monitor the repeater in real-time; or the transmissions can be recorded and reviewed by the control operator; or a closed repeater can be employed without any monitoring requirement; or a combination of these.

5. We'll delete the requirement that, as a condition for automatic control, the names of designated control operators, duty control operators and station licensee be filed with the Engineer-in-Charge of the radio district in which the station is located. We believe that the safeguards incorporated in our Rules and the desire by amateurs to be self-regulating are sufficient to insure compliance with our Rules. Should problems develop,

<sup>1</sup> Inter-linked multiple repeater systems designed primarily for emergency communications will be considered for exception on a case-by-case basis.



Small public events are worthwhile showcases for amateur radio. With less-overwhelming exhibit areas and crowds, the viewing public can absorb more of your "message." Here is the exhibit of J. E. Corwin, WA7OYX at an Art, Craft and Hobby show of First Presbyterian Church, Mesa, Arizona.

we will, of course, reopen this matter and consider revision of Section 97.88 of our Rules to require posting additional information at the transmitter location.

6. Implementation of automatic control will require no special license applications, modifications or showings. In order to operate a repeater station or an auxiliary link station as part of a repeater system by automatic control, the station(s) must first be licensed in the conventional manner, for either local control or for remote control. Licensees may then use any or all of the various options permitted under the Rules.

7. A number of parties recommended additional limitations or requirements for automatic control of amateur repeater stations. For example, there were suggestions for special logging requirements and, also, for restrictions on the number of continuous hours that a repeater station could be operated under automatic control. However, the Commission does not envision any present purpose to be served by provisions of this nature.

#### *Environmental Considerations:*

8. In accordance with the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321-4327, we are required to prepare an environmental impact statement when the adoption of a rule appears to carry with it significant environmental consequences. As regards existing amateur radio station facilities and operations, we find that the rule changes proposed in this proceeding will not have any significant impact on the environment. It is possible, however, that these rule amendments could result in requests to license additional stations. In this respect, applicants under Part 97 may be required to provide environmental information as specified in Sections 1.1305 and 1.1311 of the Commission's Rules so that for the proposed facilities, the potential environmental consequences may be carefully examined on a case-by-case basis.

9. In consideration of the foregoing, the Commission finds that adoption of rules to permit the automatic control of amateur repeater stations under specified conditions and limitations is in the public interest, convenience, and necessity. The specific rule amendments are set forth in Appendix B.

10. Accordingly, pursuant to authority contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, IT IS ORDERED That, effective July 28, 1975, Part 97 of the Commission's Rules IS AMENDED as shown in the attached Appendix B. IT IS FURTHER ORDERED That this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Vincent J. Mullins  
Secretary

Amateur radio may have much to offer shut-ins. Here, Bill Gouthro, VE3FRG, (center) introduces amateur radio to Ken Cross (left) and Al Lucas (right) at Extencicare, during a visit by the Oakville (Ontario) Amateur Radio Club. (*Oakville Journal Record photograph*).

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is amended as follows:

#### *97.3 Definitions.*

(n) *Control.* Techniques for accomplishing the prerequisite responsibilities for the immediate operation of an amateur radio station. Must be one or more of the following:

(1) *Local control.* Manual control, with the control operator monitoring the operation on duty at the control point located at a station transmitter with the associated operating adjustments directly accessible. (Direct mechanical control, or direct wire control of a transmitter from a control point located on board any aircraft, vessel, or on the same premises on which the transmitter is located, is also considered local control.)

(2) *Remote control.* Manual control, with the control operator monitoring the operation on duty at a control point located elsewhere than at the station transmitter, such that the associated operating adjustments are accessible through a control link.

(3) *Automatic control.* The use of devices and procedures for control so that a control operator does not have to be present at the control point at all times. (Only rules for automatic control of repeater systems have been adopted. Automatic control of all other types of amateur radio stations must be approved by the Commission on a case-by-case basis.)

#### *97.79 Control operator requirements.*

(b) Every amateur radio station, when in operation, shall have a control operator at an authorized control point. The control operator shall be on duty, except where the station is operated under automatic control. The control operator may be the station licensee, if a licensed amateur radio operator, or may be another amateur radio operator with the required class of license and designated by the station licensee. The control operator shall also be responsible, together with the station licensee, for the proper operation of the station.

#### *97.88 Operation of a remotely controlled station.*

(c) Except for operation under automatic control, as provided by 97.110(c) and 97.111(g), a control operator designated by the licensee must be present at an authorized control point while the station is being remotely controlled. Immediately prior to, and during the periods the remotely controlled station is in operation, the frequencies used for emission by the remotely controlled transmitter must be continuously monitored by the control operator. The control operator must terminate transmission upon any deviation from the rules.

#### *97.110 Operation of an auxiliary link station.*



(a) An auxiliary link station may use amateur frequency bands above 220 Mhz, excepting 435 to 438 MHz, for emissions. Except as provided in 97.110(c), frequencies below 225 MHz used by an auxiliary link station shall be monitored by the control operator immediately prior to, and during, periods of operation.

(c) An auxiliary link station licensed either for operation by local control or remote control may also be operated by automatic control when it is licensed as a part of a repeater station system which is being operated under automatic control. Both the auxiliary link station and the repeater station must appear on the system network diagram on file with the Commission.

#### 97.111 Operation of a repeater station.

(a) Emissions from a repeater station shall be discontinued within 5 seconds after cessation of radiocommunications by the user station. Provisions to automatically limit the access to a repeater station may be incorporated, but are not mandatory.

(b) Except for automatic control operations as provided in paragraph (g) of this section, the transmitting and receiving frequencies utilized by the repeater station shall be continuously monitored by the control operator immediately prior to, and during, periods of operation.

(g) A repeater station licensed either for local control or for remote control may also be operated under automatic control where:

(1) Devices and procedures have been implemented to assure that compliance with the rules can be accomplished without the duty control operator present at the control point at all times the station is in operation.

(2) All radiocommunications transmitted by the station are monitored by the duty control operator in real-time, or are recorded so that they can be reproduced and reviewed within 72 hours. The recordings shall be preserved for a period of at least 30 days, in the possession of the station licensee, and must be made available to the Commission upon request. However, real-time monitoring, or recording and review of repeater operation is not required when the facility is operated as a closed repeater, i.e., the repeater station employs means to restrict usage to persons specifically authorized by the control operator or station licensee.

(3) Upon notification by the Commission of improper operation of a station under automatic control, said operations must be immediately discontinued until all deficiencies have been corrected.

### RESTRUCTURING DEADLINE EXTENDED

The American Radio Relay League has requested, and received, an extension of time for filing comments in the restructuring matter, Docket 20282. Original deadline was June 16, now extended to July 16. "Reply comments," those in response to another party's filing, were due July 16; the new date is August 18.

The views to be expressed can be found in the minutes of the May 15-16 Board meeting, beginning on page 78 of the July QST, and are summarized in the July editorial as well. Also of interest in that issue is the report on the ARRL Membership Opinion Survey, beginning on page 49.

### RTTY LIBERATION

In July "Happenings," another article reported the ARRL request to FCC for deletion of speed restrictions on radioteletypewriter transmissions, and modifications of Section 97.69(a) to permit use of such codes as ASCII (American Standard Code for Information Interchange).

This request has been assigned the identification, RM-1550. Although the technical time limit for comments from other people has passed, in practice any interested party may still write to the Commission about this petition, either in support or opposition. Such comments are useful to the FCC staff in determining whether a Notice of Proposed Rulemaking should be issued.

### AMATEUR RADIO WEEK IN ALABAMA

June 23 through June 29 was declared Amateur Radio Week in Alabama by Governor George C. Wallace. The proclamation mentions amateur operations during emergencies; the people-to-people effects of daily communications between amateurs of the state and those elsewhere; and amateur preparedness through such activities as Field Day.

If your state observed Amateur Radio Week, but you have not yet seen mention of it here in "Happenings," please drop a line to WIUED at hq. with the details.

### DOC WALSH, W2BW

We regret to report the death of Dr. A. Lafayette Walsh, W2BW, of New York City, from a heart attack suffered May 22 at his dental office. Doc was director from the Hudson Division, ARRL from 1929 through 1932. He was a Fellow, Radio Club of America; a founder and Charter Member, Quarter Century Wireless Association; and founder and past president of the New York Radio Club. Originally operating before World War I from 2SP in New Jersey, Doc was active as an amateur right up until his death, having checked in with the Old Goats Net at eight A.M. on the 22nd.

### EXECUTIVE COMMITTEE MINUTES

#### Minutes of EXECUTIVE COMMITTEE MEETING

No. 354

June 7-8, 1975

Pursuant to the due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters offices of the League in Newington, Conn., at 9:00 A.M., June 7, 1975. Present: President Harry J. Dannals, W2TUK, in the Chair; Directors Roy L. Albright, W5EYB, Max Arnold, W4WHN, John Griggs, W6KW, and Robert Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. Also present were General Counsel Robert M. Booth, Jr., W3PS; Secretary John Huntoon, W1RW; Assistant Secretary David Sumner, K1ZND; Senior Assistant Secretary Perry F. Williams, W1UJD; and Hudson Division Director Stan Zak, K2SJO.

(Continued on page 150)

## FCC Acts on Linking and Automatic Control

In separate actions the FCC has released reports and orders on linking and automatic control. See "Happenings of the Month" in this issue for more details. Briefly, ARRL had petitioned FCC to remove the restrictions of linking more than two repeaters in tandem. FCC agreed with ARRL and in Docket 20073 relaxed the rules. It is now possible to link as many repeaters as desired (effective July 11th). However, crossbanded repeaters are not permitted, and a separate docket will deal with that subject. Now is the time to consider improving emergency setups with the use of linked repeaters.

At press time we don't have all the fine print from the Report and Order on automatic control. However, the Public Notice stated in one part, "All transmissions of an automatically controlled repeater station must either be monitored in real time or be recorded so that they can be reproduced and reviewed within a reasonable period of time by the station control operator for improper operation." Our interpretation would be that the only review of the recorded transmissions necessary would be in the event of a reported instance of "improper operation."

Another type of automatic control mentioned is, "Repeaters that are used only by persons specifically authorized by the control operator (closed repeaters) will not require monitoring." Our understanding of this type of operation means a coded-access, closed repeater that is only open to amateurs who are designated by the control operator. Informally, the ARRL Repeater Advisory Committee (VRAC) has been opposed to the concept of the majority of repeaters being closed. Let's hope that closed systems remain the rarity.

In the original Report and Order on Docket 18803 (concerning repeater rules) FCC made a statement about automatic control that bears repeating at this time. "Despite our efforts to forecast future needs and provide appropriate rules, we recognize that in all probability further advancements in remote control and automatic control technology will necessitate additional amendments. We urge interested parties having information and suggestions in these areas to submit them to the Commission for consideration." We would be remiss if we didn't give credit where it was due. Several amateurs with repeater licenses, particularly Dick MacKay and Fred Deeg of the Southern California Repeater Council, obtained STAs from FCC and experimented with automatic control. The results of these tests have produced the automatic control changes in the amateur rules.

This is not to say that we stop at this point. Let's try out the changes. After we have operated under the new conditions for a period of time, we will be in a position to see what further changes might be needed.

## Repeaters and Emergency Breakers

We notice that more and more repeater club bulletins are taking up the subject of the de-

terioration of operating habits by the users of their repeaters. It should be stated at the outset that every repeater group has the right to specify how its repeater should be used. However, a fundamental rule of amateur radio is that we operate in the public interest. It follows, therefore, that any emergency should *always* take precedence over casual operation.

Every repeater has its own operating methods for stations wishing to break in. However, we have yet to see *any* repeater group that doesn't specify *immediate priority* to a breaking station with emergency traffic. Unfortunately, many users of repeaters who are careless, or selfish, are ignoring the importance of emergency traffic. It is not at all unusual to hear a station say "Break, emergency traffic" and have the answering station, (who is in a roundtable) tell the breaker to wait and then go on and on, and in fact, standby for someone other than the breaker! Probably even worse are the mike-button happy characters who don't even take a pause of a few seconds to allow for breakers. Let's make sure that we give emergency traffic priority.

## Repeaters - Autopatch - Phone Tariffs - FCC

An FCC field engineer at an amateur club meeting was asked the question about amateurs using the autopatch when they were outside the local telephone calling area. The FCC engineer answered the question by stating that any amateur who used a repeater autopatch to avoid the toll or long distance phone charges could be in violation of the FCC rules. When a telephone company files tariffs, the tariffs are binding on both customer and company alike.

There is another point that should be cleared up. There has been some question in repeater operation as to who is responsible (and liable) in the event of a violation on a repeater. The user, the trustee, (and control station if other than the trustee) according to FCC are *equally* responsible. Don't misunderstand; we don't want every trustee or control station becoming "switch-happy" looking for an opportunity to shut the repeater down. However, if a violation is taking place, it is incumbent on the control station to stop the violation. - Lew McCoy, WIICP/WR1ABH

## Strays

Dear Sir:

*I am interested in amateur radio and would like to start studying in order to get my license. Do you know any ham in my area that I can talk to when I have questions and who can give me my Novice test when I'm ready?*

Sincerely,

John Q. Public

Several letters like this arrive at Hq. every week. Do you enjoy helping out when someone has a question or is prepared to take the Novice exam? We'd like to include you in our Instructor Corps; just send your name, call and address to ARRL.

# Hamfest Calendar

**Alabama** - The Decatur Amateur Radio Club's North Alabama hamfest is Sunday, August 17, in Decatur. (Location is the campus of Calhoun Junior College at the Decatur-Athens Municipal Airport.) Doors open at 8 AM. Tickets \$1 each at the door or in advance from Ken Hixon, WB4NLN, PO Box 9, Decatur AL 35601. Talk-in on 34/94 and 3,965 MHz.

**Arkansas** - The 12th annual Wilhemina hamfest on Rich Mountain is the first weekend after Labor Day. (Sept. 6-7) Held at Wilhemina Hamfest State Park, camping and trailer space available. Info: Clarence Shilling, WB5BYV, PO Box 935, De Queen AR 71832. (584-3758).

**California** - The NORCAL, Northern California DXers, quarterly gabfest with technical sessions, displays, quiz, auction and refreshments. Emphasis on SWL DX. August 29 through September 1, Labor Day, at El Racho Inn, 1100 El Camino Real Milbrae. Registrations \$1 at the door. Info from NORCAL, Rick Heald, 17412 Rolando Avenue, Castro Valley CA 94546.

**Delaware** - The Delmarva Hamfest, Inc.'s third annual hamfest is August 17 at the Delaware State Fair Grounds, Harrington. The event is from 9 to 4 PM. Flea market, refreshments. Ticket price is to be announced later. Enclosed areas available to individuals wishing such accommodations.

**Florida** - The 10th annual Melbourne hamfest is September 6-7. Swap-tables, Floridors, QCWA and much more! For info: Box 1004, Melbourne FL 32901. Of special note: just 30 miles from Kennedy Space Center, where there is an Oscar exhibit.

**Illinois** - The 41st hamfest and picnic is Sunday, August 10 at Santa Fe Park, 91st and Wolf Rd., Willow Springs, (Southwest of Chicago). Exhibits for OMs and XYL's famous Swappers Row. Info contact, John Raiger, K9DRS, 8919 West Golfview Dr., Orlando Park IL 60462. Tickets write: Joseph Poradyla, WA9IWU, 5701 So. California, Chicago IL 60629.

**Illinois** - The Hamfesters Radio Club is proud to salute Public Service radio on the occasion of our 41st consecutive hamfest. It is at Santa Fe Park in Willow Springs, near Chicago, on Sunday the tenth of August. Civil Defense, police, fire and emergency services. A special Illinois Radio Amateur of the Year will be honored.

**Illinois** - The Shawnee Amateur Radio Asso's hamfest is Sunday, August 10 at the Desoto Community Park, Desoto. Auction, demonstrators, swap-row, refreshments. (3,925, 25/85, 146.94 talk-in). Contact W9ERL.

**Illinois** - The F.R.R.L. hamfest is August 17th (U.S. Rt. No. 30 East of Aurora). Phillips Park, picnic, zoo, family fun. Advance Donation \$1. \$1.50 at the park. S.a.s.e. to PO Box 443, Aurora IL 60507.

**Illinois** - Bel Rock hamfest in Belvidere is August 24th. Advance registration is \$1.50; at the door \$2. Write: Bel Rock Hamfest, PO Box 1744, Rockford IL 61110.

**Indiana** - The original FM hamfest is August 3, near Angola. Free flea market, picnic grounds, swimming, boating available. Talk-in on 16/76, 146.94. For info contact: Ft. Wayne Rept. Asso., Box 6022, Fort Wayne IN 46806.

**Indiana** - Lafayette, Indiana hamfest is Sunday, August 17 at Tippecanoe County Fairgrounds in Lafayette. Sponsored by W9REG, Tippecanoe Amateur Radio Asso. and Indiana Radio Club Council. Located in Lafayette at 18th St. and Teaf Rd. (IN HWY. No. 25). Operation skywarn net and plenty of eye-ball QSOs, flea market, refreshments, IRCC operating awards, emergency communications forum. Camping just

20 min. away. Tickets \$2. For tickets send s.a.s.e. with check or money order to WA9ZDI, Bill Bayley, 1021 Beck La., Lafayette IN 47901. Make checks payable to Tippecanoe Amateur Radio Hamfest Fund. Tickets also available at the gate. Pre-registration entries must be received by August 12. Great place for the whole family, covered area in the event of rain. Limited number of picnic tables available. Venders, please bring your own tables.

**Indiana** - The LaPorte County Amateur hamfest is August 24 at the County Fairgrounds in LaPorte (60 miles East of Chicago). Paved Midway for sellers, inside tables available. On-site camping with hook-ups. Advance tickets are \$1 each, \$1.50 at the gate. Cold drinks and food available. Contact: Dave Nicolaus, WB9AOU, RR7, Box 275, Valparaiso IN 46383.

**Iowa** - The Iowa 75 Meter picnic is August 24 at Riverview Park in Marshalltown. Bring your own table service and a dish for the poulck meal, coffee and soft drinks are furnished. No registration fee. Write: Mary Keener, WA0DAG, R.R. 2, Cascade IA.

**Massachusetts** - The NOBARC hamfest is August 16, 17 at the Middlefield Fairgrounds. Call in on 31/91, 43/03, 34/94, 146.52, 52.525 and 223.50. Admission \$3 for adult or \$5 per family. Flea market parking is \$1 per car. Activities for both days. Free camping.

**Minnesota** - The St. Cloud Area hamfest is August 17 at the Sauk Rapids Municipal Park from 10 AM with registration and eyeball QSO, swap fest \$1 per call, refreshments. For info contact: Bill Zins, WA0OTO.

**Missouri** - The Southwest Missouri Amateur Radio Club's annual hamfest, swap meet, and family picnic is August 24 at Lake Springfield Park.

**Nevada** - The Nevada Amateur Radio Asso. hosts the annual "Sierra Hamfest" August 9th, at the California Building, Idlewild Park, Reno. Pre-registration: \$10. For info contact: NARA, PO Box 2534, Reno NV.

**New Hampshire** - The Central New England Net's annual outing is September 6 & 7 at Saunder's Bay on Lake Winnepesauk.

**New Jersey** - The 550 Club's Oakland Repeater Asso.'s annual amateur radio family picnic is August 23-24, Harmony Ridge Campground, Branchville NJ. All amateurs invited. Activities planned both days. Fleamarket, refreshments, camping area, swimming, hiking, xmtr hunts, campfire eyeball QSOs, KC plane demonstrations, entertainment for children. For further info write: Bill Buetell, WA2RIU, 50 Fairfield Av., West Caldwell NJ 07006.

**New Jersey** - The WA2WEB, East Coast VHF Society and Trenton State College Radio Club's hamfest is August 3, Sunday, at 10 AM at Trenton State College, Ewing Township NJ. Follow signs from Rt. 1. Antenna Measuring Contest on 432, 1296, and 2304 MHz at 11 AM. Free flea market. For further info write: WA2ZZP, Paul Wade, 153 Woods Rd., Somerville NJ 08876.

**New Jersey** - The 27th annual South Jersey Radio Asso. hamfest is Sunday, September 7, 10 AM rain or shine at the Mollia Farms Picnic Grounds, Malaga NJ. (Jct. Rt. 42 & 47) Swap shops, electronic equipment displays, ladies games, swimming. Family picnic area with tables and outdoor grill; food available. Free parking. Talk-in on 146.52 MHz. Advance registration \$2.50; \$3.50 at the gate. For info or tickets write Bill Brandberg, W2BBN, 322 Lakeview Ave., Haddonfield NJ 08033, s.a.s.e. please.

**New York** - ME Beacon A.R.C. 3rd annual hamfest, Saturday, August 16, 8 AM to 6 PM at Steward Airport, Newburgh NY, inside Hangar E. Flea market and auction. Talk-in on WR2ABB 37/97, 146.94, and .52. Rain or shine. Plenty of free parking. Admission, \$1; taigating, \$1; under 12 free. For advance tickets write: Marty Irons, WB2TBI, 46 Magic Circle Dr., Goshen NY 10924.

Ohio — The Ohio Traffic Net is August 9 in Columbus; contact WA8WAK.

Ohio — The Ohio Section Net's picnic is in Mt. Vernon starting at 10 AM August 9. Bring your own picnic lunch. General meeting at 1:30 PM. Contact WA8WAK for map and details.

Ohio — The Flea Market hamfest auction is Sunday, August 10 from 8 AM to 6 PM rain or shine. Indoor display area, 40 tables available, \$3 per set up; your own tables, \$2 per set up; outdoor trunk, you furnish your own table, \$1 per set up. Free auction conducted by professional auctioneer 2 PM to 5 PM. Located at the Franklin County Fair Grounds, Hilliard (just west of Columbus). Exit from 270 West at the Hilliard exit (north west of Columbus). Follow the signs to the fair grounds.

Ohio — The Warren hamfest is Sunday, August 17 at Yankee Lake. Dealers' displays. Swimming and picnicking. Giant flea market (vender's fee, \$1 per car plus registration). Registration \$3 and XYL tickets. Info: Hamfest, PO Box 809, Warren OH 44482.

Oregon — The Sunset Empire Radio Club's third annual hamfest is August 9 and 10 at the fairgrounds in Astoria, with talk-in stations on 2 and 75 meters.

Pennsylvania — The Mt. Airy VHF Radio Club (the Packrats) are holding "Hamarama '75" at the Bucks County Drive-in Theatre, Rt. 611 (Easton Rd.), Warrington on Sunday, October 5, 8 AM to 4 PM. Registration is \$1, tail-gating \$2, bring your own table. Parking for 1000 cars. Talk-in W3CCX/3 on 52.525, 146.52 and 222.98/224.58. For information contact: Lee Cohen, K3MXM, 8242 Brookside Rd., Elkins Park PA 19117 (215) ME5-4942.

Pennsylvania — The annual Eastern Pennsylvania ARRL picnic is Sunday, August 17 at Lahaska. The rain date is Sunday, August 24. The picnic will be hosted by the Penn Wireles Assn. of Bristol. Free admission. Facilities for swimming, boating, fishing, games, sports, and 2 meter transmitter hunt. Bring your own food and cool drinks. Write for info and reservations: Joan Strickland, WA3JUN, 138 North Blue Bell Ave., Langhorne PA 19047, (215)757-2461.

Pennsylvania — The 20th annual hamfest by Four York County Clubs is at Elickers Grove (1/2 mile west of York Airport or 10 miles west of York PA off U.S. Rt. 30). The date is August 31, rain or shine. After flying into York Airport call 225-1189. Registration begins at 0900, talk-ins on 04/64, 28/88, 146.52. Registration fee is \$3; XYLs and children free. No charge for flea market sales. Plenty of picnic tables, free bingo. For info write: K3POR, LeRoy Frey, 170 S. Albemarle St., York PA 17403.

## ATLANTIC PROVINCES CONVENTION

Moncton, New Brunswick, Canada August 29-31

The Moncton Area Amateur Radio Club will sponsor this year's ARRL Atlantic Canada Convention, August 29-31, at the CN's newest modern hotel in Eastern Canada, The Hotel Beausejour, Moncton, NB. "Economy type" rooms will also be available at the University of Moncton. In addition to a very comprehensive OMs program, special attention has been given to the distaff side. The YL program includes a hospitality suite and a variety of shows including professional hair dressing, make-up, fashion, cake decorating and flower arranging. A gigantic swap shop is also programmed.

Friday evening, August 29th, the Convention gets under way with a grand wine and cheese party. Saturday, the doors open at 8 AM with a full day's program commencing with an IARU forum, con-

## COMING ARRL CONVENTIONS

August 1-3 — Canadian Division, Calgary, Alberta.

August 29-September 1 — Atlantic Provinces, Moncton, New Brunswick, Canada.

September 12-14 — NATIONAL, Reston, Virginia

October 10-11 — Great Lakes Division, Columbus, Ohio.

August 2-3 — Oklahoma State, Oklahoma City.

October 17-19 — Midwest Division, Lincoln, Nebraska.

October 24-26 — Southwestern Division, Ventura, California.

November 1-2 — New England Division, Hartford, Connecticut.

NOTE: Sponsors of large ham 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.

Texas — The first annual Golden Spread swapfest is in Amarillo, August 23,24. The location of the festivities is at the Villa Inn Convention Center Interstate 40 and Grand St. Numerous activities are planned for Saturday. A noon buffet is available for those in attendance for \$4.90. Registration \$3 per person. Write: Golden Spread Swapfest, PO Box 7002, Amarillo TX 79109.

Vermont — The Burlington Amateur Radio Club hamfest is in Charlotte, Old Lantern Camping Grounds, on August 10, with camping starting on the 9th. Transmitter hunt, YL flea market. Contact Bob Hall, W1DQO.

Washington — The Radio Club of Tacoma presents Hamfair-75, August 16 and 17 at the Pierce County Fairgrounds, 11 miles south of Puyallup at Graham. Activities include seminars on all aspects of amateur radio, women's and children's activities, all types of contests, big flea market and swap and shop. Free camping. Contact registration chairman Bill Morgan, W7GPR, 3421 E. 138 E. St., Tacoma WA 98446. (LE 1-3821).

QST

ducted by IARU president Noel Eaton, VF3CJ. This is followed by an ARRL forum, chaired by the Canadian Division Director George Spencer, VE2MS. Technical forums, vhf forum (conducted by the Nova Scotia VHF Association), cw contest, and White Cane meeting are scheduled. A cocktail party, dinner and dance at the convention hotel wind up the day.

On Sunday events start early with Old Timers and White Caners breakfasts, meetings of NBARA, NSARA, PEIARL, technical forums, hidden transmitter hunt and a banquet which will be chaired by the "George Jessel" of ham conventions, Walt Wooding, VE3CLJ. Following the banquet there will be very special entertainment, and at midnight, the Royal Order of the Wouff Hong initiation.

Registration is \$20 in advance; \$25 after August 10. For full information and reservations write: The Moncton Area Amateur Radio Club, PO Box 115, Moncton, NB Canada.

QST



# Correspondence From Members -

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

## RESTRUCTURING - ARRL STYLE!

● Congrats on your stand on 20282. I concur almost 100%. Keep up the good work. - *Bill Dirk, KP4EAK, Rio Piedras, PR*

● I have not been a member of the League for a number of years for various reasons. Now it seems to me that the League is on the right track for the good of all amateurs, so I will return to the fold. I heartily endorse the counter-proposals by the League for the jumbled mess the FCC has in mind. I offer my support and appreciation for your efforts. - *Harry W. Jones, KØEDI, Albia, IA*

● I am in total agreement with the counter-proposal to Docket 20282 made by the American Radio Relay League. It is my opinion that it has the same basic intent as Docket 20282 but without the radical changes to the amateur radio service. - *Joseph Randall, WA6MUP, Huntington Beach, CA*

● I have not been a League member for approximately 13 years. I was favorably impressed with the manner in which the FCC Restructuring Proposal (Docket 20282) was handled and, in general, support the League in its counter-proposal.

Enclosed is a check for dues. Keep up the good work! - *Dirk Ostermüller, W7KCC, Salt Lake City, UT*

● First reaction to Board decision regarding Restructuring: I am disappointed. It represents present interests and distributions of hams fairly, but I doubt that it represents the best interests of ham radio as a continuity. The Basic ticket will not accomplish the inflow of new blood that the Communicator would have brought about. How do you administer a zero speed code test, and what good is it? No vhf Experimenter license means no upgrading of Techs. Ten wpm for Generals represents a lowering of standards. The proposal for 14.175-14.2 MHz for Extra phone is further erosion of cw. A 5 year term for Novice with reexamination means less incentive for upgrading. You propose A1 and A2 modes for Basic after a zero speed code test? The increase in power would have been nice for experiments such as moon-bounce and other unusual communications. . . . - *Max Blumer, WA1MKP, Woods Hole, MA*

● I support the comments filed by the American Radio Relay League, Inc. on subject docket with the following exceptions: With respect to Conditional Class operators licenses, I suggest grandfathering existing Conditional Class licenses to their equivalent regular classes and that new Conditional Class licenses be issued as proposed in Docket 20282. With respect to privileges of Operator license, I suggest that General, Advanced, and Extra Classes be authorized A1 emission on

the frequencies 7.0-7.3 MHz and A3-F3 emission on the frequencies 7.15-7.3 MHz. I think this arrangement would enhance U.S. amateur usage of the 40 meter band versus sharing with non-amateur services in Regions 1 and 3. - *James A. Gundry, Atlanta, GA*

● Kudos to the League and the Board of Directors for their most realistic counter-proposals to Docket 20282. Now, if FCC will only listen to us! . . . - *Jim Romelfanger, K9PKQ, Baraboo, WI*

## MUSIC TO HIS EARS

● The other day I auto-patched through our New Haven repeater a call to a car dealer to find out if my wife's car was ready to be picked up, certainly not a business call. Unknown to me, the car dealer had a private telephone system. Between the time I asked for the Service Department, and the time they answered, soft sweet music filled my ears - and of course came on the air over the repeater. Our repeater control operator was even faster than I; on hearing the music he dumped the repeater. The FCC R&Rs say no music on ham radio.

More and more business establishments are installing music systems so that callers don't have a dead silence between the time the switchboard operator answers and the called party picks up his extension. Visualize perfectly innocent and legitimate auto patches encountering the same problem I did, and inadvertent music coming over the air.

I imagine the music prohibition dates way back to when some of us older hams perhaps played a little Guy Lombardo music and said "Testing - testing for audio quality." I agree with the prohibition, but now it does create a new problem. - *V. A. Stancliff, W1LQZ, Branford, CT*

## OLD FRIEND

● While tuning across the 40 meter band this evening I heard an old friend. He was transmitting cw at 20 wpm with a very respectable signal when one considers the static and interference that has to be contended with on the bands at this time of year. His call sign is W1AW.

W1AW has over the years become what I can truly call an "old friend." I have worked him in the past. Today he has helped me to reach a goal that I have dreamed about for 14 years, the Amateur Extra Class, by being there every evening with a good signal and 20 wpm. There are very few individuals that I know who would meet another person every evening for 4 months and render this service.

I would like to say thanks to my "old friend" and to the staff and members who keep him alive and faithful. Without them I would still be dreaming. - *William F. Fenn, WB4WYC, Wilmington, NC*

## WINDOW TO THE WORLD

● I should like to take issue with part of your editorial, "Fragmentation and Tolerance" in the May *QST*.

When it comes to ragchewing in narrow slices of DX hands, 160 meters is a very good example. In Ontario we are virtually restricted to 1.8 to 1.85 MHz at low power, and this is where the ragchews inevitably take place. If part of this slice represents somebody else's "internationally agreed" DX band, I'd like to know about it, but where does one find out? What happened to the ARRL position that any frequency in the ham bands belongs to any operator who finds it unoccupied? I quite agree that deliberate interference to public service nets (and, for that matter, deliberate interference to any communication) must be put down, but if there is a consensus that some frequencies are to be reserved for DX or other activities, you have an obligation to verify that such a consensus exists and then to educate amateurs on the frequencies they are to avoid. In the meantime, I shall continue to call CQ in search of ragchews whenever the fancy strikes me and the frequency in question is unoccupied, and I see no violation of good manners or amateur ethics in so doing. — *A. Peter Ruderman, VE3BPR, Halifax, Nova Scotia*

● I think it is about time, before the winter 160 meter DX season gets into swing, that some decisions should be made as to the DX window 1825-30. Perhaps in the East you are not overwhelmed with the flooding of the 160 meter band the past six months. I have, within ten miles of me, 40 stations now on the air and more are coming on every day.

Since everyone crowds the low end of the band it is impossible to work anyone, and the tension is rising. If the fellows move down to 1825 the DX gang is up in arms. There is no recourse but to use this portion of the band now. — *Ed Marriner, W6BLZ, LaJolla, CA*

## STATE OF THE ART?

● There seems to be the impression among some eminent technicians who read *QST* that every technical presentation must reflect the very latest developments in the state of the art.

If one examines the motto, "devoted entirely to amateur radio," it should become apparent that *QST* must appeal to a highly diversified bunch of radio enthusiasts. Some go for moon-bounce, some specialize in DX, some are antenna buffs, and so on. One of the reasons which makes amateur radio the world's greatest hobby lies in the fact that there is so much diversification inherent in ham radio that no one should ever get bored.

Such being the case, it seems quite in order that some chaps might like to see an occasional article having to do with things which may not interest the more advanced technician. There are many OMs in our midst who are living on an attenuated income. These include the college student, the retired old-timer, the family man who is trying to stretch the buck, what with higher costs for the basics of life such as food and energy. And let's not overlook the fellow who happens to be out of work through no fault of his own.

The editors of *QST* wisely encourage the introduction of articles from hams in the field. So if some fellow amateur from Podunk Hollow comes up with a new way to soup up an old

clunker, what's wrong with that? Not all that's old is bad; not all that is new is necessarily the best. Some of the world's wealthiest men get great pleasure from rebuilding and operating antique motor cars. As long as that's their hobby — that's their hobby!

As far as being the latest with the greatest: vhf communications by Hertz date back nearly 100 years, solid-state components were used for detection more than 75 years ago, and single sideband systems go back more than a half century. So what is "new" and what is really "old?"

One man's meat is another man's poison. Amateur radio's strength lies in its infinite diversity. Why not live and let live? — *Neil Johnson, W2OLU, Tappan, NY*

## CONDO LIVING

● A UPI story appearing in the *Arizona Republic* May 28, 1975 states half of the U.S. population will be living in condominiums within the next 20 years. The National Association of Home Builders estimates they accounted for one fourth of all new housing construction in the United States last year. I believe manufacturers of amateur antenna systems should develop and offer a 10-80 meter antenna with size in mind for the amateur who will be living in a condominium building.

Some very good small amateur antennas are on the market like the Slinky, Mini-Quad, etc., but they remind me of the "B" eliminator days. Let's go further and offer a smaller antenna. Why don't antenna manufacturers take a leaf from the equipment manufacturers' book and develop an antenna system with size in mind? Milton Drake, W2JPN, with his design in the May 1975 issue of *QST* is thinking in this direction. Sure, we know 50 foot towers, quads, tri-banders, 20 foot verticals, and 120 foot dipoles for 75 meters are fundamentally sound, but think of the amateur who lives in a condominium that cannot go this route. Let's increase the amateur population and not allow it to decrease because of present day antennas that are not acceptable for condominium living. — *John C. Mevius, WA7UXT, Sun City, AZ*

## THE OSCAR BUG

● The Oscar bug has bitten! I spent this weekend reviving a Hammarlund HQ-160 so I could check out the 10-meter downlink signals from Oscar 6 and 7. Last night after copying the latest orbital data from W1AW I tried for the first time to catch Oscar. On Oscar 6 orbit 11,200 I heard 6Y5SR and WB4KGV in a cw QSO. Both were good solid signals well above the noise. This was at 0156 UTC. At about 0157 I heard W1NU request all stations to QRT, making reference to this being a "reference orbit." His transmission was ssb and was perfectly readable. 6Y5SR then called W1NU several times. . . . I'm hooked! — *James W. Grubbs, III, K9ETV, Springfield, IL*

## FINAL COURTESY

● They say the final courtesy of a QSO is a QSL. To this I heartily add, "If one cares enough to send a QSL, why not send it so it arrives as if one cared?" For two extra pennies and an envelope one can send a clean QSL — void of postmarks, smudges, water marks, dog-eared corners, etc. It's worth thinking about. — *Joe Reisert, W1JAA, Chelmsford, MA*

# I A R U News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

## ITU SECRETARY-GENERAL ADDRESSES IARU REGION I CONFERENCE

As mentioned here last month, the attendees of the Triennial Conference of the IARU Region I Division in Warsaw on April 14 were honored to have the conference opened by Mr. M. Mili, Secretary-General of the International Telecommunication Union. Here are excerpts from Mr. Mili's remarks:

May I begin by offering, on behalf of the International Telecommunication Union, my warmest congratulations and sincerest wishes for a prosperous future to the International Amateur Radio Union on the occasion of its fiftieth anniversary.

You can now look back on half a century of intense activity which, thanks to disinterested research and sound scientific studies embracing the entire radio frequency spectrum, has made an appreciable contribution to the progress of radio-communication.

They have also been fifty years of international cooperation which has forged a chain of human brotherhood between all

those who, by taste or through dedication, have devoted or are devoting the greater part of their leisure time to seeking human contact over continents and seas, and beyond differences of language, nationality, religion and political systems.

Finally, they have been fifty years of chance contacts which have been instrumental in saving many lives, thus making the International Amateur Radio Union one of the most useful and dynamic organizations when it comes to helping to save individual lives or the lives of many in natural disasters and catastrophes.

Your Amateur Service is defined in the Radio Regulations as "a service of self-training, intercommunication and technical investigations carried on by amateurs, that is, by duly authorized persons interested in radio techniques solely with a personal aim and without pecuniary interest."

This service is, hence, recognized as having two lofty missions:

*First, to instruct*, that is to say to take part in the training of those who, in any capacity, bear responsibility for the operation of radio services.

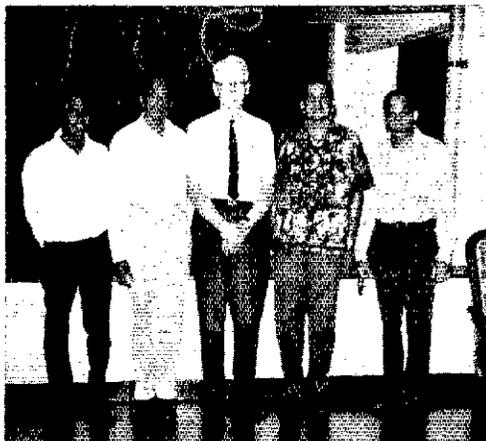
*Second, to engage in disinterested research*, in order to deepen our knowledge of such matters as the mechanisms of wave propagation.

It is therefore with the greatest satisfaction that we acknowledge the fact — and a most important fact — that radio amateurs have followed very closely the various developments brought about by the use of ever higher frequencies or by new techniques, such as space communications. Several thousand amateur radio enthusiasts have already made use of satellites (in particular, Oscar 6 and Oscar 7) and their observations will undoubtedly help to enhance our knowledge of the phenomena involved.

I will mention briefly, since it is well-known (I would even say it is perhaps the aspect best known to the general public), the part played by radio amateurs in emergency communications, especially in the event of natural disasters or catastrophes; the use of high frequencies in this sphere is so much a matter of common knowledge that there is no need to dwell upon it.



JA1AN, president of the Japan Amateur Radio League, greets VE3CJ, IARU president, and W1RU, ARRL general manager, on the occasion of a March visit in Tokyo.



One of IARU President Eaton's visits on his recent tour of Region III was with members of the *Radio Society of Sri Lanka* (Ceylon). This month, the *RSSL* celebrates 25 years of representing the interests of 4S7 amateurs, including 11 as an IARU member-society.

But the role of amateurs in technical training seems to be little known for all its great importance. As you may be aware, the ITU is engaged on a vast programme of technical cooperation to aid developing countries to expand their telecommunications. In this programme training plays a predominant role. There is no doubt that the development of amateur radio networks in the countries concerned makes a substantial contribution to the execution of this immense task and a contribution, moreover, that costs governments so little.

I have noted with pleasure, when looking through the technical reviews of amateur radio societies, that they have already embarked upon active preparations for the World Administrative Radio Conference to be held in 1979. I say that I am pleased because I feel that we cannot begin too early to give serious thought to the problems which the amateur service, as indeed all radio services, will have to face at that conference.

This administrative conference will be a particularly important one, since it will be the first since 1959 to deal with the radio frequency spectrum as a whole. All the administrative radio conferences since that date have had a limited agenda relating specifically either to space radio-communications, the aeronautical mobile service, the maritime mobile service or broadcasting.

You will readily understand that it is impossible for me to make the slightest forecast as to the way this conference will go. One thing is pretty sure, however, namely, that the problems it has to face will be highly complex. It would therefore not be amiss for me to emphasize the care you should take to present to your national administrations any wishes or requirements you have to formulate in the most convincing manner possible. Nobody can tell what will come of it; the very most I can say is that more often than not when people describe radio regulations or a table of frequency allocations as "good" they mean that the degree of dissatisfaction is roughly the same for the users of all the different services. But I am convinced that the half-century that has gone by has amply

demonstrated the importance of the part played by radio amateurs and that once again you will have the sympathy of the conference on your side.

Convinced as I am that your work will further the progress of radio technique and strengthen international cooperation with a view to improving telecommunications and human relations, allow me to conclude these few words by wishing you every success in your labours.

#### ICELAND, CANADA CONCLUDE RECIPROCAL AGREEMENT

Iceland has been added to the list of countries which will grant operating permission to visiting Canadian amateurs in exchange for similar provisions made for Icelandic amateurs visiting Canada. Such reciprocal operating agreements now exist between Canada and 27 other countries, plus the Commonwealth countries. Similar agreements exist between the United States and 45 countries. There is no reciprocal operating agreement between the U.S. and Iceland at the present time.

The complete list of reciprocal operating agreements involving the U.S. or Canada is on page 80 of *QST* for February, 1975. Other countries grant operating privileges to visiting amateurs on a courtesy basis; see the list in this column for November 1974 or contact *ARRL* headquarters for details.

#### SEANET SCHEDULES 1975 CONVENTION

The Fifth Convention of the South East Asia Net (SEANET) will take place on 7-9 November, 1975 in Kuala Lumpur, Malaysia. Host for the event will be the *Malaysian Amateur Radio Transmitters Society*. Additional information on convention activities may be obtained from *MARTS*, P.O. Box 777, Kuala Lumpur.

#### ANNIVERSARIES

Several IARU member-societies pass significant milestones this year. The *Foreningen Sveriges Sandreamatorer* representing Swedish amateurs marks its fiftieth anniversary, as does the *South African Radio League*. The *Radio Society of Sri Lanka* celebrates its 25th anniversary.

On behalf of the Union officers and member-societies, headquarters congratulates these societies on their achievements in representing amateur radio in their respective countries. 4S7

## 4510 Calculator

(Continued from page 47)

back to the register upon touching the ENTER button, retaining the presentation for another 20 seconds.

I found myself wondering if the marvelous "machine" had any innards, for it felt feather-light in my hands. It weighs only 8 ounces when extracted from the leather carrying case! Art offered assurance that there was, indeed, a complete circuit and battery inside the box.

The engineering functions include sin, cos, tan,  $y^x$ ,  $e^x$ , common log, natural log,  $1/x$ , and pi. Also available are the functions of square, square root, subtract, add, divide, multiply, degrees, and radians. Of course, antilogs and inverse-trig functions can be handled by the operator. Change-sign and register-exchange keys are provided also.

Some additional features are automatic reciprocals, ability to sum squares automatically, storage memory (one), "roll-down" clear, and indicator light for a low-battery condition.

If one is willing to stretch his imagination a bit, he will conclude that in addition to the actual memory of the 4510 there is a "kinda memory" which can be employed. This feature relates to the so-called *stack principle*, wherein RPN (reverse Polish notation) is used to employ three registers, X, Y, and Z. To be more specific, a register is an electronic element used to store data while it is being displayed, processed, or waiting to be processed. The registers are arranged in a stack with register X on the bottom. Register X is the displayed one. As the numbers are keyed in, they go into display register X. When the ENTER button is touched, the number is duplicated in register Y. At the same time the contents of Y are transferred to register Z, and the contents of Z are transferred out of the stack.

As we stood and twiddled buttons on the 4510, Art helped me to "unlearn" the similar calculator I owned. After running through a few equations, I found myself wishing I possessed the fascinating gadget we had been discussing. The moment of truth was at hand, as I almost whispered the question, "How much does NS get for this little bauble?" When Art replied, "Only \$69.95," it seemed as though something had been lost in the translation: comparable units were still selling for \$100 or more!

It seemed that the *QST* readers should be told about the 4510, so Art agreed to submit the calculator for review purposes. After working daily with the unit for several weeks, it became a valuable extension of my right hand (and brain). It is unlikely that it will be returned to the manufacturer: my check book will be called into service after this report is published!

Power for the calculator is provided by an internal 9-volt standard transistor-radio battery. Because MOS/LSI circuitry is used in the 4510, battery life is rated at several months under daily use. An external ac-operated dc supply is available as an accessory for those who want one.

A more sophisticated Novus calculator is available to those wanting a programmable model — the 4515. It uses three AA Nicad batteries and is rechargeable. The price tag on the 4515 reads \$139.95.

Electronic slide rules of the 4510 variety should find daily application in the ham shack or workshop of any active amateur. Resolution of the answers to problems is superior to that which can

be obtained from mechanical slide rules. It seems almost absurd to use the older system. Furthermore, nothing beats a calculator when taking an FCC exam. The only restriction imposed by the FCC is that you enter the examining room without information stored in the memory!

The 4510 comes with a high-quality padded leather carrying case. A detailed instruction booklet is supplied with each unit. It contains a complete course on how to use the calculator, and provides step-by-step procedures for working any problem within the capability of the instrument.

The 4510 measures  $6 \times 2\frac{7}{8} \times 1\frac{1}{2}$  inches. It is rated for proper operation over a temperature range of 32 to 112 degrees F (0 to 50 degrees C). The manufacturer is National Semiconductor, 1177 Kern Ave., Sunnyvale, CA 94086. — WICER

## Crystal Ball, Part II

(Continued from page 44)

We've hardly mentioned sporadic-E propagation, yet here is one ionospheric medium that works as well, and perhaps even better, in low-sunspot periods than in high.<sup>6</sup> Probably because it is thought of as mainly a summer phenomenon, and doomed by its common name, "short skip," its potential has received slight consideration by the DX fraternity. Most common (in the northern hemisphere) in the months of May through early August, it does have short single-hop range. But under the right circumstances, even now not yet fully understood or utilized, it has a multihop range of up to several thousand miles. Nobody really knows how far it can go, but in June and July, 1974, it provided transatlantic QSOs to some very surprised occupants of the 10-meter band.<sup>7</sup>

The nature and causes of sporadic-E ionization and their relation to solar activity are still not completely known, but there will never be a better time to work on learning more about it than right now. If you have given up on 10 meters "for the duration," we strongly urge you to mend your ways, and ride the band for all its worth (which could be considerable) during summer, 1975. The same message applies to 6 meters, too. You could have yourself some interesting times, and perhaps help to push back one of radio's last propagation frontiers, or even eliminate its frontier status. Isn't this one of the things that ham radio is all about?

### References

- <sup>1</sup> See Part I.
- <sup>2</sup> Cracknell, "Transequatorial Propagation of VHF Signals," December, 1959, *QST*. Also, "More on TE," August, 1960; Whiting, "How TE Works," April, 1963; and *The Radio Amateur's VHF Manual*, Chapter 2.
- <sup>3</sup> See "The July Aurora," September, 1974, *QST*, page 86.
- <sup>4</sup> Heightman, "Any DX Today?" January, 1948, *QST*.
- <sup>5</sup> Wilson, "Midlatitude Intense Sporadic-E Propagation," December, 1970, and March, 1971, *QST*; also Tilton, "Tips on Ten," March, 1973, *QST*.
- <sup>6</sup> September, 1974, *QST*, pages 87 and 88.

NOTE: For a different approach to the use of WWV propagation information, see Jacobs and Cohen, "A Breakthrough in Simplifying Ionospheric Propagation Forecasts," *CQ* March, 1975.

# The World Above 50 Mc.

1515-1500 2300-2450 5300-5700 5650-5925 10,000-10,500 21,000-27,000 50,000-7

CONDUCTED BY BILL TYNAN,\* W3KMV

**O**F INTEREST to all vhf/uhf amateurs should be the World Administrative Radio Conference (WARC), to be convened in 1979. A long way off, so why worry about something so far in the future? What does the upcoming WARC have to do with the world above 50 MHz? Isn't it concerned only with the hf bands?

To answer the first of these questions, plans for such a conference must begin years before its formal opening if a particular service is to have any chance of obtaining anything in addition to its existing provisions or even of defending what it presently has. Many people in all parts of the world must be "sold" in advance in order to have their support and the support of others with whom they have influence when the conference actually gets underway.

What about the second question? Why should we who inhabit the bands above 50 MHz be concerned with the WARC. Most of us have heard of the proposals for widening our hf bands and even for getting additional bands. We are all in favor of anything which will enhance amateur radio, but since many of us do little or no operating on those bands, the prospect of additional hf space doesn't particularly turn us on. But wait! Let's look at what we now have in the way of vhf and microwave bands, and consider the fact that the allocations made at the 1979 WARC will probably be with us until about the year 2000! Who knows what techniques and modes of communication we might be using or could be

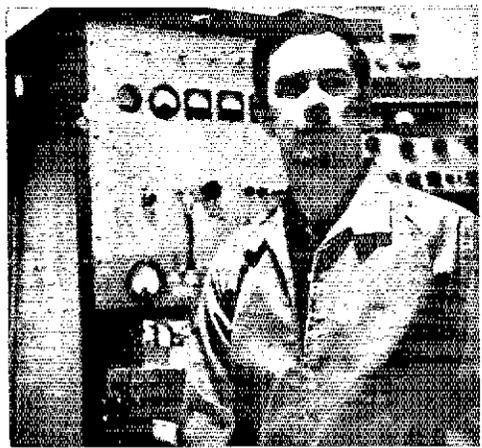
using, if we had suitable frequency allocations and operating regulations 25 years from now? The possibilities boggle the mind. We may have satellites which enable worldwide communication possibly even via fast-scan TV. We may be able to communicate on a regular basis with manned spaceships orbiting the earth or on their way to distant planets. We may be able to work hams manning lonely outposts on the moon or Mars just as we can talk to the boys at the south pole on 20 meters today. Sounds exciting doesn't it? Such dreams will be next to impossible to realize, however, with our existing vhf and microwave allocations and rules.

A perfect example of this was provided recently when FCC officially denied Amsat permission to activate the 50-milliwatt, 2304.1-MHz beacon aboard Oscar 7, even for a few minutes a week and only when the satellite was over the U.S. The Commission's reasoning was, evidently, that the frequency in question is not in those allocated for use by amateur satellites at the special WARC for Space Telecommunication held in 1971.

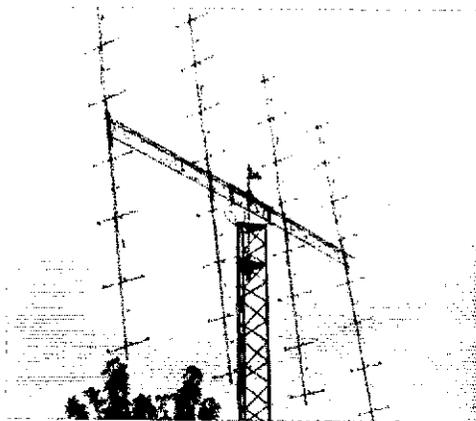
What must be done, if vhf and microwave operation by amateurs is ever to reach its full potential, is to get international recognition in terms of worldwide exclusive amateur assignments on more frequencies above 50 MHz. Under current frequency assignments, the only bands which we have on an exclusive worldwide basis are 144 to 146 MHz and 24.0 to 24.05 GHz. Without exclusive assignments, we stand little chance of utilizing our vhf and higher bands for anything but local communication. If you follow the 432 moonbounce scene, you know the difficulty that some of the foreign contingent have in receiving authority to try their hand at EME.

To plan for making recommendations to FCC with respect to what we as amateurs think should be requested by the U.S. delegation at the 1979 WARC, a committee has been setup under the chairmanship of Prose Walker, Chief of the Amateur and Citizens Division at FCC. At a meeting held May 9th, a series of 8 task forces was inaugurated. Numbers 7 and 8 of these task forces are of direct interest to us, the inhabitants of the world above 50 MHz.

\* Send reports and correspondence to Bill Tynan, W3KMV, Box 97 Burtonsville, MD 20730 or call (301) 384-6736 and record your message.



Recent addition to the 2-meter standing, John McCormick, WB5BKY, Tulsa OK.



The 160-element collinear for 144-MHz EME recently completed at W4DFK.

Task group No. 7 deals with the frequencies between 27 MHz and 1296 MHz and is chaired by Bob Haviland, W4MB. Chuck Dorian, W3JPT, presides over task group 8 which is concerned with the frequencies above 1296 MHz. Both gentlemen have extensive backgrounds in international frequency allocation matters and should bring much needed professional stature to this effort. But they cannot function in a vacuum. They must have the ideas and suggestions of those who possess a practical knowledge of the frequencies in question through actual amateur operation. Some of you may have already received letters from either Bob or Chuck, or perhaps from both. If not, don't stand on ceremony. Jot your thoughts down on paper; send them to the appropriate person or both if you wish to address the whole spectrum above 50 MHz. To stimulate your thought processes, here are a few of the ideas being advanced so far.

Allow amateur satellites to transmit on any amateur band regardless of whether or not the band is a worldwide exclusive amateur assignment and regardless of where the satellite may be at the time, provided the signal on the ground does not exceed an established value. Under such provisions, we could have a satellite with an output on 220 MHz even though that band is used for television broadcasting in other parts of the world.

Another suggestion is the establishment of an amateur satellite downlink band in the frequency range of 890 to 942 MHz. This band would be used in this country for the Land Mobile Service and other applications. Responses to these ideas from knowledgeable amateurs active on the bands above 50 MHz, as well as other suggestions, are invited. Should we push for making all of our bands exclusively ours on a worldwide basis or would this be asking so much that we might damage our own cause? Should we only ask for narrow slices of some of our bands on an exclusive world-wide

(Continued on page 154)

## 2-METER STANDING

K1HTV	36	8	1310	K5VWW	28	9	193
K1ABR	35	8	1478	WB5BKY	28	9	140
W1AZK	34	8	1412	WB5LUA	28	8	136
WA1FFO	34	9	2624	W5SSD	25	6	126
K1WHS	33	10	10749	W6PO	26	10	800
K1UGQ	30	8	1370	W6GDO	18	5	132
W1VTU	29	8	1296	W6WSQ	16	4	139
K1BKK	29	8	1275	K6QEJ	13	4	258
W1JSM	29	8	1100	K6HAA	13	4	258
K1PXE	28	7	1250	K6JYO	13	4	124
K1MTJ	26	7	1250	K6HMS	11	4	125
W1FZA	25	9	2750	WA6JRA	6	3	259
W1HDQ	24	7	1040	K6GAO	5	4	127
K1RJH	22	7	1450				
K2RTH	39	10	2590	W7JRG	28	6	132
W2AZL	38	9	2500	K7NII	28	5	129
W2NLY	37	8	1300	K7ICW	18	4	127
W2CXY	37	8	1360	WA7BBM	14	4	125
W2ORI	37	8	1320				
W2BLV	36	8	1150	W8KPY	42	10	205
WA2FGK	33	8	1340	K8AXU	38	8	127
W2CUX	33	8	1334	W8IDU	36	8	115
WB2WIK	32	8	1080	W8YIO	36	8	110
WA2CJK	31	8	1160	W8IDT	36	8	115
W2CRS	30	8	1270	K8DEO	35	8	120
K2EVW	29	8	1232	K8HWW	34	8	116
K2CEH	29	8	1200	WA8PIE	32	8	100
W2CNS	27	8	1150	W8NOH	31	8	116
K2DNR	27	7	1200	W8LLY	28	8	82
WA2BIT	25	9	10,000	W8TIU	24	8	100
WB2SIH	25	6	1000	W8KBC	24	7	90
WA2UDT	24	7	1020	K8ZES	22	8	67
WA2EMB	23	6	1335				
K2BWR	23	7	1350	W9YYF	43	9	450
WA2PMW	23	6	1000	K9UIF	43	9	157
W2DWJ	23	6	860	K9UGD	42	9	130
				W9AAG	41	9	120
K3CFY	37	8	1237	K9AAJ	41	9	120
W3RUE	36	8	1250	W9OII	37	8	107
W3BHG	36	8	1260	W9BRN	36	9	126
W3BDP	30	8	1225	W9PBP	34	8	82
W3LNA	27	8	970	K9HMB	33	10	182
W3OMY	26	8	800	K9UNM	33	8	93
K3CFA	25	8	1200	WB9NLF	30	9	181
W3TMZ	26	9	2410	W9JDJ	29	8	100
K3QCQ	24	8	1000				
W3HB	23	8	1310	K0MQS	46	10	1060
W3ZD	22	8	950	WA0CHK	44	10	165
W3TFA	21	8	1342	W0LER	44	9	144
K3OBU	21	7	930	W0DQY	41	9	130
				W0LFE	40	9	110
K4GL	40	10	2340	W0RLI	36	9	129
W4HJQ	39	9	1150	W0PW	35	9	138
K4IXC	38	10	4850	W0ENC	35	9	136
W4WNH	38	9	1350	W0EMS	34	10	132
W4HHK	38	9	1280	W0LCN	33	9	110
K4EJQ	37	8	1125	W0PMN	30	9	124
W4VHH	36	8	1125	W0DRL	27	9	129
K4VW	35	8	1440	W0MJS	26	8	111
K4QIF	35	8	1225				
W4FJ	34	8	1150	VE1ZN	7	2	50
WA4CQG	31	8	1170	VE2DFO	39	10	1060
W4AWS	29	8	1350	VE2YU	32	8	120
W4ISS	29	8	1000	VE2BZD	23	7	130
W4DFK	28			VE2HW	18	6	80
				VE3ASO	38	9	214
WASUNL	44	10	1715	VE3BQN	37	8	125
K5BXG	44	10	1553	VE3EZC	33	8	128
W5UGO	43	10	1398	VE3AIB	29	8	134
W5ORH	42	10	1507	VE3EVW	29	8	110
W5RCI	42	9	1289	VE3DSS	27	8	120
W5WAX	39	10	1370	VE3CWT	27	7	107
K5WXZ	38	10	1450	VE3EMS	27	8	110
W5HFV	38	10	1285	VE7BQH	12	3	792
W5AJG	33	9	1360				
W5UKQ	33	9	1290	KH6NS	3	2	600
W5LO	30	7	1325	SM7BAE	1	1	1105
K5PTK	29	9	1330	VK3ATN	4	4	1043
				VK5MC	3	3	1000
				ZL1AZR	2	2	1105

Figures are states, call areas, and best DX in miles.

# How's DX?

CONDUCTED BY ROD NEWKIRK,\* W9BRD

## How:

Some of the richest prose in contemporary radio literature appears in *Mercury*, journal of England's Royal Signals Amateur Radio Society, currently edited by G3DPS. Its poetic content is just as interesting. This month we'll borrow a few RSARS verses to help make amends for May's ragged DXHPDS limericks. . . .

### Deliberations on Forty Most Wanted Countries or, All I Want for Christmas is South Yemen

I can think of nothing finer  
Than a QSO with China.  
I would jump and shout "Hooray!"  
If I contacted Bouvet.  
In sleep I oft times murmur  
"O Lord, please give me Burma,"  
And I also rave and ramble  
Of the need to chalk up Campbell,  
And just thinking of Albania  
Drives me zanier and zanier,  
To hear me whining for Mt. Athos  
Is nothing less than pathos.

I rant and rave and bawl  
For St. Peter & St. Paul,  
And I'd pat my dog and lick him  
To catch someone from Sikkim.  
I would give a thousand lira  
For a contact with Palmyra.  
I check daily how the band is  
In hopes of Juan Fernandez,  
Though I'd change my style and manner  
Just to QSO Serrana  
The success would be a dry one -  
I'd still be needing Taiwan.

When I'm old and gray and creaky  
I'll still need Manihiki.  
Though I'd stoop to be a forger  
Of a card from old South Georgia  
That would still not be *fini*  
Since I'd still need one from Guinea  
And the whole thing's so much phooey  
With no two-way yak with Niue.

I tell you, brother, flatly  
I would give my wife for Spratly  
And would mortify my flesh  
For a sniff of Bangladeshi.  
I would wear a surgeon's bandage  
To help me work South Sandwich  
And though that would bring me smiles  
I'd still need Red Sea's isles.



VU2ABC was extremely active in Bombay before closing down in June for Stateside return. Dave, who signs WA1FEO back home, also works DX from club station W3USS. (Photo via K3K WJ)

I wake at night so scared  
That I've missed someone from Heard  
And my heart is full of venom  
For creeps who don't need Blenheim,  
And my nextdoor neighbor, Charlie,  
Who has just confirmed Somali,  
And that other pinhead, Frank -  
How did he get Geyser Bank?

But one day I'll end my credo  
With a fervent, joyful "Amen!"  
I'll work Revilla Gigedo  
And guess what, that's right, South Yemen.  
So on and on I strive  
Toward my frantic final goal:  
By the time I'm ninety-five  
I'll have made the Honor Roll.

The by-line for this gem is left anonymous by *Mercury* but the author is reported to be VS5MC. Plenty of delicious DX in that ditty!

\* c/o ARRL, 225 Main St., Newington, CT 06111.

ZK1AA's Rarotonga real estate is your lush QTH of the Month. ZK1s AA and DD (VE3EZM) appear at center and right during the latter's Cook Islands stopover on a DXtensive springtime Pacific tour.





4Z4s LF and NJ, Yossele and Ricky, in action at 4Z4HF, Kibbutz Sasa club station. WA2BZA/4X, right, enjoys DXing from Jerusalem. Ben shares this setup with son Jonathon, WA2NGG/4X.

**Where:**

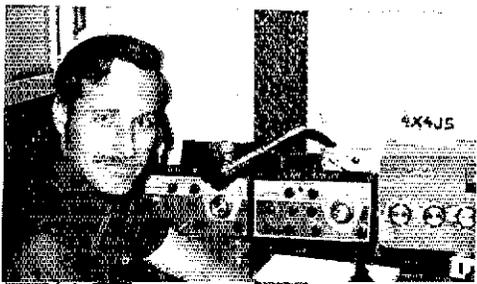
**NORTH AMERICA** - The new-style International Reply Coupon causes some confusion. On the old IRC the validating stamp of the issuing post office was necessary or the Coupon was no good. The new IRC provides space for such a stamp but its use is optional. By the way, our USPS expects to discontinue "airmail" as a separate service this month. (WCDXB) . . . W1GNC holds VP2VL logs for the period March 24 to May 18, 1975, and seeks records for earlier QSOs. (WCDXB) . . . TI2AJF left Costa Rica and now makes his home in Schaumburg, Illinois. QSLs can reach him via the ninth call area ARRL Bureau branch. Self-addressed envelopes will expedite replies but are not vital. Stateside requests unaccompanied by s.a.s.e. will experience about a nine-month delay. (WB9EBO) . . . I can confirm HH2WF QSOs dating after December 1, 1974. Will is now in the States. Say, does anyone know the whereabouts of former W2HH? (W3HNK) . . . I've found that QSL inscriptions made with felt-point pens fade out rapidly and completely in sunlight. Lost my OY9LV confirmation that way. (W1JUB) . . . Fancy QSL print jobs, comments in the DX stations' native tongues, etc., are probably to little avail. Most operators either do or do not QSL - period. The main thing in getting good results is to fill out your cards clearly with correct QSO information, especially Greenwich Mean Time, Date, Year, and spell out the month. I have to bounce about ten percent of all cards received here, and I suspect in most cases it's because the other op has carelessly provided incorrect or illegible QSO data. (VO1KE) . . . Anybody still need my Adak QSL? Many thanks to those who already sent cards. Other inquiries are welcomed at my North Carolina QTH. (K4WLS 'KL7) . . . Lots of QSLs arriving for purported cw QSOs but I do not use telegraphy. Sorry! (W4OC) . . . SP6ES prefers no QSLs direct, all to the address in the listings to follow. (WCDXB) . . . H3, as in H31AC (HP1AC) was a variant Panama prefix employed in

May. XL, as in XL3EDC (VE3EDC) joined CH and CY as a fresh Canadian prefix in June. (DXNS) . . . Your August "QSLers of the Month" include HB9BBJ, HC8 2YL SEE, I3PKZ, K1.7HOY, KS6S FF SFA, OE1s UZ ZGA, OX5BW, OZ1VY, SP2AVE, TK2XW, VP2LAW, W9MR/CE0, YS1GWE, sz4LW, 9H1BX and 9Y4BB, all enthusiastically applauded in "How's" correspondence from W1OPJ, K4DAS, Was 2ROZ 8YTL, WB5CEW, KH6s IAC and ILF. QSL agents Ws 3HNK 6KLI, K3RLY and WA8TDY also draw praise for prompt pasteboard action. Any worthies in your recent receipts? . . . 'Alpl Colleagues in parentheses plead for clews toward securing QSLs from reluctant goodies specified: (W1WV) EP2s DO '73, JA '72; (W5NQN) A4XFO, 1Xs 2FL 6DS; (K4HJC) VS0PJV '71; (WA2ROZ) TR8PB; (WA6CIL) FY7AK; (WA8YTL) HC8FN '70; (WA0TAS) DJ0UJ, UJ8AC; (WB5SHGS) CO2JA, GM3GNE, JD1ACH, JX4GN, SV1BV, VP8MH, YO2BB, ZD7BB, 3H8AW, SVZYH; (KH6IAC) EA3JE, P19JR, TF3SV; (VO1KE) C31IU, C6ABC, VP2KX and 4U6ITU. Any 'alp?

**AFRICA** - VQ9D says the Mahe bureau receives A numerous QSLs for assorted prefixes other than those of the Seychelles area. Send only VQ9 cards, please, either to Richard C. Barnes, Aero-Ford, Box 116, APO, New York, New York, 09030, or to VQ9 QSL Bureau, Box 191, Mahe, Seychelles. (WCDXB) . . . Please mention my departure from Liberia in favor of a Georgia QTH. All QSLs that were sent to EL-land are now being answered by my QSL manager, K4MOJ. (ex-EL2FN) . . . The item in June's "How's" represented as a communication from me indicating that I manage QSLs for TY6ATE, SA1LT and 5K5SS is spurious. I have no such arrangements and have no intention of becoming a QSL manager. (W2AIM)

**OCEANIA** - My KK6Z and VE3EZM/C21 QSLs are all filled out ready to go. Those for VK2BZM/9, VR4Z and 3D2DD are also well under way. So far, as of mid-May, I've received

4X4JS was known for many years in the New York region as Dan of WA2CRD. At right 4Z4JT smiles for WB2AOC's traveling birdie. Strulik is a professional photographer in Tel-Aviv.





The late 4X4CZ, pioneer amateur in the area as ZC6AB and long-time IARC president, welcomes visiting WA2BAV. Right, Ben and Devora, 4X4s 1L and NW, are a popular husband-wife DX team in Israel.

cards for only about half the 5600 QSOs accumulated during my spring stops at nine locations in the Pacific. When requests run thin I'll complete QSLing 100 percent. (VE3EZM) . . . W7OK has the 1200-QSO logs for YK4AK/9's Norfolk Island operation including contacts on 3.5 and 7 MHz. (WCDXB)

**ASIA** - OD5CS closed down and moved to California where he awaits a Six call. I can confirm any of his past contacts and those of his XYL, OD5JJ, (W3HNK) . . . XW8AL no longer is proprietor of the Laos QSL bureau. Cards for XW8s now must go direct or via their various managers. (W3HNK) . . . My contacts from Korea beginning in June of last year should be QSL'd via manager WA7KYZ or direct to my WA7NTF address. (HL9TG) . . . DJ9ZB's stint as YK1AA QSL aide concerns only this year's QSOs. (DXNS) . . . JA2KLT manages confirmations for CR8s AG AL, KC6JW, KG6s RA SH, VK9s JV YV, VQ9AP, VSs 5AP 5DB 5JS 5PW 6BS, YJ8KS, 5W1AB, 9Ms 6AB and 8WUW. (VERON)

**SOUTH AMERICA** - Some two thousand QSL requests for FY7s 7AA 9BHI and TK7YAA have piled up at F2QQ but no logs have arrived for QSOs after this January. (WCDXB) . . . All those "special" Brazilian prefixes and suffixes give skimpy QSL results at my end. (VO1KE) . . . I operated KC4USX at Williams Field, Antarctica, from November '74 until this February. Logbooks are on hand and I welcome QSL inquiries at my California address. (WA6HXR)

**EUROPE** - My wife, LA8KT, takes care of my QSLing at the Harmstad home QTH. (JW5NM-LA5NM) . . . I must join those who report poor QSL returns from Russia. (WA8YTL) . . . Our monthly QTH directory now, but remember that all suggestions are not necessarily either accurate, complete, or official. Could bring home some bacon, though. . . . C31s LO YL (via DJ9ZB)

- FG7AS, Box 444, Pointe-a-Pitre, Guadeloupe
- HS2AKZ, PSC, Box 1811, APO, San Francisco, California 96330
- IZ4MPI, P.O. Box 93, Faenza, Italy
- JW5NM, M. Bjerrang, Isfjord Radio/Aeradio, Svalbard via Tromsø, Norway (or to LA5NM)
- K4BR/VP9, W. MacDonald, USNAS Box 1264, FPO, New York, New York 09560
- KA5KP, K. Phillips, Naval Air Support Unit, FPO, Seattle, Washington 98784
- KZ5DX, Box 1143, Howard AFB, Canal Zone
- OX5BW, Box 543, RCA-OMS, HMEWS Project, APO, New York, New York 09023
- PA9TOM, T. Stiehl, Hoofdweg 55, Post de Cocksdoorp, NL-1822, Elerland/Texel, Netherlands
- ex-TJ2AJF, c/o NIDXA, P.O. Box 519, Elmhurst, Illinois, 60126
- TK6BBU/TJ (to F6BBU)
- VE3EZM/KH6 (via VE3GU)
- VQ9Z, C. Smith (WA6HNQ), c/o MARS Stn., FPO, San Francisco, California 96685
- W2DEO/HR2/VP2D/VP2S/8R1 (to W2DEO)
- W5TES/KJ6 (via WA6GWY)
- WB4FDT/4X (to WB4FDT)
- XW8GW, Box 312, Vientiane, Laos
- ex-ZF1JA, L. Anstead, 80 Allington Rd., Paddock Wood, Tonbridge, Kent, England
- ZL3NR/c, D. Horan, Waitangi, Chatham Islands, New Zealand
- ZP5NP, APO, New York, New York 09881
- 5N2NAS, Box 3034, Lagos, Nigeria
- 8P6ES, c/o C. Geibel, 1807 Beechwood Dr., Holiday, Florida 33589
- 9M8TT, Telecoms Training Unit, Jalan Batu Lintang, Kuching, Sarawak, East Malaysia

- C31GN (to DK3SF)
- C311R (via F6AUS)
- C31IX (via DK6SX)
- CH1XP (see text)
- CY6ARQ (via VE6TK)
- EI0W/p (to EI2CL)
- EI0X/p (via EI7CC)
- EI0Y/p (to EI2CA)
- EL1E (via WB0ARU)
- ex-EL2FN (via K4MOJ)
- EL5G (to WA0SYJ)
- EL0S/mm (via YU2RCZ)
- EP2BW (via JE1GMM)
- F0BAL/FC (via DK6ZQ)

4Z4AO has a widely heard Tel-Aviv signal. Louis formerly signed YO3DL in Bucharest. 4Z4JI, right, dips his final with special test gear and surmounts sightless status in Haifa college studies. (All photos by WB2AQC, WA2BAV)



W9MR/CE0 did well on 20 and 40 from Easter this spring, about 1500 QSOs worth. There Wayne enjoyed the company of resident CE0AE, Fr. Reddy (K2BUI) who expects to become more radioactive soon in his own right.



FC0APA (via DL6WC)  
 FL8YL (via DJ1TC)  
 FO8DP (via VE3GUS)  
 H31AC (see text)  
 HC8GI (via W3HNK)  
 HL9TG (see text)  
 IB0JN (to 18JN)  
 IM0BVS (via I2BVS)  
 IM0CBM (via I2YDX)  
 IM0DMK (to I2DMK)  
 K4WLS/KL7 (to K4WLS)  
 KC4USX (see text)  
 KH6ITU (to KH6BZF)  
 KP4ECH (via WA0CLN)  
 KS6SFA (via KS6FD)  
 OA2CNL (via RCP)  
 OD5JJ (via W3HNK)  
 OK5BPT (via OK2UX)  
 ON0ITU (to ON5TU)  
 PA9ITU (to PA9TOM)  
 PJ8HS (via KV4FZ)  
 PJ9EE (via WA3UTA)  
 PP6ITU (to PY6AM)  
 PQ7ITU (to PY7ARM)  
 PR5DIT (via LABRE)  
 PR0ITU (via PY2DSE)  
 PS0ITU (to PY7NS)  
 PY7AZO (via K9MKX)  
 TI9VC (via W9BNH)  
 TT5AC (via W1YRC)  
 TU2FC (via F2QQ)  
 TY6ATE (see text)  
 VK2BKE (via W9RKP)  
 VP2LBJ (to W2DEO)  
 VP2VL (via W1GNC)  
 VP5RB (via K4KXQ)  
 VP8OF (via RSGB)  
 VR7A (to ZL1AJU)  
 WN9NTP/CE0 (to W9NTP)  
 WM6EC (via KM6EB)  
 XL3HMV (see text)  
 XW8HK (via JA8SSY)  
 YK1AA (see text)  
 YN1DEO/5 (to W2DEO)  
 YN1MTY (to K0MZY)  
 ZB2DF (to G3JZV)  
 ZF1MD (to W4QCG)  
 ZF1WO (to W2DEO)  
 ZK1CV (via JA8SB)  
 ZP5ML (via PA6LOU)  
 ZP5NW (via RCP)  
 ZS6ZE (via K9MKX)  
 ZV1ITU (to PY1EN)  
 ZV5ITU (to PY5YC)  
 ZV7ITU (to PY7YS)  
 ZX3ITU (to PY3CMH)  
 ZX0ITU (via LABRE)  
 ZY8ITU (to PY8JO)  
 ZZ4ITU (to PY4AKL)  
 4U7ITU (to 4U1ITU)  
 5X5SS (see text)  
 6Y5LA (to W2DEO)  
 8P6GL (to W2DEO)  
 9A1C (via G3PEU)  
 9M2CX (via SM0BYD)  
 9M2RL (to G3WUW)  
 9M8VLC (via WA7PEZ)  
 9V1SO (to G3XGY)

Contributors of the preceding include Ws 1JUB 1KYK 1OPJ 1VV 4WEL K4s DAS QOB, WAS 2ROZ 7NTE 8PWZ 8TNI 8YTL, Wbs 5HOD 9EBO, WN1UAW, KH6BZF, VE3EZM, VK3ASV, VO1KE, 8P6ES, Columbus Amateur Radio Association CARAscope (WSZCQ), DX News-Sheet (G. Watts, 62 Belmore Rd., Norwich, NR7 0PU England), International Short Wave League Monitor (E. Chilvers, 1 Grove Rd., Lydney, Glos., GL15 5JE, England), Japan DX Radio Club Bulletin (JA3KWJ), Long Island DX Association DX Bulletin K2KGB, Newark News Radio Club Bulletin (M. Witkowski, Rte. 5, Box 167, Stevens Point, Wisconsin 54481), Northern California DX Club DXer (Box 608, Menlo Park, California 94025), North Florida DX Association News (WA4UFW), Southern California DX Club Bulletin (WA6KZI), VERON's DXpress (PA0TO), West Coast DX Bulletin (WA6AUD) and Western Washington DX Club Totem Tabloid (WA7JCB). Your turn?

† † †

#### W h e n c e :

**S**OUTH AMERICA — KC4USX, Williams Field, active only during Antarctica's summer, should be back on DX bands in November. Last season we found 40 cw very good around 0730 UTC. A number of people at the base will be sporting fresh Novice licenses in the 7-MHz subband. (WA6HXR) . . . I try 40 sideband occasionally with my SB102/SB220 but broadcast QRM is unbelievable. Much better results on 75. Been in Peru three years now waiting for more sunspots. QST takes two to four months to arrive but it's always better late than never. (OA6CV) . . . Ex-4WIGM, back in the States for a while, next heads for 8R1-land. (W3HNK) . . . LU4EGE points out that the top of 75 meters in his country is 3750 kHz, requiring some W/K split-frequency finesse if LUs are to be worked from our end. (WCDXB) . . . Delicacies from the far south like CE9s AA AT, LU1s ZE ZS, etc., gather on 3740 kHz at 0300-0900 UTC each weekend, often tuning higher. (NNRC) . . . Write HK3DEU if you'd like to see Malpelo Isle re-activated early next year. The HK0AA bunch is wondering if there's sufficient redeveloped demand for an all-out effort. (DXNS) . . . PY7YS is said to be planning a late-summer round of Noronha, Rochas, St. Peter & St. Paul doings. (LIDXA)



C21s CT ZO NP DC AZ and VE3EZM/C21, left to right, whoop it up on Nauru during the latter's recent Pacific junket.

**O**CEANIA — Midway's Bird Island ARC is again active with club call KM6BI. Our membership numbers twenty; three licensed amateurs, one Novice and sixteen WMs-to-be. July 4th was celebrated with a Midway "field day" operation from 2200 to 0500 UTC, mostly ssb on 14 MHz.

(Julie Haile, secy., BIARC) . . . My XYL now is WM6EC. Others on Midway who passed their Novice exams are anxiously awaiting their tickets. Lyn must be the first lady WM6 to hit the air. Thanks, ARRL, for all assistance toward successful conclusion of my two amateur radio courses. (KM6EB-W4DNU) . . . As of early May there were no hams residing on Johnston Island. Operation occurs when amateurs such as myself visit K16-land on business. (KW6HF) . . . A35AF, 21,105 kHz at 0030 UTC, still makes WNs happy on 15 meters and sometimes is the only DX signal breaking through. (K4DAS) . . . Too many mainlanders call too many terribly long CQ-DXs. They'd get more answers, especially from me, by transmitting less and listening more. (KH6IAC) . . . XYL Pat and I learned a lot in our half-year Oceania tour. People in the Pacific have a rare gift of sincerity and hospitality toward strangers. Everyone opened their homes completely to us and brought us into their families for a short time. We hope North American hams display as much warmth to foreign amateurs visiting our shores. (VE3EZM) . . . KM6EA hunts elusive Oneland states for WAS. Neighbor KM6FB keeps busy as Midway's chief Elmer. (KM6BI) . . . Ten meters comes to life in Jakarta now and then, low sunspot numbers notwithstanding. From 0800 to 1400 UTC YB0AHV encounters such items as AP2ZR, CR5 4BS 6WT, IT9QNV, VQ9RD and 3D2RM. Trans-equatorial 28-MHz bounce still works. (WCDXB) . . . Pacific DX Net, 14,265 kHz at 0600 UTC, continues as a source of island goodies. (NFDXA) . . . VK4ABA, formerly well known as KH6GLU, hopes to join VKs 3JW and 4WS this month aboard a trawler departing Mooloolaba for such tasty points as Mellish Reef and Willis Island. (DXNS)

**N**ORTH AMERICA — The annual New England DXCC meeting and banquet is scheduled for October 4th at the Waltham, Massachusetts, Holiday Inn. S.a.s.e. to my address will bring full details. (W1VAH) . . . I'm interested in documenting 160-meter QSOs between stations more than eleven thousand miles apart, such as ZL3RB's contacts with Gs 3PU and 6GM. (W5RTO) . . . Yes, anyone can beat the 11,621-mile 1.8-MHz QSO by PY2EUS and JA2CQO? (DXNS) . . . DX still pokes through on 10 cw's rare openings. HC1XG, VP2LAW and 5T5ZR were recent catches here. (K4DAS) . . . My final Aleutians DX score is 117/105 countries worked/confirmed with a 500CX and modest wire antennas. Now for a Carolina quad! (K4WLS/KL7) . . . Finally worked

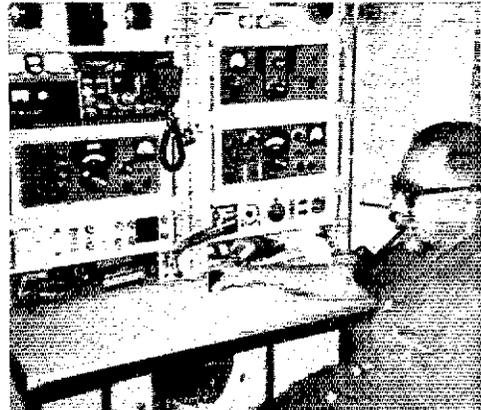
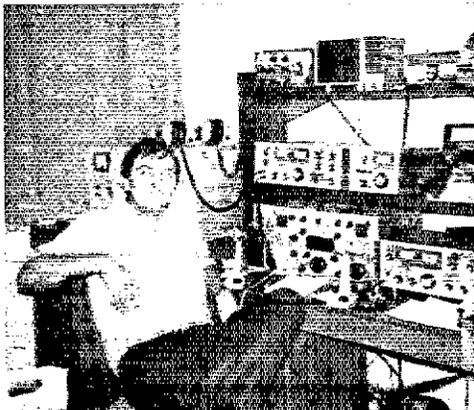
K6ZE, FKs 0IC (K6YFZ) 8BB 8AU, WA6ZPK (standing l. to r.), WB6LTJ and K6RIR (front) get together for the camera during a recent New Caledonia caper by Californians. WB6LTJ and K6RIR jointly signed FK0GA. K6ZE and WA6ZPK dropped by as electronics officers aboard Scripps Institute of Oceanography research vessel *Thomas Washington*. (Photo via K6ZE)



elusive Alaska thanks to KL7USA. Naturally the next one, KL7HJR, came very easily a few days later. (WA2ROZ) . . . Reached 110/84 on bare-foot Heath and dipoles. Fifteen produces very little DX nowadays but I find 20 and 40 fairly good. (WA8YTL) . . . Short-skip oddments via the aforementioned literature of clubs and groups: WR6ACZ, NCDXC's vhf link, is a 147.96/147.36 deal with 147.54 MHz the suggested simplex spot. . . . YN9IMP, 77 years young, did missionary work in China back in the '20s and '30s as XU2JM. Jacques was reassigned to Nicaragua in 1952, retired there two years ago and now hunts old cw friends on 14 MHz. . . . Your ARRL DX Advisory Committee is considering lifting the cross-mode prohibition in QSOs for 5B DX Century Club credit. . . . North Florida DX Association emits flash DX news on 147.2 MHz for local clientele. . . . 'Tis said that short-wave broadcasting interests hope to grab about seven more megaHertz in the precious 3-27-MHz DX range at the next opportunity. Yehhhh!

**QST**

VS6DO (left) and CR9AK are among Asia's brighter DX lights although the latter's activity is lately limited by local conditions. Paul and Fern were photographed by K3NEZ on his recent visit to the orient.





# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* W3WRE

## YL Certificates

**T**HE GOOD THINGS arriving in envelopes marked DO NOT FOLD are the proof of the hard labor of earning a certificate. For what has been termed the "distaff side of amateur radio," clubs and nets in this country offer dozens of these awards, available to all amateur radio operators.

Of the six certificates offered internationally by YLRL, two are limited to YLs only; the other four certificates duplicate the major ARRL and IARU awards with an accent on the feminine. In Canada, CLARA and the Ontario Trilliums list five certificates. Japan's JLRS sponsors the "YL-10" award for contact with their growing YL population. In Italy, the YLRC Italiano Elettra Marconi offers two: the "Worked All Italian YL" certificate and the "Jolly Flower Award" of their mini-contests.

In South Africa, the SAWRC, now in its 23rd year, has set up a number of these awards: the Iris Hayes Phone, donated by ZS2AA; the Irvine CW, given by ZS6GH; ZS4NG's 40 Meter Pearl Pearce Trophy; the SAWRC ssb award; Edie Bennett 80 Meter Phone, and for those who enjoy cw operation, the club's Key Keen Klub certificate. Those who have earned that third "K" know just how difficult it was to acquire.

The YLISSB has created some 30 different types of certificates available to members of this worldwide group and representing operation within the System. They also offer seven trophies. All of these YLISSB awards represent the System's

\* YL Editor, QST. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.



"Torch of Friendship" and its efforts to promote better understanding through amateur radio.

How do we earn these colorful certificates? Through our contacts on the air with other gals. Thus, we meet and talk with YLs all over this country. We enter contests sponsored by YLRL and CLARA, YLRC Italiano, and the Ontario Trilliums. We join local nets to work area gals and clubs, and we join the nationwide nets to pick up those elusive calls across the country. Such contacts often develop into lasting friendships.

With the increase of operation as the fall season begins, those YL sponsored contests are a great source of these contacts. September opens the season with the YLRL "Howdy Days." The YLAP, the anniversary party of YLRL, follows in October and November. Also in November is the annual Trillium Weekend; in January, YLRL's DX YL to North American YL Contest. There are others: the "Jolly Flower" of YLRC Italiano, YLISSB's QSO Party, the CLARA Day, CLARA's AC-DC contest, and of course YL-OM, Florida Month, Buckeye Belle Week, in particular.

Each certificate is evidence of the YLRL theme of "International Friendship through Amateur Radio" that began with the "Adoptee" program and that first DX-YL certificate.

## Major YL Meetings

There will be only two major YL meetings in 1975. The Canadian Division ARRL Convention, August 1-3, will include the first CLARA Convention meeting of the YLs in Canada, with VE6YL as chairperson.

The YL meeting at the national ARRL convention in Reston, Virginia, September 12-14, will be under the guidance of the WAYLARCs with a special YL Forum that will have YLRL President Chris Haycock as speaker. Chris, WB2YBA, plans to highlight the club's longterm plans, as well as the final ideas for the YL film and the coming YL Directory issue of Harmonics. As always there are plans for a hospitality room for the women who will be attending the convention.

This will be the only large gathering of YLs in this country this year, so see you there.

RTTY operators know Rosa, I1PXC, one of the DX RTTY YLs. Rosa finds that she is able to overcome the language problem using this form of emission.

W6PAU, Mary Jaquette, qualifies for membership in the OOTC with her experience in amateur radio lasting from before WWII. (W6WNN/K7QWU photo)



### 1975-76 Ontario Trilliums Officers

The Ontario Trilliums have announced the following women to head Canada's oldest YL club for the year June 1975 through June 1976: president, Irene Williams, VE3BEI; vice president, Joan Powell, VE3FVO; treasurer, Doris Cody, VE3BBO; secretary, Audrey Mc Dermott, VE3CCO; publicity covenantor, Joan Stone, VE3BCP and editor of *TOTOPICS*, Thelma Woodhouse, VE3CLT.

Now in their 10th year as a YL club, the Ontario Trilliums sponsor three nets weekly: Saturday, 1440 EST, on 14.140 MHz; Saturday, 2000 EST, on 3.770 MHz; and for the cw members, Thursday, 0000 UTC, on 3.695 MHz.

### New CLARA Certificate

Canada's national YL club, CLARA, has announced a new award, the Canadian Family Certificate. This award is open to all radio operators who show proof of contact with those VE families who have several members with amateur radio licenses.

To earn this certificate, log data must be submitted showing contact with two or more members of the same family with a requirement of 22 points that are acquired through 1 point for the first member of the family contacted, and two points for each additional member of the same family. Thus a YL-OM team would count as three points towards the 22 required for the certificate.

All bands and modes of operation will be accepted. The certificate will be awarded for contacts with Canadian families after January 1, 1975.

Full breakdown of the rules may be obtained from the custodian, Cathy Hrischenko, VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, Canada, M2J 2Z5.

### YL, XYL

There has been an increase in the mail to "YL News and Views" lately regarding the definition of

the abbreviations "YL" and "XYL." It is really quite simple; the ARRL publication *The Radio Amateur's Handbook* defines YL as "young lady," and XYL (YF) "wife," under abbreviations for cw use.

True, the abbreviation YL has come to indicate female amateur radio operators, and has been adopted in most of the YL club names. However, it is still true that the "X" adds one special thing to a YL's status (her marital status) — whether the lady is licensed, or the wife of an amateur.

### New French YLs

Each issue of the publication *Ondes Courtes Informations* of the Union des Radio-Clubs of France lists the new calls that have been issued. Lately there have been several YL names among those new amateurs in that country. For those who have worked FM7BJ, Josiane has had her call changed since she moved to Martinique and is now using F2YL.

The other YLs who are newly licensed in France are F2QS, Mme. Germaine Gogin; F6DCO, Mme. Germaine Thievenaz; F6DCW, Mme. Annette Bassanoni; F6DCY, Helene Bassanoni; F6DRJ, Yvette Jausas; and F6DRV, Elisee Bismuth.

### "Age here is . . ."

Don't be surprised if in answer to *Age here is . . .* in the beginning of a QSO you hear 78 or 88. Evelyn Fox, WN9QZA, of Merimac, Wisconsin, has received her Novice license at the age of 78. According to the *Call Book* magazine, summer supplement, she is now on the air with that call.

Dr. Mary Jaquette, W6PAU, is now 88 years old. She is a retired Ophthalmologist. Before WWII, Mary held a W2 call in New York. After the war she moved to California and was assigned the call W6CPI. For a while she held a call in the fifth call area. After the death of her husband she moved back to California and is now W6PAU. Mary has quite a radio-minded family. Her sister held a call briefly. Her son is K5HJZ, and her daughter-in-law is K5HLC. Besides amateur radio, Mary's interests are painting and travel.

**QST**



VE3AYL was the first YL in Canada to receive a VE prefix call. She is an active and enthusiastic RTTY contest participant.

# Operating Events

de WYI.

## AUGUST

**2-3 YO Contest, Illinois QSO Party, p. 106 July.**

**6 West Coast Qualifying Run, (W6QWP prime, W6ZRJ, alternate), 10-35 wpm at 0400Z on 3590/7090 kHz. This is 2100 PDST the night of August 5. Please note that dates are always shown at least 2 months in advance and times are always the same local "clock time," i.e. 9 PM local Pacific time. Underline one minute of the highest speed copied, certify copy made without aid and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address.**

**9-10 European DX Contest cw, LU DX Contest phone, p. 106 July.**

**12 WLAW Qualifying Run, 10-35 wpm at 0130 UTC transmitted simultaneously on 1,805 3.58 7.0R 14.08 21.0R 28.08 50.08 and 145.588 MHz. This is 2130 FDST (9:30 PM local Eastern time) the night of August 11. Underline one minute of the top speed copied, certify copy made without aid (typewriters OK), and send to ARRL for grading. Please include your full name, call (if any) and complete mailing address.**

**15-24 Missouri State Fair Operation, sponsored by the Warrensburg ARC and the Central Missouri ARC; special call not known as of this writing. Starting times/freqs, as follows: 3963 - 2130Z, 7125 - 1900Z, 7250/14070 - 2000Z, 14300 - 0000Z, 14300 - 0000Z, 21150 - 1800Z, 21375 - 1500Z, 28150 and 28600 as openings occur. QSL address will be announced by the Fair station, an s.a.s.e. appreciated. Further info, from WB0CJB on the Missouri SSB Net 3963 kHz at 2300 or by writing Paul Kemp, 810 Manor Court, Sedalia, MO 65301.**

**16-17 New Jersey QSO Party, SARTG RTTY Contest, Oregon QSO Party, p. 107 July. QRP Contest, sponsored by the QRP ARC, 2000Z Aug. 16 through 0200Z Aug. 18, open to all. Members send RST(), state, province/country, QRP no. Non-members use input power in lieu of QRP no. Non-member to non-member QSOs do not count. The same station may be worked once per band and mode for multiplier points only. Members count 3 points per QSO, non-member contacts count 2 points, non-WVE stations (including Alaska and Hawaii) count 4 points. Power mult.: 100 watts or less X 1, 25-100 watts X 2, 5-25 watts X 3, 1-5 watts X 4, less than 1 watt X 5. Scoring: total QSO points X states (max. 48), provinces and country, X power multiplier. (Multipliers count once only.) Suggested freqs.: cw, 3540 7040 14065 21040 28040; phone, 3855 7260 14260 21300 28060 50350; novice, 3720 7120 21120 28110. Awards. Logs must show usual date and include a summary with gear description, power level, score computation. Logs must be postmarked within 30 days and sent to: W. J. Fallon, W4KFB, 124 Stoll Ave., Louisville, KY 40602. Include a large s.a.s.e. for a list of the winners.**

**23-24 All-Asian Contest cw, p. 105 May and 107 July. Arizona QSO Party, p. 107 July.**

**30-31 SSA-50 Contest p. 106 July. MARTS SEANET Worldwide Contest, the full period GMT, phone or cw (no crossmode) 160-10 meters. Single band, single op, multiband, multi-multi, categories. The contest is to publicize the 5th SEANET Convention in Kuala Lumpur Nov. 7-9. Send RST() plus consecutive serial no., starting with 001. Scoring: 5 points for QSOs with 9M2 9M6 9M8 and VSS stations, 1 point with other SEANET stations other than those listed. A multiplier of 3 points per SEANET country; score equals points times the sum of multipliers. Usual log/summary. Awards. SEANET countries: A4 A51 A7 A9 AP BV CR9 DU EP HL/BM HS JA JD1 JY KC6 KG6 KH6 KX6 P29 S21 VK VQ9 VSS VS6 VS9K VS9M/SQ6 VU2 VU (Andaman, Nicobar & Laccadive) XU XV5 XW8 YB YJ8 ZL 3D2 3B6 3B8 457 4W1 5Z4 9M2 9M6 9M8 9K2 9N1 9V1. Restrictions: no crossmode or crossband, ops. not allowed to transmit 2 or more signals on the same band, only 1 QSO per band with the same station, usual declaration, MARTS SEANET committee decisions final. Logs postmarked no later than Sep. 30. Send to: MARTS SEANET Committee, Ismail Razak "Eshce" 9M2FK, 281-c, Jalan Pekariling, Bukit Glugor, Penang, Malaysia. Results to be announced during the convention. **Ohio Interstate QSO Party, sponsored by the Ohio Council of Amateur Radio Clubs, open to all. There are two 8-hour operating periods: 1900Z Aug. 30 to 0300Z Aug. 31 and 1500Z Aug. 31 to 2300Z Aug. 31. No restrictions on time, power, number of ops. or transmitters.****

Each station can be worked twice on each band; once on phone, once on cw. Ohio stations may contact any other station for credit. Non-Ohio stations may contact only Ohio stations for credit. To encourage emergency preparedness and provide contacts from rare Ohio counties, portables operating from any Ohio county EXCEPT Butler, Cuyahoga, Franklin, Hamilton, Lorain, Lucas, Mahoning, Montgomery, Stark, Summit, and Trumbull may multiply their final score by 1.5. Portable operation is defined as operation outside the county in which you are licensed and signing your call as /P. QSO points are 1 per completed exchange, and 2 on 160 and all frequencies above 50 MHz. As a bonus, a complete exchange with the Ohio State Fair special event station (expected call W08HIO) are 5 QSO points on 80-10. The final score for Ohio stations is the total number of QSO points multiplied by the no. of ARRL sections worked, including Ohio. DX stations may be worked for QSO points but do not count as additional sections. For non-Ohio stations, the no. of QSO points is multiplied by the no. of Ohio counties worked. Portables changing counties during the contest may repeat contacts for QSO points but multiple contacts may not be claimed by operating on a county line. Stations outside Ohio may claim both QSO points and counties. Exchange QSO no., RST(), and ARRL section (or county for Ohio). Stations operating on county lines may issue more than one multiplier but not more than one QSO number per band/mode. Suggested freqs.: 1808 3575 3975 7075 7275 14075 14285 21075 21375 28075 50.15 145.10. Try phone each even hour UTC and cw each odd hour. Try 160 at 0200Z Aug. 31. Logs showing usual info. and score must be received by Nov. 1 and sent to: Ohio QSO Party, 6470 Penick Dr., Reynoldsburg, OH 43068. Awards. A contest package of logs, Ohio county & ARRL section list and summary sheet will be sent upon receipt of s.a.s.e.

## SEPTEMBER

**4 West Coast Qualifying Run.**

**6-7 VHF QSO Party, this issue (and p. 73 May). Kentucky QSO Party, sponsored by the Bluegrass Amateur Radio Club, from 1800Z Sep. 6 to 0400Z Sep. 7 and from 1600Z Sep. 7 to 0100Z Sep. 8, open to all. One cw and one other mode (SST) permitted per station per band (phone and cw portions of the hf bands are not counted as separate bands). VHF simplex only. KY stations may work each other, other stations work KY only. Send RST(), consecutive QSO no. and county (for KY), others substitute state, province or country. One point per complete exchange. Multipliers: KY stations use KY counties, states, provinces, countries worked; others use KY counties. Stations operating at power input below 250 watts use a final multiplier of 1.5. Suggested freqs.: phone, lower edge of general bands; cw, 60 kHz up from the lower edge of the general bands; novice, check periodically; vhf, limited to 6 and 2. Logs must show date and time for each contact. Awards. Send logs and dupe sheets postmarked no later than Oct. 11 to R. van Outer, WB4YQY, 285 Hillsboro Ave., Lexington, KY 40505. **Maryland-D.C. QSO Party, sponsored by the Maydale Amateur Radio Society, 2300Z Sep. 6 to 0100Z Sep. 8. The same station may be worked on each band and mode for QSO points as well as band multiplier. Exchange QSO no., RST() and QTH (county for MD stations except Baltimore City and Wash. D.C.); ARRL section or country for all others. Score 2 points per complete QSO. The same station may be worked on each band/mode for additional QSO points. Multiplier: MDC use ARRL sections and countries; all others use MD counties and Independent Cities. Score: sum of MDC counties/cities or sum of ARRL sections/countries from each band multiplied by total QSO points. Suggested areas: use all bands, on hf bands 75 kHz from the low end of the cw band on even hours; 25 kHz from top of band on phone (on odd hours). On the half hour try 10 and 15 meters. Awards A separate log should be submitted for each band and mode as well as a check sheet for each band and mode with over 100 contacts. Submit summary for all operation with name, address and call (block letters, please) and usual declaration. Mailing deadline Oct. 4. Send to Maydale ARC, c/o C. F. Andersen, W5TWF/3, 14601 Claude Lane, Silver Spring, MD 20904. **4-Land QSO Party, sixth annual, sponsored by the Fourth Call District ARA, from 1800Z Sep. 6 to 0200Z Sep. 8. Open to all. Exchange RST(), county and state for 4th district stations; state, province or country for others. Scoring: 4th******

district stations 1 point per WVE qso and 3 points for foreign contacts (including KH6/KL7), multiplied by no. of states and provinces worked. All others 2 points per QSO multiplied by no. of 4th district states and counties worked. The same station may be worked on each band and/or mode and repeated again if operated portable or mobile and from each different county. Fourth district stations may work each other. Freqs. (plus/minus 10 kHz): cw, 3575 7060 14070 21090 28090; phone, 3940 7260 14340 21360 28600; novice, 3710 7110 21110 28110. Awards. Send logs to Bob Knapp, W4OMW, 105 Dupont Circle, Greenville, NC 27834 by Oct. 8 (s.a.s.e. for results).

**Szavaria C.C.S. Contest (HA)**, sponsored by the Claudius RC of Hungary, uhf 1500-2300Z Sep. 6, hf 0000-2400Z Sep. 7, open to all, 80-10 cw, 144 and 432 cw and phone. Call CQ CCS. Exchange report plus QSO no. starting with 001. Three points per QSO with an hf station, a mult. of one for each of the 10 HA call areas. Score for each band will be the no. of mults. times no. of points; for all band score use the sum of mults. for all bands. Usual log info, (separate logs for separate bands); include usual declaration. Categories: single op., all band, single op., single band, multiop., all band (club stations in this last category). Awards. Logs must be postmarked by Nov. 30 and sent to the Claudius RC, 9701 Szombathely, P. O. Box 145, Hungary.

**7 Frequency Measuring Test.** open to all begins with a callup at 0130 and 0430 UTC Sep. 7. (Remember, this is the evening before, local time!) The periods for measurement start at 0137 (20 meters), 0145 (40 meters) and 0153 (80 meters); for the late run, 0437, 0445 and 0453 respectively. Note reverse order of measurements and measure 20 first! Each measuring period lasts five minutes. Submit your averages for each 5-minute period which will be compared with the umpire's averages during the same period. (The umpire is a professional measuring laboratory.) Tell how many readings you took to form your averages. Approximate frequencies for the early run are 14,117 7079 and 3544 kHz. Late-run frequencies are 14,105 7065 and 3539 kHz. Your entry must be received by Sep. 18 to qualify for the QST report of the competition. WIAW will start transmitting the official results in a special bulletin Sep. 19.

**Two-Meter RTTY Contest.** sponsored by the Tu-Boro Radio Club, from 6 am to midnight local time, on 145.620. Issuance of a club certificate on basis of having worked 5 members of the club. Inquiries, logs, applications for certificate accepted until Oct. 1. Send to Tu-Boro RC, 149-14 14th Avenue, Whitestone, NY 11357.

#### 10 WIAW Qualifying Run.

**13-14 Annual CLARA DAY Contest.** p. 94 July. **Pennsylvania QSO Party**, 18th annual, sponsored by the Nittany Amateur Radio Club, open to all. PA stations may work both in and out-of-state stations. Periods: Sat. 1600-2100Z, 2300-0500 (Su.), Su. 1300-2400Z. Exchange QSO no., RS(T) and county (PA) or ARRL section, Freqs.: cw, 1810 3560 7060 14060 21060 28060; phone, 1815 3980 7280 14315 21380 28560; novice, 3715 7160 21115 28115. Try phone on evch UTC hours, 160 at 0300Z, 10 at 1900. Scoring: PA stations score 3 points per out-of-state QSO, 1 point per PA QSO, multiplied by no. of ARRL sections worked (EPA and WPA may be counted as sections for PA stations). Non-PA stations score 1 point per QSO times the total no. of PA counties worked. Stations may be worked once on each cw and once on each phone band. A bonus of 100 points is offered to each mobile for each country activated during the contest. Send log/summary with usual info, plus juicy tidbits, gipes and suggestions by Oct. 15 to Douglas Maddox, W3HDH, 1187 S. Garner St., State College, PA 16801.

**European DX Contest** phone, p. 106 July. **Washington State QSO Party**, tenth annual, sponsored by the Boeing Employees' Amateur Radio Society (B-ARS), 2000Z Sep. 13 to 0200Z Sep. 15, open to all. A station may be worked once each band and mode for contact points and more than once if they are additional multipliers. Wash. stations score 1 point per QSO (including contacts with other WA stations). Others score 2 points per WA QSO. WA stations multiply total points by the total of different states, VA provinces and other foreign countries worked. All others multiply total points by no. of different WA counties worked (max. 39). There will be an extra mult. of 1 for each group of 8 contacts with the same WA county. WA stations send QSO no., RS(T) and county. All others use province or country for QTH. Awards. Suggested freqs.: cw, 3560 7060 14060 21060 28160; phone, 3935 7260 14280 21380 28660; novice, 3735 7125 21150 28160. Usual log info., signed declaration. Committee decisions final, no logs can be returned, S.a.s.e. NO1 required for results. Logs and

scores by Oct. 13 to BARS, c/o Willis D. Propst, K7RSB, 18415 38th Ave. South, Seattle, WA 98188.

**13-15 T7SAA DX Expedition.** by the Radio Amateur Club of Guatemala (CRAG), celebrating the Independence of Guatemala, the full 72-hour period. Operation will take place at the old capital, of the Mayan Empire, Tikal. Phone operation only within 5 kHz of 3780 7080 14195 21300 28600; experiments on 146,940 - 146,520 MHz. Commemorative QSLs. Special Tikal Certificates by air upon request and receipt of \$2 (U.S.). CRAG address, Box 115, Guatemala City, Guatemala.

**20-21 VE/W Contest.** this issue. **Scandinavian Activity Contest (SAC)** cw, sponsored by the Finnish Society the SRAL, from 1500Z Sep. 20 to 1800Z Sep. 21 (phone same times Sep. 27-28) Non-Scandinavians try to work as many Scandinavian stations as possible, the same station may be worked once on each band during the contest; 80-10 no cross mode. Prefixes to watch for: LA/LB/LJ/LG (Norway), JW (Svalbard), JX (Jan Mayen), OH (Finland), OHØ (Åland Islands), OJØ (Market Reef), OX (Greenland), OY (Faroe Islands), OZ (Denmark) and SM/SK/SI/SJ (Sweden). Classes: single op., multiop. single transmitter, multiop. multi-transmitter. Exchange report plus consecutive serial starting with 001. One point per complete QSO. Max. of 10 multipliers per band. The sum of complete QSOs multiplied by the sum of multipliers equals final score (note there is only oneband category in this contest). Certificates. Usual log, note each new multiplier, separate sheets per band not necessary but do include a full summary. Note phone and cw are separate. Include declaration. Committee decision final. Logs must be mailed no later than Oct. 15. Send to SRAL Contest Committee, Box 306, SF-00101 Helsinki 10, Finland.

#### 23 WIAW Morning Qualifying Run.

**27-28 SAC phone.** see above listing. **Delta QSO Party**, 6th annual, sponsored by the Delta Division of ARRL, open to all. Times from 2000Z Sep. 27 to 0200Z Sep. 29, no time or power restrictions. Object: non-Delta Div. work only Delta stations (Ark.-La.-Miss.-Tenn.). Delta amateurs work both Delta and non-Delta stations. Scoring: inside the division no. QSOs times no. of ARRL sections (max. 75); outside the division, no QSOs times no. of Delta counties (max. 316). DX may be worked but does not count as multipliers. Awards. Any station disrupting a working Delta traffic net or whose log exhibits obvious irregularities will be disqualified from award consideration. Suggested freqs.: cw, 3550 7050 14050 21050 28050; ssb, 3990 7290 14290 21390 28590; novice, 3725 7125 21125 28125. Logs must be postmarked by Oct. 21 and will be returned if requested. Send to Malcolm P. Keown, WSRUB, 213 Moonmist, Vicksburg, Mississippi 39180.

### OCTOBER

- 1 West Coast Qualifying Run.
  - 4-5 California QSO Party, Rocky Mt. QSO Party, VK/ZL Contest phone, CARTG RTTY SS.
  - 11-12 CD Party phone, VK/ZL Contest cw.
  - 16 WIAW Qualifying Run.
  - 18-19 CD Party cw, Manitoba QSO Party, WADM.
  - 25-26 CQ WW phone.
  - 27 Special WIAW Evening Qualifying Run.
- Nov. 8, Frequency Measuring Test.  
 Nov. 8-9, SS cw. Dec. 6-7, 160-Meter Contest.  
 Nov. 22-23, SS phone. Dec. 13-14, 10-Meter Contest.  
 Nov. 29-30, CQ WW cw. Dec. 31, Straight-Key Night.

### Technical Topics (Continued from page 62)

It should be mentioned in closing that if the League were to publish only those projects which employ readily available, inexpensive components, we'd soon be out of the ham radio sphere of endeavor and would be catering only to gadgeteers and tinkers. Progress would come to a halt, and new techniques would not be learned. There are precious few useful amateur circuits that could be based on so idealistic a premise. — WICER

# Operating News

GEORGE HART, WINJM  
*Communications Manager*  
ELLEN WHITE, W1YL  
*Deputy Communications Mgr.*

ASST. COMMS. MGRS.: DXCC, R. L. WHITE, W1CW; *Hq. Station*, C. R. BENDER, W1WPR;  
*Public Service*, W. C. MANN, WA1FCM; *Contests*, JIM CAIN, WA1STN.

**Plateaus in Code Learning.** For the average code learner, things go along quite smoothly up to about 10 wpm, then progress begins to level off. Achieving 12 wpm is hard, 13 wpm even harder, and by that time 15 wpm seems far away, almost out of reach. Those who persevere eventually get there, however, and from then on the upward progress again becomes smooth — not necessarily rapid, but steady, depending on how much you practice.

What causes this 10-12 wpm plateau and other similar phenomena in code learning with most people? It comes about principally through the necessity to change your learning habits as you reach this level. Most code learners start out by memorizing the alphabet in terms of "dots" and "dashes" or "dits" and "dahs." Even those who are cautioned by an enlightened instructor that A, for example, is not a dot followed by a dash but a sound whose closest voice emulation is "didah" — even those usually "memorize" that it is a short sound followed by a long sound, a B is a long sound followed by three short sounds, and so on. Thus, the initial stage of code learning with most people is a counting procedure, and no amount of emphasis on sound is going to change this.

At the slower speeds, counting dots and dashes is easy enough, but as the speed progresses it gets to be more difficult. By the time you reach 10 wpm the average brain starts to miscount, and progress decreases. At 15 wpm only the nimblest of brains can still count, and at 18 wpm it becomes virtually impossible.

With some people, the transition from counting to "hearing" is accomplished almost automatically, and for them the plateau is of minor duration. Others all but bog down completely, sometimes in despair.

The solution has been to present the code at speeds too fast to count to begin with, and elongate spaces to give recognition time. In WIAW code practice, for example, the 5, 7 and 10 wpm transmissions are actually sent at 16 wpm. Try

counting dits and dahs at that speed! At 13 wpm, we revert to normal spacing.

This method is just dandy, but it causes a new kind of plateau — a rhythm plateau. That is, you get used to recognizing characters sent at 16 wpm with exaggerated spacing, then suddenly the rhythm changes to 13 wpm at normal spacing — normal spacing that to some learners sounds like *no* spacing by comparison — and you have to get used to that before you can proceed again.

Whichever plateau you run into, once you have conquered it, if you continue your quest for code proficiency (beyond mere licensing requirements, that is) you will run into still another plateau, again concerned with changing your habits. Up to about 25 wpm you can copy well enough letter by letter, but then along comes another difficulty — the letters start coming at you too fast and you can't keep up. You start getting behind. By the time you recognize a letter and write it down, another letter has been sent and you've lost it. So you have to start "copying behind," letting your pencil (or preferably, by this time, typewriter) get behind your brain. This means you receive not just letters, but syllables and short words at a time. Difficult? Nope, easy. If you ever write down what somebody tells you (and who doesn't?), you do it all the time. It's just a matter of practice.

Let's back up a minute. Why, you might well ask, do you send the very low speeds at 16 wpm with exaggerated spacing, then shift to 13 wpm at normal spacing? Why not stick with 13 wpm in the first place, just decreasing the spacing to normal for a real 13 wpm? This is a good point, and one way to do it. The reason for the higher speed is to avoid any possibility of the learner "counting," a strict no-no. Oh sure, the really nimble-brained youths may still be able to do it, but at that speed even they will find it easier to learn to recognize the sound, thus avoiding the most difficult plateau of all.

Learning the code is like learning to talk, and most of us started mastering that at age two. How? By imitation, that's how. One of the first things to do is to get yourself a communications receiver and spend some time, a lot of time, listening to it. No, not to sideband and short wave broadcast, but to all the hams conversing with each other by CW. Learn what CQ sounds like (you'll hear it a lot), the DE preceding a call, the various ending signals, the call prefixes, the number in every call, the commonly-used Q signals. First thing you know,

IN A COMMUNICATIONS EMERGENCY,  
MONITOR WIAW FOR SPECIAL BUL-  
LETINS AS FOLLOWS (times in GMT).

Phone: On the hour.

RTTY: At 15 minutes past the hour.

CW: On the half hour.

## W1AW SCHEDULE (effective February 23, 1975)

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M. - 1 A.M., Saturday 7 P.M. - 1 A.M. and Sunday 3 P.M. - 11 P.M., (all times local Eastern). The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your original operator's license with you. The station will be closed Mar. 28, May 26, July 4 and Sept. 1, 1975.

Times/Days CDT	UTC	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
0740	1240	← Oscar <sup>9</sup> →							
0800	1300	CODE PRACTICE <sup>1</sup> (5-25 wpm MWF, 35-15 wpm TTh) Details Below							
1200-1300	1700-1800 <sup>1</sup>	21/28 cw <sup>7*</sup>	7.290*	21/28 cw <sup>7*</sup>	7.290*	21/28 cw <sup>7*</sup>			
	1800	← Oscar <sup>9</sup> →							
1320-1400 <sup>4</sup>	1820-1900 <sup>4</sup>	14.290*	14.080*	14.290*	14.080*	14.290*			
1400-1500	1900-2000	7.080*	21/28 ssb <sup>8*</sup>	7.080*	21/28 ssb <sup>8*</sup>	7.080*			
1500	2000	← CODE PRACTICE <sup>1</sup> (10-13-15 wpm) Details Below →							Oscar <sup>10</sup>
1530	2030	← CW Bulletin <sup>1</sup> →							
1600-1630 <sup>4</sup>	2100-2130 <sup>4</sup>	7.1 Nov. <sup>5*</sup>	21.1 Nov. <sup>5*</sup>	28.1 Nov. <sup>5*</sup>	21.1 Nov. <sup>5*</sup>	7.1 Nov. <sup>5*</sup>		Oscar <sup>11</sup>	
1630	2130	← RTTY Bulletin <sup>3</sup> →							
1700-1800 <sup>4</sup>	2200-2300 <sup>4</sup>	CPN <sup>6</sup>	14.095 RTTY*	3.625 RTTY*	7.095 RTTY*	CPN <sup>6</sup>			
1800-1830	2300-2330		CN <sup>6</sup>		CN <sup>6</sup>				
1830	2330	← CODE PRACTICE <sup>1</sup> (10-13-15 wpm) Details Below →							
1900	0000 <sup>†</sup>	← CW Bulletin <sup>1</sup> →							
1930-2000 <sup>4</sup>	0030-0100 <sup>4†</sup>	3.7 Nov. <sup>5*</sup>	14.080*	14.080*	7.1 Nov. <sup>5*</sup>	14.080*			
2000	0100 <sup>†</sup>	← Phone Bulletin <sup>2</sup> →							
2010-2030 <sup>4</sup>	0110-0130 <sup>4†</sup>	3.990*	50.190*	145.588*	1.820*	3.990*			
2030	0130 <sup>†</sup>	← CODE PRACTICE <sup>1</sup> (5-25 wpm TThSatSun, 35-15 wpm MWF) Details Below →							
2130-2200 <sup>4</sup>	0230-0300 <sup>4†</sup>	3.580*		1.805*		3.580*			
2200	0300 <sup>†</sup>	← RTTY Bulletin <sup>3</sup> →							
2230	0330 <sup>†</sup>	← Phone Bulletin <sup>2</sup> →							
2240-2300 <sup>4</sup>	0340-0400 <sup>4†</sup>	7.290*	3.990*	7.290*	3.990*	7.290*			
2300	0400 <sup>†</sup>	← CW Bulletin <sup>1</sup> →							
2330-0000 <sup>4</sup>	0430-0500 <sup>4†</sup>	3.7 Nov. <sup>5*</sup>	7.080*	3.580*	7.1 Nov. <sup>5*</sup>	3.580*			

<sup>1</sup>CW Bulletins (18 wpm) and code practice on 1.805, 3.580, 7.080, 14.080, 21.080, 28.080, 50.080 and 145.588 MHz.\*\*

<sup>2</sup>Phone Bulletins on 1.820, 3.990, 7.290, 14.290, 21.390, 28.590, 50.190 and 145.588 MHz.\*\*

<sup>3</sup>RTTY Bulletins on 3.625, 7.095, 14.095, 21.095 and 28.095 MHz.\*\* Bulletins at 170 Hz shift, repeated at 850 Hz shift when time permits.

<sup>4</sup>Starting time approximate, following conclusion of bulletin or code practice.

<sup>5</sup>W1AW will tune the indicated band for Novice calls, answering on the caller's frequency.

<sup>6</sup>Participation in traffic nets.

<sup>7</sup>Operation will be on one of the following frequencies: 21.02, 21.08, 21.11, 28.02, 28.08, 28.11 MHz.

<sup>8</sup>Operation will be on one of the following frequencies: 21.26, 21.39, 28.59 MHz.

<sup>9</sup>When an Oscar satellite is in orbit, daily updated orbital data is sent at 18 wpm on cw frequencies.

<sup>10</sup>Oscar orbital data for the coming week, on cw frequencies.

<sup>11</sup>Oscar orbital data for the coming week, on RTTY frequencies.

\* General contact period.

\*\* No 10- or 15-meter activity from 2030-0000 CST.

† Indicates following day when UTC is being used.

All frequencies are approximate.

### W1AW CODE PRACTICE

W1AW transmits code practice according to the following schedule. Approximate frequencies are 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

Speeds	Local Times/Days	UTC/Days
10-13-15	7:30 PM EDST dy	2330 dy
	4:30 PM PDST	
10-13-15	4:00 PM EDST MTWThF 2000 MTWThF	
	1:00 PM PDST	
5-7½-10-13-20-25	9:30 PM EDST SnTThS	0130 MWFSn
	6:30 PM PDST	
5-7½-10-13-20-25	9:00 AM EDST MWF	1300 MWF
	6:00 AM PDST	
35-30-25-20-15	9:30 PM EDST MWF	0130 TThS
	6:30 PM PDST	
35-30-25-20-15	9:00 AM EDST TTh	1300 TTh
	6:00 AM PDST	

The 0130 UTC practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period. To improve your fist by sending in step with W1AW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and QST practice text to be sent in the 0130 UTC practice on the following dates, from the June issue.

August 4:	It Seems to Us
August 7:	Correspondence
August 13:	League Lines
August 19:	ARPS
August 25:	World Above
August 29:	YL News

**New A-1 Operators**  
 WA1APJ W4GS WA4MTZ K6GMI  
 WA6IPI WB6OYN W0BA WB0BVI VE1CD

# DX CENTURY CLUB AWARDS

## New Members

Radiotelephone listings follow the general-type "New Member" and "Endorsement" listings -- May 1-31, 1975.

## New Members

W6TCQ	310	K7KTD	163	JH6DVL	131	JA3YBF	116	JA7JWF	106	DLØRCA	101
JA1UQP	303	JH3DAE	162	UR5UAL	131	DL2GK	115	JR1TNE	107	DU6RH	101
JA7EHU	301	G3LMD	161	K9ZUH	129	JA7QVI	115	WA2GEZ	107	JA3AVO	101
K6SVL	291	IT9RAN	161	UA9MS	129	K1RQF	115	IA6WW	106	K4LRO	101
WB9EBO	269	JA1WSK	161	JH3SBC	128	W2JWX	115	K1UJB	106	UB5GBD	101
WA4NRE	259	YU3TKL	160	W2YYF	128	DL3ZH	114	OK1XN	106	WA2URD	101
WB4JSV	244	IT9BWO	158	OH2AC	127	JA6EGL	114	W1GME	106	WA4GQJ	101
W2BVN	244	WA2GLU	158	W2R1J	127	WB5DTX	113	W2RRY	106	WB9FGN	101
WB5ESW	224	YU2RTW	154	OH1AF	126	JA7CL	112	WA2TTJ	104	K2UPR	100
W6POZ	220	WA1LRO	153	W1JAA	126	K2IJ	111	F6CZU	103	K4JSG	100
DK5WS	214	DJØYL	151	K4II/DL	124	W4ET	111	K4RD	103	K6OPG	100
K5BZ	211	JA8WY	151	JH1KIK	123	JH3EGD	110	LA9LS	103	K8MKA	100
W1WQC/4	207	I5XRR	150	JA1RUJ	122	K5LZJ	110	UY5EI	103	UB5ZA	100
KP4CRT	200	WA6VYU	150	WA1NRF	122	OK3CIU	110	UAØPY	103	VE3GGS	100
SM5BMB	200	JH1OCO	147	GCSAGA	121	OK3KTR	110	W1DYH	103	VE6FY	100
WB8GKG	196	OH6KN	146	K5EJP	121	JAØSC	109	W3BHE	103	W6TPR	100
I1FOX	187	W1FYZ	140	JA7DXD	120	OK3YCA	109	W4JGE	103	WB4BUT	100
DJ6WD	183	W6USV/2	140	VE7AZV	120	W8LBU	109	UY5ZH	102	WB4IWN	100
JA3JOR	182	UA6AAQ	138	YU3TFO	120	I3PIN	108	WA1MYX	102	WB8NMP	100
W3FCS	167	WA6ETN	137	K4EBY	119	JA7SPJ	108	W2NUV	102	W9RR	100
W2FGY	165	K8RMN	136	OZ7JB	119	JR3EDN	108	W4UPV	102	W9VZL	100
WA4UPR	165	DL2UH	135	W91UH	118	WA3IFO	108	4Z4B	102	ØH4L	100
		EA8CG	131	VU7GV	117	WA7IHN	108	DK7NX	101		

JA1UQP	300	W2BZL	181	JA8WY	151	UK5IBM	129	JH1KIK	108	W5GUS	105
W6YO	293	W3WTJ	179	JH3DAE	148	EP2EJ	128	HC2VL	107	JAØSC	104
W5SDR	258	VK2ADX	173	K5BZ	148	JH3SBC	128	K4OEN	107	WA4UPR	104
SP3DZI	249	DK2WH	170	JH1OCO	147	K42BL	128	WA1LRO	107	WA3HXX	102
DK5WS	214	W4DPS	168	PY1FI	143	W2PQZ	126	ØM2PV	107	W4UPV	102
W2PFO	208	DJ9RB	164	DK5AI	142	5W1AR	125	E41LJ	106	G4BYK	100
W9EGV	206	K6SMF	160	W3HYJ	136	K5EJP	120	JA6WW	105	HPIXMM	100
W5OSH	205	W3FCS	159	WB6VYU	134	W91UH	117	K4EBY	105	K7ICW	100
W6TCQ	203	VE3AXE	157	G3LMD	133	K4II/DL	111	ØZ5FY	105	WA3VQP	100
W1WQC/4	198	JA1WSK	156	W6VDJ	133	JH3EGD	110	W2HEK	105	WA6DNM	100
W4NQD	185	W2EOK	153	DJØYL	129	W7JVG	109	W4PDX	105	W9RR	100
JA3JOR	181										

you'll be copying pieces of conversation, then most of it, then all of it, and you'll be IN! Learning the code is learning a new language, the language of ham radio. It isn't drudgery, a necessary nuisance to get your ticket. It's interesting, exciting, intriguing. It's FUN!

**New tapes available.** Speaking of learning the code, our Training Aids (Affiliated Club) Branch has now ground out a new tape of code practice at 10-13 wpm, to supplement the already-existing 5-7 wpm tape already available. The tapes are available on C-60 cassette only, providing a half hour of practice at each speed. Effective Aug. 1, 1975, all code practice cassettes are \$5 apiece.

**Ho Hum.** We made the mistake of mentioning, in our Annual Report, that personnel turnover was less a problem in 1974. Right after this was written, all Hades broke loose and the game of musical chairs started up again. A vacancy in the Public Service Branch was filled by WA1QME, but no sooner did he start getting settled than he received an unexpected opportunity to further his education, so it was off to Colorado for Bob. His place is being filled by another Bob - Bob Halprin, WB2NOM, who comes to us freshly graduated

### 5-BAND AWARDS

*(Updating the July 1975 listing.)*

**5BDXCC:** (Starting with number 425), JA1JRK K4CFB KS6DH W6TCQ W9DWQ W9QLD W4QAW W9OHH F9YZ DK9WB.

Note: In the June compilation, no. 138 should have read W3CRE.

**5BWAS:** (Starting with number 217), W4NXD WB4ZNH.

from American University. This Bob is well qualified for the job as was the previous one and his education is more complete, so we're keeping our fingers crossed.

Working at headquarters can be a most interesting career if your primary career interest is promotion of ham radio and not getting rich. Starting salaries are best suited to young single people, since openings usually occur at the bottom while promotions occur from within. If you are interested in having your qualifications on file, write us for further information. - WINJM.

## Endorsements

In the endorsement listings shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10 and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

W4DQS	335	W4AST	280	W1GTJ	240	WA2YJN	200	W5TFZ	160	VF5XV	140
UA9VB	325	W9ZWH	280	YV5CWO	240	W0YVA/4	200	W6ONV	160	VOIKE	140
W4KFC	325	JA1GTF	270	JH3BHW	220	WB4RUA	200	W7NJ	160	WA5TYB	140
W7RS	325	OZ7JZ	270	K1AWP	220	W6KYA	200	WB8FOS	160	WA6EYK	140
VE3NE	315	WIDAL	270	K4RDU	220	W9FPZ	200	YU3DJK	160	W7LR	140
G3JAG	310	W5RO	270	K5YMY	220			DL7UO	140	WA7FBP	140
W8RSM	310	W7CNL	270	K6ELX	220	K4BYN	180	JA1ATF	140	W8EDU	140
DL3ZI	305	W8UM	270	K6TZK	220	K5ETA	180	JA7GIF	140	WA8GGN	140
OH2BAD	305	K0ALL	260	K6ZXS	220	K5KLA	180	JH3JPM	140	W8IEC	140
XE1KS	305	W5TMN	260	K8VRZ	220	SM5ACQ	180	K1BUR	140	HB9AXB	120
IT9SEZ	300	WA7RFH	260	WA4DHO	220	WA1NSF	180	K6QHC	140	JA3GLJ	120
JA1JRK	300	ZC4CB	260	W0JYE	220	WA0HMP	180	K9GSC	140	K2GAT	120
JA3AAW	300	G3NKQ	250	WA5LUM	220	DL6GN	160	K9PKQ	140	K7AOZ	120
W6JKR	300	JA3MF	250	JA1SKE	200	JA1QER	160	K9UKM	140	WA1STN	120
W6MI	300	W3KJ	250	JA6VA	200	K5CWS	160	KP4EAK	140	WB2FKF	120
WA6AUD	300	W5HMM	250	K3PUI	200	K9YBC	160	OK3BDE	140	WB2FYS	120
WA2BLV	290	JA1FHK	240	W0JYE	220	SM0FKD	160	UW3DH	140	WB2JJN	120
W5NBI	290	JABAOX	240	K9DIN	200	W2DPL	160	OZ7AN	140	W4EDB	120
W6HJA	290	K5DGI	240	OH2LU	200	WA3TZT	160			YU3TFB	120
						W4CZU	160				

W6PT	325	JA7EHU	290	CT1FL	250	DK8SK	220	W6KYA	180	JA1FHK	140
W4EEQ	310	K1QMV	290	I3ZOF	250	K6ZXS	220	W8EXD	180	JA7GIF	140
VE3NE	310	K6SVL	290	JA3MF	250	UC2BF	220	W8JK	180	JA1GTF	140
K6AOV	305	W1JNV	290	K2GBC	250	W4HNW	220	WA0HMP	180	K1BUR	140
XE1KS	305	CR7GJ	280	OE2GKL	250	W6HEW	220	YV5IZ	180	KP4EAK	140
G2BOZ	300	W4AST	280	W3KJ	250	K3PUI	200	6Y5AH	180	PY8ADD	140
JA1JRK	300	W5RO	270	W5HMM	250	WA5LUM	200	JA1SKE	160	W2CKR	140
K6GA	300	W9ZWH	270	W5LTY	250	KL7HFQ	200	K7UKN	160	WA5TYB	140
OH2BAD	300	K4II	260	WA8TDY	250	K0ALL	200	WA3GZT	160	W6ID	140
W1DO	300	W1BFB	260	EA3SA	240	WB2EZU	200	WB4NXXR	160	HB9AXB	120
W4REZ	300	WA4NRE	260	EA7EM	240	W4EPZ	200	W6ID	160	JH3JPM	120
W5PWV	300	W5FFW	260	K8SOE	240	JH3BHW	180	W6ONV	160	K7CZU	120
WA6AUD	300	W5NQN	260	OZ7JZ	240	K8VRZ	180	W7RS	160	WB2HTJ	120
W9MWO	300	W5TMN	260	W9HHB	240	W2NZG	180	15XRR	140	WB2JJN	120
CT1UA	290	WB9EBO	260	YV5CWO	240	W3OJW	180	W2FGY	160	WA3TZT	120
IT9SEZ	290									WB4TIN	120

### SCM ELECTION NOTICE

To all ARRL members in the Sections listed below.

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been both the holder of amateur Conditional Class license or higher (Canadian Advanced Amateur Certificate) and an ARRL full member for at least two years immediately prior to receipt of petition at headquarters. Petitions must be received on or before 4:30 PM Eastern local time on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, Zip code of the candidate and signers should be included with the petition. It is advisable that a few extra full-member signatures be obtained, to insure that it will be valid.

Elections will take place as soon after the closing dates specified as full information on the candidates can be obtained. Candidates' names will be listed on the ballot in alphabetical order.

The following nominating form is suggested. (Signers should be sure to give city, street address and Zip code.)

Communications Manager, ARRL  
225 Main St., Newington, Conn. 06111 (Place and date)

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.

You are urged to take the initiative and file nominating petitions immediately.

*George Hart, WINJM, Communications Manager*

Section	Closing Date	Current SCM	Present Term Ends
VT.*	8/20/75	J.H. Viele, W1BRG	3/1/74
Sask.*	8/20/75	P.A. Crosthwaite, VE5RP	4/10/75
S.Dak.*	8/20/75	E.C. Gray, WA0CPX	1/1/75
N.C.*	8/20/75	C.H. Brydges, W4WXZ	1/10/75
Manitoba*	8/20/75	S. Fink, VE4FC	1/11/76
N.Dak.*	8/20/75	H.L. Sheets, W0DM	1/11/76
SCV*	8/20/75	J.A. Maxwell, W6CUF	1/11/76
Ind.*	8/20/75	M.P. Hunter, WA9EED	1/12/76
Ore.*	8/20/75	L.R. Perkins, WA7KIU	2/1/76
S.Fla.*	8/20/75	W. Huddleston, K4SCL	2/4/76
S.N.J.	10/20/75	C.E. Travers, W2YPZ	3/4/76
Okla.	10/20/75	C.C. Cash, W5PML	3/19/76
Conn.	10/20/75	J.J. McNassor, WA9EED	4/12/76
Idaho	10/20/75	D.A. Brock, WA7EWV	4/23/76
Ohio	10/20/75	H.R. Greeb, W8CHT	4/29/76
E.N.Y.	10/20/75	G.G. Berry, K2S2N1	6/10/76

\*Repeat Solicitations

1 Resigned 6/15/75

(Continued on page 152)

## Semiconductors

(Continued from page 27)

frequency. Therefore, if L1 is made variable and adjusted to resonance with  $C_0$ , the value of  $C_0$  can be computed by measuring the inductance of L1. If a Q meter or inductance bridge is not available for measuring L1, the coil can be removed from the circuit temporarily and measured by shunting various values of known capacitance across it until a dip meter indicates resonance at the operating frequency. The value of external C needed to establish resonance will be approximately equal to  $C_0$ . Finding  $C_0$  for Network 2 can be done in the same manner, using L1 as the inductance and  $C_0$  as the capacitance whose reactances must match at resonance. Part V of this series will appear in a subsequent issue of QST.

### Suggested Reference Material

- 1 - RCA Designer's Handbook, Solid-State Power Circuits No. SP-52 and SC-16.
- 2 - RCA Transistor, Thyristor & Diode Manual, No. SC-15.
- 3 - Lenk, Handbook of Simplified Solid-State Circuit Design, Prentice-Hall Pub. Co.
- 4 - Lenk, Handbook of Modern Solid-State Amplifiers, Prentice-Hall Pub. Co.
- 5 - The Radio Amateur's Handbook, any recent edition.

## VE/W Contest Announcement

(Continued from page 67)

also required to have check sheets (ARRL-op aid 6) for listing or awards. A separate submission for each class (cw and ssb) is mandatory. All entries must be postmarked no later than October 31, 1975, and become the property of the contest committee.

9) *Operating Aids:* Check and summary sheets are available from the VE/W Contest Committee, P.O. Box 2206, Dorval Station 780, Quebec, Canada. Include s.a.s.e. (legal size), IRCs or Canadian stamps with your request. Official sheets are not necessary and reasonable facsimiles are acceptable.

10) *Awards:* Plaques, donated by the Montreal Amateur Radio Club, will be awarded to the high-scoring Canadian and to the high-scoring U.S. entry for both classes, cw and ssb. A minimum of 25 QSOs is required to qualify. Entrants operating under reciprocal licensing agreements are not eligible for plaques.

Certificates will be awarded for the high-scoring stations in each section for each class and type of entry providing at least three entries in each class and type are received from each section.

11) *Disqualification:* If the claimed score of an entry is reduced by 2% or more, logs may be disqualified. Score reduction does not include corrections for arithmetic errors. Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contact, or

other scoring discrepancies. The ruling of the VE/W contest committee will be final in all instances of doubt. **QST**

### ARRL QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 5 by 8 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

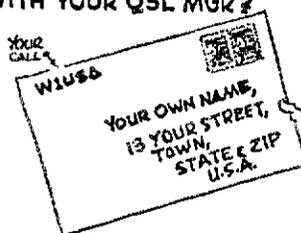
Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in bold face.

- W1, K1, WA1, WN1 - Hampden County Radio Association, Box 216, Forest Park, Station, Springfield MA 01108.  
W2, K2, WA2, WB2, WN2<sup>1</sup> - North Jersey DX Assn., PO Box 3160, Haledon NJ 07508.  
W3, K3, WA3, WN3<sup>1</sup> - Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern PA 19355.  
W4, K4 - National Capitol DX Assn., Box DX, Boyce VA 22620.  
WA4, WB4, WN4 - J. R. Baker, W4LR, PO Box 1989, Melbourne FL 32901.  
W5, K5, WA5, WB5, WN5<sup>1</sup> - ARRL W5 QSL Bureau, Box 1690, Sherman TX 75090.  
W6, K6, WA6, WB6, WN6 - ARRL W6 QSL Bureau, 2814 Empire Avenue, Burbank CA 91504.  
W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., PO Box 555, Portland OR 97207.  
W8, K8, WA8, WB8, WN8 - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus OH 43215.  
W9, K9, WA9, WB9, WN9 - Northern Illinois DX Assn., Box 519, Elmhurst IL 60126.  
W0, K0, WA0, WB0, WN0 - Dr. Phillip D. Rowley, K0ZFL, 5209 Loma Linda Road, Altamosa CO 81101.  
KP4, WP4<sup>1</sup> - Juan S. Sepulveda, KP4QM, Cereipo 99, Alturas De Santa Maria, Guaynabo PR 00731.  
RV4 - Graciano Belardo, PO Box 572, Christiansted, St. Croix VI 00820.  
KZ5 - Lee DuPre, KZ5JD, Box 407, Balboa CZ.  
KH6, WH6<sup>1</sup> - John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, HI 96701.  
KL7, WL7 - Alaska QSL Bureau, Star Route, Box 2401, Wasilla AK 99687.  
VE1 - L. J. Fader, VE1FQ, PO Box 663, Halifax NS.  
VE2 - A. G. Daemen, VE2II, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.  
VE3 - R. H. Buckley, VE3IRW, 20 Almont Road, Downsview, ON.  
VE4 - D. E. McVittie, VE4OX, 647 Academy Road, Winnipeg MB R3N 0E8.  
VE5 - A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, SK S4S 5E3.  
VE6 - D. C. Davidson, VE6FK, 1108 Trafford Dr., N.W., Calgary 47, AB.  
VE7 - H. R. Hough, VE7HR, 1291 McKenzie Rd., Victoria, BC V8P 2L8.  
VE8 - Frank Van Der Zande, VE8OO, PO Box 72, Fort Smith, NWT X9E 0P0.  
VO1 - William Coffin, VO1KM, PO Box 6, St. John's NF.  
VO2<sup>1</sup> - Stan L. Parsons, VO2AS, PO Box 232, Goose Bay, LB.  
SWL - Leroy Waite, 39 Hannum St., Ballston Spa NY 12020.

<sup>1</sup> These bureaus prefer 4-1/4 by 9-1/2 inch or No. 10 business envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the "IARU News" section of the June and December issues of QST.

## IS YOURS ON FILE WITH YOUR QSL MGR?





**ATLANTIC DIVISION**

**DELAWARE** - SCM, Roger E. Cote, W3DKR - SEC: K3KJ. RM: W3EEB. PAM: WA3DUM. PSRR: WA3DUM 61, K3KJ 44. K3KJ states that the DELMARVA Hamfest will be held Aug. 17 at the State Fair Grounds, Harrington, De with a TENTEAC Argonaut as 1st prize. K3GUW now has Autopatch in operation on his WR3ACV repeater. Congratulations to K3HBP on making DXCC. Stations participating in the 3rd Del. Ham Campout at Luckhock Acres included W3FEG, W3TCI, W3TDU, W3WYO, W3ZNF, K3GUV, K3NVV, K3YHR, WA2JSJ, WA2KOB, WA3PFI, WA3QLS, WA3RUF, WA3QSS, WA3SSJ, WA3UUN, W3WVIT, W3WBC. Visitors included WA3IV and WA3KZL. K3YHR demonstrated Oscar reception at the Campout and the June Del. ARC meeting. A fall campout in the Wilmington area is in the planning stage. DTN: QNI 326, QTC 50. DEPN: QNI 64, QTC 3. Traffic: K3KJ 124, W3EEB 103, WA3DUM 41, W3DKR 40, WA3UUN 12, K3YHR 12, WA3KUD/3 10.

**EASTERN PENNSYLVANIA** - Acting SCM, Paul D. Mercado, W3FBF - SEC: W3FBF. PAMs: WA3ZPO, WA3AVJ. RM: K3DZB, W3EML, K3MVO, WA3WQE, WA3PHQ, WB2FWM/3. At this writing Indiantown Gap Military Reservation is humming with Viet Relief traffic. WA3PX, through Viet Relief Organizations has been instrumental in securing Viet families. WA3REY organized a communications project for a motorcycle endurance race. W3ZD reports good progress with the coming Bicentennial Atlantic Division Convention in Philadelphia, July 1976. It is not too early to request banquet reservations through K3WAC. An EPA, Communications Advisory Council type of organization is being explored. W3HK is enjoying his leisure time and is looking for interested persons to join the Morse Telegraph Club. WA3PHQ was awarded membership in the National Honors Society. Congratulations are in order. WA3YPI, WA3YJG and WA3WYL became proud Generals. The North Philadelphia Amateur Radio Club held an enjoyable practice Field Day. W3YAY is going for his General. WA3FZO is busy writing EPA press release activities. W3GOA is busy on 6-meter AREC nets. WA3VUE has coordinated AREC activities with the Reading Radio Club. W3HMR is OOnig at night and reports no infractions observed in three months. W3WRE was a main speaker at recent meeting of the South Jersey Amateur Radio Club. She was also invited to the Radio Club of America. W3CUL, W3VR, WA3MOP, WA3PHQ, WA3VDO and others are handling Viet traffic. WA3VDO is on a visiting hamfest tour. W3CL does not wish his call confused with W3LC in these reports. K3OIO is busy with Public Service deeds. WB2RBA/3 looked forward to his first Field Day. W3LC will be away this summer. WA3TMP is operating portable in NJ. WA3BJQ enjoying good health and sends her 88. W3KEK's antenna blew down during recent storm but expects to repair damage soon. WA3QOZ is trying to improve his electronic keyer - hmm. WA3UDS received the WPNX No 78 award for confirming 100 prefixes while a Novice. W3GMK has power supply problems and will be off the air for awhile. W3ADE sorry he missed Wintfield gathering. Traffic: W3CUL 2221, W3VR 970, WA3MOP 523, WA3PHQ 1091, WA3ATO 392, WA3WJO 310, WB2FWM/3 211, W3EML 183, WA3UKZ 115, WA3QOZ 106, W3WRE 105, K3MVO 100, WA3VDO 97, K3OIO 90, WA3REY 46, WB2RBA/3 44, WA3TFF 42, WA3UUN 38, W3BMR 28, WA3VJ 27, W3ADE 23, WA3WHL 18, W3CL 2, WA3CFJ/3 10, K3HXS 5, W3ID 5, W3LC 5, W3HK 4, WA3TMP 4, WA3BJQ 1.

**MARYLAND-DISTRICT OF COLUMBIA** - SCM, Karl R. Medrow, W3FA - SEC: K3LFD. RM: W3FZV, PAM: WA3EOP. NCM: WA3LPL. May BPL the hard way WA3ZAS and WA3UJY. WA3WRN and WA3UUM with originations and deliveries. MDCTN Top Honor men were WA3UYB, WA3ZAS and WA3EOP. MDD notes Top Brass as W3FZV, W3FA, WA3UYF and W3MWD. W3FCS seeks more space in Westminster. WA3HKR travels to Purdue for summer studies and WA3FJG goes to Cornell. Ex-MDD mgr. W3QCW has returned from Fla. as K3EC. W8BZY/3 now located at Andrews AFB. WA3ULH is also planning to move. WA3PRW reports the tower and all antennas back after the Apr. disaster. WA3ZAS got his Advanced ticket and the amplifier running. W3FZV was in the Conn. and Mich. QSO parties. WA3AFQ made all his traffic points in one night. WA3UHF leads the gang in the Southern Md. counties. K3DFI is inundated with outside chores. WA3RVU hit by the wind now has TVI to contend with. K3QKP cashed in his Tech. license for a General ticket. Congrats. WA3SZI is regular OO reporter. W3YKK now well acquainted with Murphy. K3IOG at Loyola plans the new season with W3LPI. pres.-WA3OCN, vice-WA3NCI, station mgr. The Patuxent ARC's new ad "Hams Wide World." W3ZNV's boating accident was more serious than previously reported. W3MWD is a stalwart for MDI at 3RN. WA3UUM gets in a little humming when it rains on the farm. WA3SIY visited the canyons of Ariz. and Utah. W3ZY has a fishing trip all lined up. WA3RCI is proud owner of a new TR-22C. Publicity man W3BHE reports the Mountain ARC new officers are WA3WSW, pres.; WA3ILL, vice-pres.; WA3SYF, secy.; W3XYV, treas.; K3HYE, trustee. W3EOP has all his antennas back with some improvement in rig behavior. With the nets Sessions/Traffic/QNI average. MDD 62/339/7.7. MDCTN 18/128/14.2 a new high. MEPN 22/110/19.9. Meet the tone nets at 6 PM local 3920 kHz. The cw nets at 7 and 10 PM local on 3643. Traffic: WA3ZAS 634, WA3UYB 570, W3MWD 290, WA3WRN 197, W3FA 167, WA3EOP 150, WA3UUM 136, WA3UHF 135, W3FZV 65, WA3SYJ 43, W8BZY/3 39, W3EOP 36, WA3AFQ 33, WA3ULH 32, WA3RCI

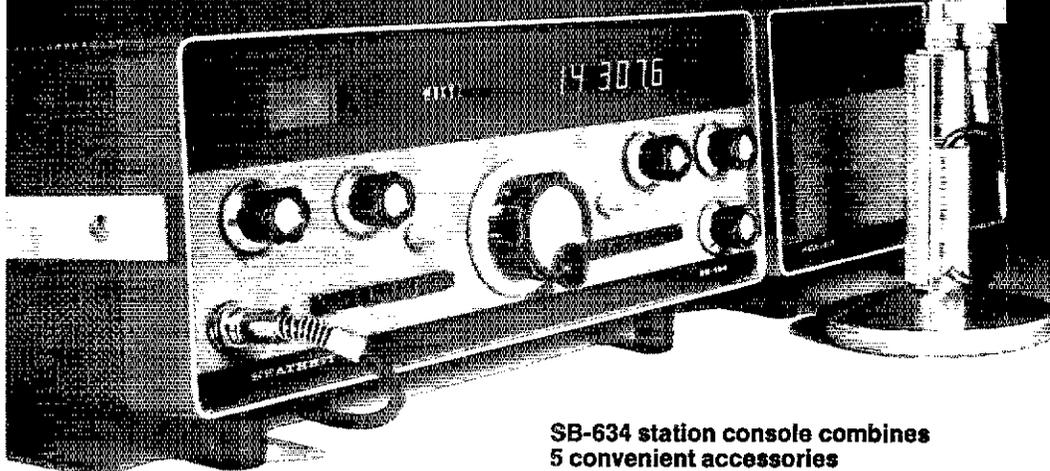
29, WA3PRW 25, K3IOG 12, WA3SJS 8, W3ZNV 6, W3BHE 4.

**SOUTHERN NEW JERSEY** - SCM, Charles E. Travers, W2YPZ - SEC: W2JI. Recent appointments include WA2WLM as OO Class IV; WA2TRK, WA2WPZ as ECs for Princeton and Cumberland counties respectively. The efforts of these volunteers will be greatly appreciated and their willingness to help in the emergency and improvement field of ham radio must be commended very highly. WB2RMK mgr. of the NASN reports 31 sessions, 270 check-ins and 90 messages. WA2SEA, EC of Gloucester Co. carried on a very successful exercise using eight mobiles and working thru repeater WR2AGO on 147.78/147.18. Stations are requested to make activity reports thru traffic. This will help to swell traffic totals and so give more station traffic experience. Word was received from WA2FGS from Vienna where she is having a very pleasurable trip. The Scout Troop headed by WA2JL held a very successful session at the 112th Field Artillery the week end of May 6-7-8. Jim is very versatile with the use of his "cherry picker" and installed the antennas used in the exercise. All bands were covered and a very successful week end was had. Many thanks to Jim for his great contributions to hams and hamdom in this area. Traffic: WB2LCV 64, K2JOC 18, W2YPS 14, WA2TRK 13, W2JI 9.

**WESTERN NEW YORK** - SCM, G.W. Hippisley, K2KIR - SEC: W2CFE. A big month for Walk/Bike-a-Thons, with RAGS, Troga County, and Tompkins County EC reporting participation. Also on the public service front, CVARA provided communications for a Canoe Regatta, the Chemung County AREC Assn. (K2DNN, EC) held an SET on Apr. 26, and the Onondaga County Emergency Radio Corps has started holding practice alerts under the guidance of W2ABV, W2EOS, WA2PEA. The FCC has issued WH2SCI to RARA for the Sister Cities International Conference in Aug. Also a big month for new club officers with WB2RYH, WA2VPM, W2EYF, W2NYZC and K2ZUT (usual order) coming in at GRAM (Batavia); WA2CER, WB2EDT, WB2PT and WA2ZNC at RARA; WA2LUF, W2WBT, WB2JFC, WA2PUU and WB2QKQ at RAGS. Ex-WA2UUA running around saying "I am W2IAM...." New Advanced Class tickets to WA2CME and WA2JGO; General Class to WA2s OVV, ZJW, ZMK, WB2WOO, W2WVH and ex-WN2MKB. 229 of the 300 applicants for upgrading at the FCC exams at RARA Hamfest passed, including new WNY Extra Class holders K2s BZC, LWL, MSI, PIT, YGH, ZUU; W2s AKR, BLU, CEO, GTE, HFQ, MPM, PZN, OJM, OMO; WA2s KTW, UKS, VKR, ZRD; WB2s EDT, HIV, ITU, QEV, QEW, UDM, VPK. WA2VNI busy setting up his station at the new QTH in Hamilton. K2DNN and WA2TCZ back from a gem-mining vacation in the Carolinas. Congratulations to: WA2BAK, selected a Congressional intern on Rep. Jack Kemp's staff; WA2DRC, third place in the WECO hobby show; WA2EAJ, admitted to SUNY Buffalo grad school; WA2EKK, RARA Amateur of the Year award; WA2CNE and WA3JSU, 1st and 2nd place in the Code Receiving contest at Rochester. WA2TPR and WB2IPX (both OVS) reports 6-meter openings on at least nine days in May, and WA2WBA, who finds that very few of the 6- and 2-meter fm crew want to handle formal traffic, reports a 2-meter opening to the west on May 4. Auburn area repeaters now in operation include WR2AEY (87/27) and WR2AHG (40/00). Look who's on 2M fm - WA2ABV, with a new Genave. Other 2M equipment (HR-2Bs) to WA2CME and WA2SHN. W2RQF has an FT-101 on the way, while WB2WBT is tearing up the Novice bands with his HW-7. Tentative speakers for the 11th annual RAGS Hamfest on Oct. 1 include WIICP of ARRL, and W2FMI of Short Section. Also, don't forget the Hamburg Hamfest on Sept. 20. PSRR this month to WB2JRX and WE2ITU (one and the same). Traffic: W2FR 316, W2RUF 202, WA2ICB 146, WB2UBW 139, WB2VND 107, WB2JRX 66, WB2AEK 65, W2N2VRJ 59, W2MTA 54, W2RQF 50, WB2QIX 49, WE2ITU 42, WA2DRC 38, W2FZK 34, W2HYM 23, WA2TPC 22, K2KIR 19, W2EAF 17, W2PZL 16, K2OFV 15, WB2KUN 12, W2UYE 9, K2IMI 7, WA2AIV 2, WA2EAJ 1.

**WESTERN PENNSYLVANIA** - SCM, Donald J. Myslewski, K3CHD - SEC: W3ZUH. Asst. SEC: K3SMB. PAM: K3ZNP. RM: W2KAT/3, W3NEM, W3LOS, W3KUN, WPA CW Traffic Net meets daily on 3585 kHz at 7:00 PM local time. Pa. Traffic Training Net meets daily on 3610 kHz at 6:30 PM local time. Pa. Phone Net meets Mon. thru Fri. on 3960 kHz at 5:30 PM local time. Recent appointments made: WA3JBO as EC for Allegheny Co., WA3WNU EC Lawrence Co., WA3VUP EC Blair Co., K3HJI as OO, and WA3VIL as OBS. WA3UFI, K3MBO, WA3PMT, WA3JBO, K3HJI, WA3KOH, WA3EKH and WA3IZH provided all coordinating communications for the Pennsylvania Lions State parade held in Rittsburg in May. Fine job folks. Thanks to W3KPD, who has helped the following get their Novice tickets: W3N3VP, W3JYOP, W3AZHV, W3WBE and W3N3WTS. WA3AHP provided his Extra Class ticket. WA3DET acquired a new Tempo EMH Hand Table and WA3FRI updated his station with a Drake TR-22C and SB-200 linear. The Crawford Amateur Radio Society has published some very good operating points concerning actual or simulated emergencies. The Nittany ARC provided communications for the State College Fireman's Day parade. W2KAT/3 Net Mgr. WPA CW Traffic Net reports the date for the annual WPA picnic will be held on Sept. 7 at Cook Forest State Park. All WPA appointment holders are welcome to attend. If you want more info, contact W2KAT/3 or myself. Hope to see you there. WPA CW Traffic Net had 31 sessions in May, 344 stations check in, and handled 189 messages. PSRR credits WA3VBM 44, Traffic: W2KAT/3 446, WA3VBM 219, W3JUT 129, WA3RBS 111, W3EJG 54, K3CHD 36, K3CR 35, W3SN 20, WA3TTS 18, K3VQV 11, K3HCT 10, W3KUN 8, K3OFN 8, K3JSV

# Heathkit "104"...



## ...new performance standard for SSB transceivers

A revolutionary "new generation" transceiver. It's completely solid-state and totally broadbanded to eliminate preselector tuning. And the output can be instantly switched from 100 watts to 1 watt. The true digital readout offers resolution down to 100 Hz and outstanding tuning accuracy. Receiver intermodulation distortion has been minimized and there are very few active devices ahead of the highly selective crystal filter. Adjacent channel overload is negligible, yet sensitivity is better than  $1 \mu\text{V}$  ( $.8 \mu\text{V}$  typical) and front-end overload is dramatically reduced. The "104" is 12 VDC-powered for mobility and the optional HP-1144 fixed station supply fits inside the SB-604 speaker cabinet. An optional noise blander can be installed in the "104" and an optional 400 Hz crystal filter improves CW selectivity.

- Kit SB-104, 31 lbs., mailable ..... 669.95\*
- Kit SBA-104-3, 400 Hz CW crystal filter, 1 lb., mailable ..... 36.95\*
- Kit SBA-104-1, Noise blander, 1 lb., mailable ..... 26.95\*
- Kit SBA-104-2, Mobile mount, 6 lbs., mailable ..... 36.95\*
- Kit HP-1144, Fixed station power supply, 28 lbs., mailable ..... 89.95\*

### SB-230 — the lowest-cost conduction-cooled linear around

The SB-104's "silent partner," 1200 watts PEP or 1000 watts CW from less than 100 watts drive. It's rated at 400 watts input for slow-scan TV and RTTY. The high-efficiency Eimac 8873 triode is double-shielded to reduce stray RF and a massive heat sink replaces noisy fans and blowers. The "230" assembles in just 15 to 20 hours with no alignment.

- Kit SB-230, 40 lbs., mailable ..... 319.95\*

### SB-634 station console combines 5 convenient accessories

The "634" performs 5 important functions—a 10 minute digital ID timer with visual or visual and audible indicators an RF wattmeter that reads 0-200 or 0-2000 watts with  $\pm 10\%$  accuracy, an SWR bridge, a hybrid phone patch that can be used manually or with VOX control, and a 24-hour digital clock that runs independently of all other functions. It's a must for every well equipped station.

- Kit SB-634, 14 lbs., mailable ..... 179.95

### SB-614 station monitor shows you how clean your signal is

Highly visible  $1\frac{1}{2} \times 2"$  CRT detects problems that can reduce the effectiveness of your signal—non-linearity, insufficient or excessive drive, poor carrier or sideband suppression, regeneration, parasitics and CW key clicks. It monitors SSB, CW and AM signals from 80 to 6 meters. Push-pull drive for keystone free trace; automatic sync sweep generator with 3 ranges from 10 Hz to 10 kHz. Can be used as an ordinary oscilloscope from 10 Hz to 50 kHz.

- Kit SB-614, 17 lbs., mailable ..... 139.95

### SB-644 remote VFO

Designed exclusively for the SB-104. It provides split transmit and receive control and you aren't frequency-limited in any way—transmit at one end of the band, receive at the other. The "644" even has two crystal positions for fixed-frequency control. The "644" has a linear dial, but the exact frequency is displayed on the "104's" digital readout. The display automatically changes when switching from transmit to receive.

- Kit SB-644, 10 lbs., mailable ..... 119.95

### SB-604 station speaker — response-tailored to SSB

Designed to match the SB-104 in styling and performance. The "604" uses a  $5 \times 7"$ , 3.2-ohm speaker. And there's room inside for the HP-1144 power supply. With connector cable and plug.

- Kit SB-604, 8 lbs., mailable ..... 29.95

# Heathkit "202"...



## ...top value standard for 2-M transceivers

The HW-202 puts you on "two" at a price you want to pay, with the features you need. It operates on any 2 MHz segment from 143.9 to 148.3 with independent selection of 6 transmit and 6 receive channels, and all 12 can be netted. A solid 10 watts min. transmitter output, a hot 0.5  $\mu$ V receiver sensitivity. Dual-gate MOSFET front end... IC IF...dual conversion...10.7 MHz crystal filter...built-in hash filter/voltage regulator...crystals for 146.94 MHz...push-to-talk mike...quick-connect cable for 12 V hookup...antenna coax jack...quick-release gimbal mount...complete alignment procedures using the front panel meter... and a complete line of accessories to put you on "two" with maximum versatility and low cost.

Kit HW-202, 11 lbs., mailable .....**179.95\***

### Crystal Certificates.

Order from Heath, mail certificates to crystal mfr., get the crystals you specify, postpaid.

HWA-202-6, one Transmit Crystal certificate .....**5.95\***

HWA-202-7, one Receive Crystal certificate .....**5.95\***

### Tone Burst Encoder.

Put this in your "202" so you don't have to whistle while you work repeaters. 4 tone buttons can be preset to any tone between 1800 and 2500 Hz. Burst duration is adjustable. Stability is  $\pm 1\%$  from  $-30^\circ$  to  $+50^\circ$ C. Mounts behind removable front panel bezel of your "202".

HWA-202-2, 1 lb., mailable .....**26.95\***

### AC Supply.

To work your "202" as a fixed station. Delivers 13.8 VDC @ 2.2A. with better than 1% regulation.

Circuit breaker protected. Wire it for 120 or 240 VAC. Includes 3-wire line cord and transceiver cables.

HWA-202-1, 7 lbs., mailable .....**32.95\***

### 40-watt 2-M Amplifier.

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Kit HA-202, 4 lbs., mailable .....**59.95\***

**Mobile 2-M antenna;**  $\frac{5}{8}$ -wave whip w. rear deck clip mount. Inc. 17' coax.

HWA-202-3, 2 lbs., mailable .....**19.95\***

**Fixed 2-M antenna;**  $\frac{5}{8}$ -wave vertical w. radials for mast mt.; less coax.

HWA-202-4, 4 lbs., mailable .....**17.95\***

**New mobile 2-M colinear;**  $\frac{1}{4}$  &  $\frac{5}{8}$ -wave phased radiators; swivel trunk lip mt. 17' coax.

HWA-202-9, 4 lbs., mailable .....**37.95\***

**New fixed 2-M colinear;** two  $\frac{5}{8}$ -wave phased radiators for mast mt. Heavy duty. Less coax.

HWA-202-10, 7 lbs., mailable .....**47.95\***

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**CENTRAL DIVISION**

**ILLINOIS** - SCM, Edmond A. Metzger, W9PRN - Asst. SCM Harry Studer, W9RYU. SEC: W9AES. PAM: WA9LDC. RM: K9ZTV. Cook County EC: W9HPG. Net. Freq., GMT/Days, Tlc. NCPN 3915, 1700 MS, 45; NCPN 3915, 1200 MS, 125; IEN, 3940 1400 S, no report; ILN, 3690, 2330/0300 daily, 264; Ill Phone 3915, 2145 daily, 48. The League's Executive Committee approved the application of the Metro Amateur Radio Club for an affiliated society of ARRL. New appointments this month include WB9LQC and WB9GU as EC of Lake and Grundy counties respectively. WB9OLF is now WB9OLF. 67 N.W. area hams were involved in furnishing communications for the Des Plaines River canoe marathon in which 1000 canoees paddled an 18 mile stretch of the Des Plaines River on May 18. WA9QBK received his post graduate Doctor of Ministry degree. WB9POQ is a new tech in Jacksonville. Hamfesters will hold their annual hamfest Sun., Aug. 10, at Santa Fe Park just south of Chicago. Radio Expo '75 will be held Sept. 6-7 at the Lake County Fairgrounds. WN9NIO has advanced to General with the call WB9NIO. Our sympathy to the family and friends of WSSZ ex-W9HKE who recently passed away in Santa Fe, New Mexico, and who for many years was a consulting engineer for WCFL (Chicago). WB9EIA reports that 2 meter gear has been installed in the Red Cross building in Macomb. WA9PHA, editor of the Halo of the Six Meter Club had his Regency HR2-B stolen. The Serial No. is 49-03187 and he would appreciate it if the gang would keep a vigilant eye out for this unit. WN9TQ passed his General and waiting for his new call. Dick Bukowski, an Underwriters Laboratory electrical engineer presented a smoke and fire detectors program at the Northwest Amateur Radio Club in May. W1FQZ9 now W9NPL. New call heard on 80-meter Novice is WN9OZI of Otendale Heights. W9PRN spoke on docket 20282 at the Sangamon Valley Radio Club (Springfield) and also at Cenozo ARC (Decatur). C3JUGC was a guest of W9PRN. Traffic: WA9VGV 281, W9MXG 224, WB9NOZ 150, W9HOT 120, W9XJ 108, W9AES 90, W9NJP 89, K9ZTV 88, WB9LQC 62, WA9IF 58, WB9NQ 58, W9OYL 57, W9KR 56, K9KHI 47, W9SUU 41, WB9OLF 35, K9BGL 26, W9PRN 20, W9RYU 16, WB9DED 12, K9DDA 4, W9VEY 3.

**INDIANA** - SCM, M.P. Hunter, WA9FED - SEC: W9UMH. PAM: W9PMT. Missing from this month's column is the net information. I'm trying to find a simple method of conveying the data. K9TEF reports some good openings on six meters. The summer noise is getting very bad but net activity continues to be high. DX is still abundant on all bands with an occasional 10 meter opening. Good European openings are being reported on 80 meters. W9PMT is at home recovering from an operation. W9FML is reported to be undergoing tests in the hospital. Check June QST for instructions on nominations for SCM. Get your choices in for consideration. Congrats to ISKRA for affiliated club honor roll. The listing of SBDXCC lists several Hoosiers. That proves it's possible from here. Congrats to W9IT for first place Indiana finishes in the 160- and 10-meter contests. His 10-meter score was good enough for top ten. WA9BWW and crew got a fine second place overall in the 160-meter multi-op category. WN9PIR advises he needs only a KL7 for WAS. W9MFB missed several persons during his recent trip to Easter signing JCEG. The new general directory is now available from HQ, note the charges. Traffic: (May) WB9OMX 275, W9QLW 165, WB9FT 122, W9EWH 119, WN9FWO 117, W9UAD 98, WA9HZ 89, K9BCX 71, W9UEM 61, K9FZX 51, W9UMJ 45, WA9BVS 44, WB9MDS 39, W9HUF 33, WB9IHR 33, WA9QXK 27, W9ENU 23, K9JZN 23, W9DKP 22, K9PR2 22, WA9QXK 20, WA9TJS 17, K9QY 16, K9KWO 14, W9MCI 11, W9RWB 9, W9PMT 9, WB9DIX 8, WB9HCH 7, K9YBM 7, W9DZC 6, WN9PIR 2, W9BDP 1, W9CMT 1. (Apr.) W9EI 45, W9CMT 6.

**WISCONSIN** - SCM, Roy A. Pedersen, K9FHI - SEC: K9PKO. PAM: W9AYK, WA9LRW, K9UTQ. RM: WB9ICH, K9KSA, W9MFG, K9LGU.

Nets	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
BWN	3985	1145 M-S	466	358	W9AYK
BEN	3985	1700 Dy	619	79	WA9LRW
WNN	3725	2215 Dy	73	20	WB9ICH
WBSN	3985	2230 Dy	1157	229	K9UTQ
WSSN	3985	2330 M-W-F	34	10	K9KSA
WIN-E	3662	0000 Dy	227	150	W9MFG
WIN-L	3662	0300 Dy	224	114	K9LGU
WIPON	3925	1701 M-F	531	29	WA9NIX

Neenah-Menasha banquet well attended. BWN cert. W9FG. Officers W9RA K9KSA, pres.; W9MI, vice-pres.; K9HRR, secy.; WB9EJE, treas.; K9MITX, WB9LYH, W9NA, board. W9MFG received membership in A.L. Club. RMORS-WIN-E cert. endorsed W9MFG. WN9MRF ship in General. W9ABE back at 600 foot with duplexer. Man-of-war banquet well attended. WA9PVV working Oscar 7. WBSN cert. renewed WB9LSP. VYARC hamfest well attended. Fred Luan, Phil Haller and Tony Cruz-Urbe as speakers. Central Division Convention 1975 Milwaukee July 9-10 at Red Carpet Inn. Co-Chmn, WA9KRF, WA9POV. WB9JMP, WB9JBV new Generals. New ARRL affiliates are Menomonee Falls ARC, Wisc. Lutheran HS Electronics Club, Madison Area Repeater Assn. Wisc. Valley RA now W9SM. WA9QVT on 2-meter mobile with 41V. K9CPM made RPL. Traffic: K9CPM 827, WB9KXP 191, WA9QVT 188, W9PVH 161, W9DND 149, K9FHI 137, WB9NME 119, K9LGU 102, WB9ICH 77, W9MFG 71, W9PD 71, W9AYK 58, WB9HLS 47, WB9ABE 44, K9UTQ 37, W9EJ 33, K9KSA 27, WA9PRM 25, WB9DK 24, K9FPS 23, WB9JW 16, WB9LKC 16, WB9KMQ 15, WB9KW 15, WB9HRP 11, WN9NRK 11, WN9PTX 10, WB9NRC 7, W9NA 6, K9EYA 1.

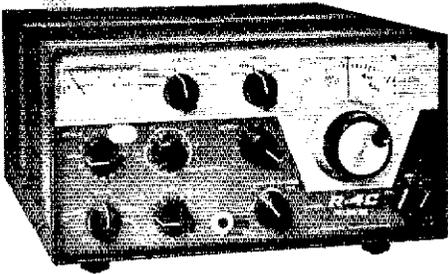
**DAKOTA DIVISION**

**MINNESOTA** - SCM, Ted Olson, W0IYP - SEC: WA0QFZ.

**Many hams say...**

# The only thing better than the Drake 4-Line is the Drake C-Line

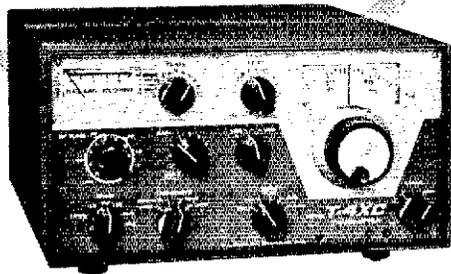
- 1 kHz Dual Concentric Dial Readout
- Receiver and transmitter lock together in transceive operation
- No side controls
- Iridited cadmium-plated chassis
- Compatible with all previous Drake lines



**R-4C  
Receiver**

**R-4C FEATURES:**

- 8-pole crystal filter combined with passband tuning, SSB filter supplied
- Provision for 15 additional accessory 500 kHz ranges
- Transistorized audio
- Optional high-performance noise blanker
- AVC with 3 selectable time constants
- Optional 8 pole filters available for CW, AM, RTTY



**T-4XC  
Transmitter**

**T-4XC FEATURES:**

- Plug-in relay
- More flexible VOX operation; Including separate delay controls for phone and CW
- Crystal control from front panel for amateur, Mars, commercial uses
- Provision for AFSK RTTY operation

*For complete details on the C-Line and other Drake equipment, contact:*

**R. L. DRAKE COMPANY**



540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

# AMATEUR ELECTRONIC SUPPLY USED GEAR

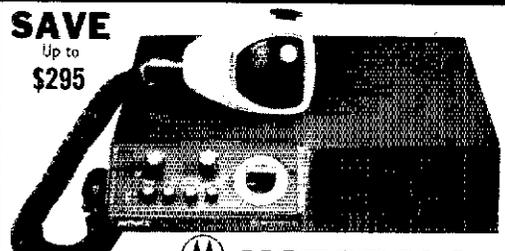
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<b>ALLIED</b> AX-190 Receiver \$159	OC-4 DC supply 89	HQ-170A Receiver 189
<b>AMECO</b> CN-50 6m omv (14-18) \$ 29	L-46 Linear 595	HQ-170AG/Immizer 209
CN-50 130 S-34 S) 29	W-4 Wattmeter 49	HQ-170A/VHF Receiver 259
CN-144 2m conv (50-54) 29	TR-72 2m FM Xcvt 149	HQ-180 Receiver 239
<b>ATLAS</b> 210 80 10m Xcvt \$449	<b>DYCOMM</b> 10-0 2m FM amp \$129	HQ-180A Receiver 369
<b>B &amp; W/WATERS</b> 3001 Phone patch \$ 34	5000 2m FM amp 49	HQ-215 Receiver 199
<b>CENTRAL ELECTRONICS</b> 20A Exciter \$ 89	<b>EICO</b> 723 Transmitter \$ 34	<b>HEATHKIT</b> HR-10 Receiver \$ 69
91-1 Anti-tup 199	730 Transmitter 29	HRA-10-1 Calibrator 9
600L Linear 4	75 S Xcvt (29	SK-300 Receiver 199
MM-2 Analyzer 5.9	751 AC supply 49	SK-301-2 CW filter 294
<b>CLEGG/SQUIRES-SANDERS</b> 27'er 2m Xcvt \$129	717 Keyer 49	SB-301-2 CW filter 294
27'er Mk II Xcvt 199	<b>ELMAC</b> M-1070 AC/DC supply \$ 39	SB-600 Speaker 15
66'er 6m Xcvt 109	<b>GALAXY/GLOBE/WRL</b> Galaxy III Xcvt \$159	S-600 2m 6m converter 19
Inor 6 Linear (RF) 29	Galaxy V Mk II Xcvt 229	SB-900 4 2m converter 19
417 AC supply/mod 65	Galaxy V Mk III Xcvt 259	DX-20 Transmitter 49
418 DC supply/mod 35	G1-950A Xcvt 279	DX-60B Transmitter 69
Interceptor Receiver 219	G1-950A Xcvt 299	TX-1 Transmitter 94
Interceptor B Rcvr 289	AC-35 AC supply 49	SB-10 SSB adapter 75
Apollo Linear 175	AC-400 AC supply 79	HX-10 Transmitter 179
27'er FM Kenes 251 189	5-300 DC supply 39	HR-11 Transmitter 34
FM-27B 2m FM Xcvt 279	DC-35 DC supply 65	HX-20 Transmitter 125
011 AC supply 49	DC-35 Remote VFO 59	SB-400 Transmitter 249
FM-21 220 MHz FM 189	GAL-35 Calibrator 9	HA-10 Linear 175
<b>COLLINS</b> 75A-1 Receiver \$139	SC-35 Speaker 9	59-200 Linear 219
75A-4 Iser no. 14521 349	SC-550A Speaker 15	Ha-14 Linear 99
75S-1 Receiver 125	UAC-35 Deluxe console 69	HW-24 AC supply 49
75S-3 Receiver 495	2000 Linear/Supply 275	HW-22A 40m Xcvt 85
51S-1 Receiver 1495	FM-210 2m FM Xcvt 99	HW-100 Xcvt 249
30S-1 Transmitter 349	AG-210 AC supply 19	HW-101 Xcvt 269
J0L-1 Linear 395	<b>GENAVE</b> GTX-2 2m FM Xcvt \$139	5B-102 Xcvt 369
10S-1 Pick-up Cleveland store 895	Ham-Pak 25	SB-650 Freq display 159
312B-A Sln control 229	<b>GONSET</b> Comm III 2m Xcvt \$ 99	HW-18 160m Xcvt 99
RWM-1 20-10m Xcvt 225	Comm III 6m Xcvt 69	HW-30 (Twoert) 2m Xcvt 34
RWM-2 Xcvt 535	Comm IV 2m Xcvt 149	HW-17 2m Xcvt 99
312B-S PIO console 349	Comm IV 6m Xcvt 119	HP-11 DC supply 9
3512-A Mount 175	Comm IV 6m Xcvt 119	HP-23 AC supply 49
316F-2 AC supply 125	GC-105 2m Xcvt 199	HP-25A AC supply 54
FM-2 Xcvt 59	311A AC supply 65	HD-10 Monitor scope 69
302C-1 Wallmeter 59	G-65B Xcvt 3 way PS 69	HM-15 SWR bridge 19
<b>COMCRIFT</b> GTR-144 2m Xcvt \$199	Ham-Pak DC supply 19	<b>JOHNSON</b> Inverter 200 Xmts \$219
<b>DRAKE</b> 2B Receiver 189	G5B 100 Transmitter 169	Counter Linear 139
25S Speaker 15	G5B-201 Mk IV Linear 395	4N2 6-2m Xmt 139
2AC Calibrator 9	<b>HALLICRAFTERS</b> SX-96 Receiver \$119	6N2 Conv (250-43) 49
2NB Noise blarker 15	SX-99 Receiver 69	TR switch 24
R-4 Receiver 269	SX-110 Receiver 99	<b>KW</b> KW-204 160 10m Xcvt \$349
R-4A Receiver 289	SX-111 Receiver 139	<b>KENWOOD</b> K-959A Receiver \$349
R-4B Receiver 339	SX-140 Receiver 69	S-599 Speaker 12
R-4C Receiver 399	R-49 Mobile Speaker 12	SK-511S AC supply 79
FI-500 Filter 39	HT-31 Transmitter 159	<b>KNIGHT</b> I-60 Transmitter \$ 39
FL-4000 Filter 39	HT-40 Transmitter 49	TR-106 6m Xcvt 69
MS-3 Speaker 15	HT-44 Transmitter 199	TR-108 2m Xcvt 89
MS-4 Speaker 15	HT-46 Transmitter 159	<b>LAFAYETTE</b> HA-800 Receiver \$ 89
SC-6 6m converter 49	SR 150 Xcvt 249	<b>LINEAR SYSTEMS</b> Adcom 250 DC supply \$ 49
SCS-1 Conv supply 12	PS-150-12 AC supply 49	250-12 DC supply 59
SCS-1 VHF calibrator 19	SP 400AC AC supply 85	50U 12 DC supply 79
TC-6 6m unit conv 175	PFM-300 Mk II Xcvt 349	400 DC supply 79
TR-3 Xcvt 269	HA-6 Converter 89	Century DC-DC conv 79
TR-4 Xcvt 399	P-26 AC supply 45	<b>MIDLAND</b> 13-500 2m FM Xcvt \$179
TR-4/NB Xcvt 459	SP 340C 6-2m Xcvt 175	<b>MILLEN</b> 906S1 Grid dip \$ 39
TR-4C Xcvt 249	SR-42 7m Xcvt 75	<b>MOSLEY</b> GM-1 Receiver \$ 99
TR-4C/NB Xcvt 509	SR-42A 2m Xcvt 89	
FF-1 Xtal cont. adapt. 34	SK-46 6m Xcvt 69	
TR-6/NB 6m Xcvt 599	HA-26 6-2m VFO 39	
2N1 Transmitter 49	HA-1 Keyer 59	
T-4 Receiver 175	<b>HAMMARLUND</b> HQ 110A Receiver \$149	
1-42B Transmitter 375	HQ-160 Receiver 189	
AC-4 AC supply 25	HQ-170 Receiver 149	
DC-3 DC supply 75		

<b>MOTOROLA</b> Metrum II (25w 12m FM) \$279	SB2 AC Calibrator 12	SIXX Xtal oscillator 12
<b>NATIONAL</b> NC 98 Receiver \$ 99	SB2 MB Mobile mt 9	50B Remote VFO 9
NC 109 Receiver 99	SB2 MIC Microphone 9	60D Transmitter 9
NC 155 Receiver 99	SB-36 Xcvt/AC supply 595	ICAF Notch/peaker 9
NC-210 Receiver 119	Sensation S51V 595	NB-500 Noise blarker 9
NCX-4 Xcvt 189	SR 144 2m FM Xcvt 169	2-DC 6m Xcvt 9
NCX-5 Xcvt 189	<b>STANDARD</b> SR-CR2AM 2m FM Xcvt \$199	FM-1210A 2m FM w/AC 9
NCX-5 Mk II Xcvt 279	SR-112/120-1A AC PS 299	<b>TEMPO</b> Tempo One Xcvt 9
NCKA AC supply 299	SR-C110 2m FM Xcvt 299	AC-100 AC supply 9
NCKD DC supply 75	SR-C148A 2m FM HT 189	VFO-One Remote VFO 9
NCKX-500 Xcvt 199	SR-IMA Mob adapt. 9	1-000 Linear 9
AC-500 AC supply 69	SR-IMPDC Mic 25	ASH Charger 9
<b>P &amp; H</b> LA-400C Linear \$ 69	SR-UHHC 1 Charger 15	<b>TEN-TEC</b> PM-3 Xcvt 9
<b>PEARCE SIMPSON</b> Gladding 25 2m FM Xcvt \$139	<b>SWAN</b> SW-240 Xcvt \$169	210 AC supply 9
<b>POLYTRONICS</b> PC-628 6-2m Xcvt \$149	SW-17 DC supply 59	TX-100 Transmitter 69
<b>RADIO INDUSTRIES</b> MK II Linear/Supply \$249	406B VFO 89	RX-10 Receiver 9
<b>REGENCY</b> RR-2 DLX 2m FM HT \$149	MB 40 40m Xcvt 149	<b>VARRITRONICS</b> IC-2F 2m FM Xcvt \$199
HR-2MS 2m FM Xcvt 159	160m Remote VFO 89	PA-50 2m FM amp 9
HR 212 2m FM Xcvt 189	220 Cymnet Xcvt 329	DT-2 Mk II 2m FM HT 9
HR 6 6m FM Xcvt 189	270B Cymnet Xcvt 319	<b>YAESU</b> FT-101 Xcvt 9
AR-2 2m FM amp 99	270B/SS-148 Xcvt 369	FT-101B Xcvt 9
<b>ROBOT</b> 1000X Xcvt 329	1200W Linear 199	F10X-400 Xcvt 9
117C AC supply 65	350 Xcvt 209	F10X-560 Xcvt 9
512 DC supply 65	500 Xcvt 329	F10X 570 Xcvt 9
117XC AC supply 65	1000X Xcvt 329	FT-401B Xcvt 9
14X DC module 49	117C AC supply 65	SP-101 Speaker 9
14C DC module 49	117XC AC supply 65	SP-401 Speaker 9
117X Basic AC supply 45	14X DC module 49	FV-401 Remote VFO 9
LA-117 DC supply 99	117X AC supply 65	F80X-400 Receiver 9
	14C DC module 49	F80X-400SD Rcvr 9
	117X Basic AC supply 45	FT-2 Auto 2m FM Xcvt 9
	LA-117 DC supply 99	

All items are subject to our sale. Amateur Electronic Supply reserves the right to sell such items as power supplies with their matching equipment only and not separately - depending upon a stock situation. To insure quality, our used gear is serviced and made ready for shipment after a check by you order. So please allow for a possible delay approximately 5 to 10 working days.

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TR-72

2C..... \$295.00  
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TR-22C

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 RY-4 Teletype adaptor..... 13.00  
 DIAL Crystal Selector - plain..... 2.75

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Send used gear list

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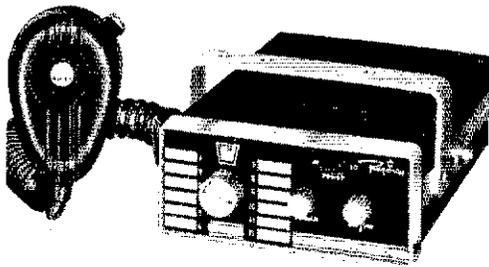
Phone (414) 442-4200

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HR-22D  
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ACT 10-H/LJU  
3 Band-10 Channel FM  
Scanner Receiver

PAMS: WA0YVT, K0FLT, WB0FTL. RMs: K0ZXE, WA0YAH. Chief OBS: WB0LOR. Chief OO: WA0PRS.

The Minn. Calling Frequency is 3925 kHz  
New ARRL appointees: OBSs: WB0KTH, WB0MAO, OPS WB0QCT; OVS WB0QCT. WB0MGI reports information on the St. Paul ARC Worked All Minn. Counties award is available by SASE from Box 30313, St. Paul, Mn 55175. W0NMEB informs us a Novice Net meets Sat. at 3:30 PM on 7125 kHz. WB0FCO says the Wilmar repeater may be outfitted with autotatch. K0DMO, WA0CLR & W0NDD upgraded to Advanced. W0CRO recovering after hip surgery. WA0CEL awarded Worked All Counties award No. 123. K0ERQ moved to Wisc. W0VIW a new 15-520 as does W0IYP. The Piconet Picnic was held in Albert Lea June 1 with WA0IWA in his first public appearance as Dak. Division Dir. The Albert Lea area hams provided radio communications for the Freehorn County Cancer Bike-a-thon. The Hennepin Co. Mobile Radio Corps provided communications for both the Diabetes Assn. and Heart Assn. Bike-a-thon. WB0CPC's TR-4 stolen out of Sister Alverna's car. WB0ELM graduated from college. BPLA; WB0HOX, K0CVD and WB0KTH. WA0CCA spent June vacationing with son in Colo. The St. Cloud Picnic is Aug. 17. Traffic: WB0HOX 745, K0CVD 303, W0QMY 207, K0ZXE 148, WB0KTH 111, WA0YVT 95, WB0QCT 58, WA0TFC 95, WB0QCT 43, K0ZBI 40, WA0URW 38, WB0LOR 35, WB0FTL 33, K0FLT 30, WA0YAH 26, WA0CCA 24, WA0GLI 24, WA0YWA 24, K0CSE 17, WB0IYT 17, W0HZU 17, WB0NZE 14, WA0WOV 13, WB0CYM 10, WA0IPR 9, WB0LJH 9, WA0ADZ 6, K0ZRD 6, WB0GMK 4, K0SXQ 5, WA0IAW 2, WB0LMD 2, WB0GMJ 1.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - OBS: K0PVG, OO: W0BF, K0RSA has resigned as SEC. Suggestions in order for replacement. Also need several county ECs. WB0FDT on sb and 2 meter fm between job hunting. W0NEJ took the Conditional test. W0DM busy winding up the FCC testing program for students and townspeople. WA0SUF continues excellent work on DTRN Net. W0DM finally made up his mind on an IC-22 for 2m FM rig. W0MXF has a new Swan 500 CX on the air and a new Shure mike.

Net	kHz	CDST/Days	Seas.	QNT	QTC	Mgr.
RACES	3996.5	1830 S-S	.30	389	59	WB0ATJ WA0SUF

Traffic: WB0HHC 113, WA0SUF 67, W0DM 15, WB0BMG 7, W0MXF 3.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - K0OTZ of Rapid City has a new tower up. W0HXX of Rapid City is now a Silent Key. The Brookings repeater, WR0ACP is now open access with the receiver and transmitter both located in Brookings. WB0ME, Platte; WB0QMD and WB0OME, Mt. Vernon are new YLs on two meters. K0ZBI of Watertown has been serving as net mgr. for the summer session evening net. Net reports: Morning Net, 280 check-ins and 84 formal; NIQ, 458 check-ins and 29 formal; Evening Net, 1125 check-ins and 32 formal; SDN CW remains active. Traffic: WA0KKR 96, WA0UEN 85, WB0IIV 78, W0HOJ 72, W0MZI 26.

### DELTA DIVISION

ARKANSAS - SCM, S.M. Pokorny, W5IIAU - SEC: W5RXU. PAM: W5POH. RM: W5MYZ. Net, kHz, Time/Day, QNT, QTC, Mgr.: OZK, 3765, 0000/Dy, 205, 55, W5MYZ; APN, 3937, 1100/M-S, 728, 25, W5POH; MJB, 3025, 2130/M-F, 470, 12, W5ZWZ; ATN, 3995, 2430/Dy, 228, 22, W5SIGF; ANN, 3715, 2300/Dy, 36, 12, W5SIGF; ARN, 3995, 2330/Dy, 480, 69, - Operation Ft. Chaffee; On May 16 call from ARRL re State Dept. request amateur communications be set up at Ft. Chaffee. Contacted W5s FMJ, FMK, HHM & WASZEX who now have station set up at Fort. and will be operating on 75, 40 & 20. Still need more operators in area to help out. Welcome to W5OHO, W5SOJX, W5NS, OHS, OII, OIK, OIN, OJE, P5FR; W5EJ 56, W5MYZ 49. Traffic: W5SIGF 96, W5EJ 65, W5IIAU 61, W5MYZ 59, W5IXA 15, W5KL 2.

LOUISIANA - SCM, Robert P. Schmidt, W5GHP - Asst. SCM: John Souvestre, W5NYY. SEC: W5TRI. RM: W5AZZA. PAM: W5SEKU. VHF PAM: W5AKND. Congrats to W5SLBR, LAN, LTN/LSN members, on her engagement to W5VUC. Wedding in July. New Novice classes started at the Baton Rouge and Jefferson ARC. New Novices are W5SOZK, W5OKN of Metairie and New Orleans and W5OKI of Morgan City. Also congrats to W5SHT and W5BWM of Monroe on new Advance tickets. K5AHD making progress on the road to improved health. K5CAV with new tower and beam up shortly. Winner of the Council Award to be announced next month. Roger Burt, active member of the Delta DX Assn. being transferred to Boston. W5LPCQ moved from Alexandria to Shreveport. W5ATHI moving to Houston. W5SFZJ has new Triton II.

Net	kHz	Time(PM)/Days	QTC	QNI	Mgr.
LAN	3615	7:00/10:00 Dy	257	303	W5AZZA
LTN	3910	6:45 Dy	67	342	W5SEKU
LSN	3703	8:30 M-F	72	116	W5LIQU
LRN	3587.5	7:00 Su	4	16	W5GHP

Traffic: W5LIQU 247, K5TTC 209, W5MT 167, W5GHP 141, W5SLBR 122, W5AZZA 105, W5SKFA 100, W5SNWO 36, W5ASPI 33, W5SFZJ 24, W5NSNR 14, W5SHT 8.

MISSISSIPPI - SCM, W.L. Appleby, W5SDCY - Asst. SCM: C.E. Gibbs, W5LL. SEC: W5FXA. W5HVR and W5ZLX now Advanced. MSBN Net Cert to W5YTN. W5BMTQ; MTN Net Cert to W5BMTQ, W5AMZ, W5WB. ORS to W5BMTQ, W5AMZ. Welcome to new Miss. amateurs W5OIN, W5SOIU, W5SOJU, W5SOJL, W5NSLI, W5NSLL, W5NSHW, W5SOHN, W5SOJU, W5SFH; continues with FB MTN Newsletter. Check-ins receive copies like-wise W5BMTQ with the Miss. Sig Net Newsletter. W5BLDW/ back for 4 more years at KAFB. W5UCY continues on Qscar 6 &

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 10 kc Bandwidth without adjustment  
 Covers entire 160 meter band with adjustment  
 Slim, lightweight, factory-sealed, loading coil, 500 watt capability, 10 1/2 ft. Total Length, Standard Ball Mount Thread (3/8" - 24)

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- Center Fed Tuned Doublet • 130' Total Length — may be cut shorter if desired
- 100' 450 ohm open balanced Transmission Line
- 14 ga. stranded copper antenna wire
- Comes Assembled, just add rope to ends & pull up in the air and tune with the Dentron Super Tuner

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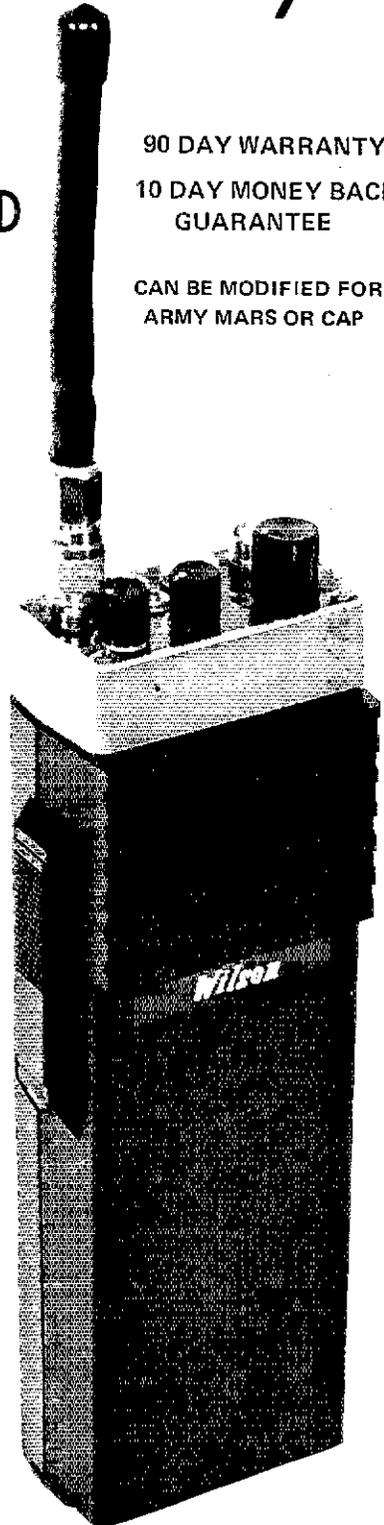
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- .3 Microvolt Sensitivity For 20dB QT.
- 2.5 Watts. Nominal Output 12 VDC.
- Microswitch Mike Button.
- Size 8-7/8 x 1-7/8 x 2-7/8 Inches.
- Weight 1 lb. 4 ounces. Less Battery.
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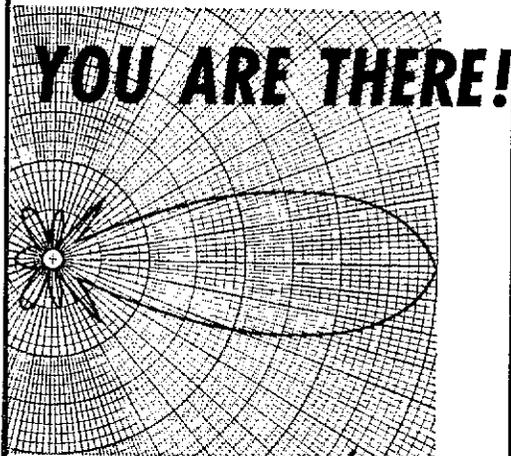
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WB5JBW back on MTN. WBSHVY now wall to wall Drake. Don't forget Delta QSO Party Sept. 27-29. Heard on MTN: WB5NSC W5LL, K5RSE, WB5ADC, K5KSC, W5UEP, WBSFML. New 20-mt antenna at WBSKUI. W5BW first licensed as 3UJZ in 1913, later as 3BA and W9BA. He was heard thru Oscar 6 & 7 during FD as W5BW/S. WBSCKK now in N.O. WA5EQZ rec'd DXCC 187 countries phone, DXCC 200 countries mixed. Also WAC and WAS. WNSNSC now WBSNSC General, WNSJHC now WBSJHC Advanced, FB fellowed K2DE/S returning permanent basis to Pensacola. Heard on MSN WBSFKA, WBSGNU, WBSUJE, WBSKFN, WNSMDR, WNSNGO, WNSNJS, WNSNJZ, WNSNOJ, WNSNQS, WNSNSC, WNSOLL, W5UEP & OM WAS5YZ. K7QDH/S reports 6 mtrs open. WA4GP/S new VHF/FM rig. WSNCB did Ham PK on Color TV in Oxford and Univ. Ms. WBSHVY earned 3rd BPL, PSHR WBSMTQ.

Net	Freq.	Time (Z)/Days	QNI	QTC	Mgr.
MTN	3665	2345 Dy	175	75	WBSFHA
MSBN	3987.5	2315 Dy	947	151	WBSBUE
MSN	3733	0000 MWF	60	16	WBSMTQ
CGCHN	3935	0100 Dy	1785	66	W5OEB

Traffic: WBSHVY 143, WBSFHA 140, W5FDT 110, WBSDCY 70, W5WZ 68, WBSMTQ 65, WSNCB 33, W5QDC 31, WBSBUE 27, WBSKUI 27, WBSIUS 23, WBSBKM 9, WB4HRR/5 3, WA4EOP/5 2, WBSAHZ 1, W5LL 1.

TENNESSEE — SCM, O.D. Keaton, WA4GLS — SEC: WB4DYJ. PAMS: WB4PRF, K4LSP, RM: WB4DIJ.

Net	Freq.	Time (Z)/Days	Sess.	QNI	QTC	Mgr.
TPN	3980	1040 M-F	76	3614	212	WB4EWW
		1145 M-F				W4PFP
		2330 M-S				WB4YPO
		1300 SSuH				
TCN	3980	2330 S				WB4ZBC
1WN	3980	2100 S	3	65	2	WB4DYJ
1CN	3635	0000 Dy	29	230	144	K4YFC
1NN	3707.5	0000 Dy	31	179	62	WN4FZU
ETVHFN	50.4	0000 T-ThS				WA4YKN
ETVHEN	145.2	0000 WF	9	41	1	WB4DZG
ETTMN	28.7	0000 WF	9	69	2	WB4NFI
MTTMN	28.8	0100 T-F	9	61		W4EAY
ACARECN	146.28	0000 T				WB4ZSZ
	146.88					
KCARECN	146.52	2130 F	4	33	6	WA4IPT
WTVHFN	146.37	2000 S	10	109	8	WA4VVX
	146.97	0130 F				

WA4DPF had 85 phone patches in Apr., '96 in June. Everyone invited to attend Cedars of Lebanon Hamfest to be held at the Cedars of Lebanon State Park on the 31st. The Humboldt Hamfest was a success; WA4VXW got first prize, WA4RQW the 2nd. The Knoxville Hamfest also a success, winners of prizes were W4WFW, WN4JGH. W4OGG had traffic count of 337, PSHR 67 for Apr. Congrats to W4OGG on great turnout for Tenn. QSO party. 1st place home station K4PUZ, mobile W4OQG, portable K4LTA and out-of-state W5RUB. Traffic: W4OGG 264, K4CNY 180, K4KCK 63, WB4ZSZ 55, WA4IDY 38, W4CYL 30, W4RUW 27, WA4UAZ 27, WB4MPJ 21, WB4YPO 19, WB4ANX 14, WB4DYJ 14, WA4GLS 11, WB4PRF 10, WB4CMQ 7, WB4GTW 7, K4SBV 6, WB4DDV 1, WA4DPF 1.

### GREAT LAKES DIVISION

KENTUCKY — SCM, Ted H. Huddle, W4CID — SEC: WA4GHQ.

Net	QNI	QTC	Net	QNI	QTC
KRN	298	19	KYN	323	165
MKPN	871	54	KNTN	82	20
KTN	1027	97	8 DAREC	80	2
			8 DAREC	80	11

Summer blah's on traffic again! Net and personal QTC again are down. W4CDA is fighting 2-meter antennas. Over 25 Kentucky amateurs participated in the activity surrounding the Pike County floods. WA4DSD provided much of the damage reporting out of the hard hit area. He also received a commendation from the Governor for his activity. Traffic: WB4ZML 142, WB4EXQ 88, WB4AUN 64, WA4IGS 55, W4BAZ 52, WB4FOR 31, W4CID 49, K4HOF 30, W4RHZ 30, WB4FAT 27, WA4GHQ 22, WB4FAF 16, WB4NHO 15, W4CDA 14, WN4IKF 14, WB4BYV 12, WN4NNG 9.

MICHIGAN — SCM, A.L. Baker, WBTZZ — SEC: WBMPD. RMs: WB1JA, WBRTN, WB1QJ, K5KMQ, WB8MI, WB8NI. PAMS: WB8JX, K8LNE, WB8BYB. VHF PAMS: WA8WV, K8AEM.

Net	Freq.	Time/Days	QNI	Tfc.	Sess.	Mgr.
GLETN	3932	0130 Dy	591	51	30	WB80BR
QMN	3663	0700/2300 Dy	571	242	87	WB3JA
MACS	3953	1500 Dy	819	217	35	K8LNE
MNN	3720	2230 Dy	175	45	30	WB8JAD
UPEN	3922	2230 Dy	430	25	32	WB8IEH
HR/MEN	3930	2130 Dy	628	85	31	WB8BYB
WSBN	3935	2300 Dy	610	75	31	WB8JX
M6M	50.7	0000 MS	195	20	26	WA8VXE

W8CVQ reports SW Mich. 2M net QNI 48 in 4 sessions. 2M Catfish net had 59 QNI in 4 sessions as reported by WA8WV. WB8NCD taking over as Mgr. of MNN. On May 17, SVARA members headed by WB8JCD did an excellent job of supplying communications for the Jaycee's Bike-A-Thon. Menominee County EC WB8PFB reports excellent turnout for surprise drill. I am pleased to report new Novices: WN8s UJH, UQJ, UQK, UXD. WN8OZX passed General Class exam. Central Mich. Repeater, WR8AHM now operational on 146.13/73. Saginaw Valley AREA claims to be the leading contest

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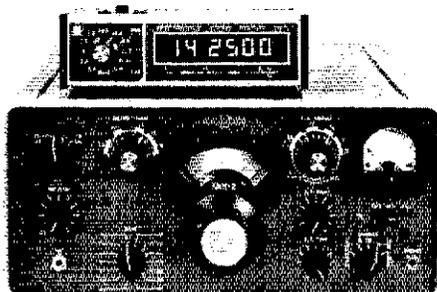
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club in Mich. Any challengers? K8MPV made 10-meter DXCC. K8SWW reports portable repeater W8RAAA on 146.14/79. Traverse City area amateurs get in step — now monitoring 146.52 simplex. Murphy strikes W8TBP, mysterious antenna trouble. Traffic: (May) WB8ITT 26G, W8SDQ 218, WB8JAD 207, WA8WZF 125, W8TZZ 103, K8DYI 99, W8MG 91, W8NOH 78, W8BRXS 61, K8LJS 58, W8SIL 44, K8LNE 44, W8FBC 43, W8TBL 43, W8SBNW 36, W8WV 34, W8BNC 32, W8TIN 32, K8WJ 30, K8CJ 28, W8OW 26, W8YIQ 25, W8BOER 23, W8DT 22, W8UFS 22, K8JED 20, W8BJUS 18, W8IUC 18, W8PDD 15, W8UOQ 13, W8SDE 12, W8EOI 11, W8VIZ 11, W8DCN 10, W8IUP 10, K8AMU 9, K8JHA 9, W88PFB 8, W8MDK 7, W8TBP 7, K8ZJU 7, W8RAXI 6, W8FZL 6, K8MIK 6, W8QBE 6, W8AFXR 5, W8LOU 5, K8PYN 5, W8RNO 5, W8WVL 5, W8WVV 5, W8ACUP 4, K8SWW 2. (Apr.) W8RRXS 61, W8IHD 22.

OHIO — SCM, Hank Greeb, W8CHT — Asst. SCM: William K. Shaeffer, WA8MCR, SEC: WA8COA. RMs: WA8WAK, W88KLI, PAMS: W8MOK, WA8VWH.

Net	Sess.	QNI	QTC	Freq.	Times	Mp.
OS8BN	84	2771	784	3,9725	1430/2000 /2245	W8MOK
HNR	31	83	128	3,610	2200	K8NCV
BN	62	524	288	3,577	2245/0200	WA8WAK
OSN	29	178	87	3,577	2210	W88KK
ClcMtrn	29	321	66	50.160	0100	WA8VWH
BRTN	60	160	5	146.46	2200/0100	W8SOZA /W8IBX W88GG
MASFR	8	150	34	146.34/94000		

Public service activities in abundance: Central OH AREC provided communications for Bicycle Tour of Scioto River Valley, May 10-11. Queen City Emergency Net (Cincinnati) aided Cincinnati Red Cross in Search & Rescue for lost child on May 22. Apricot Net (Cleveland) provided communications for two parades on May 19 and 26. SW OH AREC provided communications for Peterloo Boy Scout Camporee on May 17. W8RAXI, W88HUP, W88FRX, W88HRU, W88NUT, W88NW, W88ZPS provided communications for Elder High School (Cincinnati) 20 mile walk. Central Ohio DX Assn., Cincinnati Area Ten Tuners, Miami Valley FM Assn., NW OH Amateur Radio Club, OMIK Electronics Assn., and Univ. of Akron ARC are among the latest ARRL affiliated clubs. W8HXR is communications officer for Fayette Co. ED. K8ONA is ham of the year. Cleveland Chapter, OJWA, for her public service work. Reports from W88MW, W88QO, K8TUP, W88GC 4, others on 6-meter band openings during late May. 6 is popping these days! Remember Ohio QSO Party, Aug. 30 & 31. Details in Operating Events. W88HO will be in SE Corner Buckeye Building, Ohio State Fair, Aug. 21 thru Sept. 1. Ohio Section Nets Picnic, Aug. 19, 1975, Mt. Vernon, Ohio, see WA8WAK for details. Traffic: WA8MCR 461, W8DIL 391, W8PMJ 369, WA8HGH 345, W8PTT 243, W88BZX 201, W8SOZA 169, W8QZK 169, W8IBX 149, W88E1 130, W8MGA 128, W88SM 119, WA8ZNC 95, W88KWD 88, W88KKI 87, W8ID 68, W8OIL 65, K8LGA 64, W88SGF 62, WA8YB 54, W8CHT 52, W88KQJ 52, W8PGD 49, WA88OV 47, K8MLO 44, W8TYF 44, WA8VWH 42, W8MOK 41, K8YIU 40, WA88SI 38, W8QYF 37, W8CXM 34, W8OE 33, W88GGR 32, K8LXA 31, W88GW 29, K88VYR 28, K8VMI 28, W88C80 21, WA88E 21, W88NUT 18, W88UET 18, W8DPW 17, W88YD 17, W88CJ 14, W88RKA 14, W88HL 12, K8CKY 12, W88GE 12, W8TH 12, W88ET 10, WA88SF 10, WA8MAZ 10, WA88RY 10, W88TEM 10, WA8DWL 8, K8JPF 8, WA8MWF 7, W88QXN 7, W88US 7, K8UQY 7, W88MRGR 6, W88MHO 6, WA8TSX 6, W88DCX 4, W88IBZ 4, W88MKZ 4, W88YF 1, W88PGW 1, WA8RQ 1.

## HUDSON DIVISION

EASTERN NEW YORK — SCM, Gary J. Ferdinand, WA2PJL — SEC: W2KGC. Asst. SEC: K2AYQ. RMs: WA2FBI, WB2IXW, KMRTY: K2ZDN. PAM: WB2QEL. Traffic nets: ESNN, 3735, 1930Z ESS, 3590, 2200Z: NYS (NTS Section Net), 3675, 2300/0200Z: PON, 3913, 2945Z. Hudson Division PR Net, 2nd/4th Sun., 3925, 2100Z — ECs and exc. ECs welcome. K2AYQ reports excellent work done by the AREC in supplying communications for several canoe races. Participating were: W2FEM, K2AYQ, K2PBE, WA2AQD, WA2PCK, WA2QZW, W82BZJ, W82FRV, W82GN, W82IDD, W82OMP, W82RPL, W82RTA, W82VWD, W82YBL, W82ZOR, W82EDB, W82WPE. Real FR news report, too! More excellent PR found in Poughkeepsie paper thanks to W82NK, W82NCT, W82OTK, and others from the Mt. Beacon club. The half page feature discussed emergency communications, 10xing, ragchews, TVI, and entry into ham radio. QVS WB2YQ reports QSO of two new states on 6m: Ore. and Wash. I K2YL in N.Y. ARRL affiliations to Orange Co. ARC, Maple Hill ARC, Westchester Emerg. Comm. Assn. How about your club? Westchester ARC heard W2KP, W2KFB, W2CFU on propagation, phased verticals for 40, 2m fm Albany ARA heard WA2PJL on Public Service and Section structure. Schenectady ARA heard WA2CGD on Red Cross Amateur cooperation. W2OOI to Advanced. WA2PAU reports Saratoga Emerg. Net on 147 MHz, or thru W82ADN, Thur., 9 PM. WA2CYI homebrewed a 3 watt 40 transceiver. W82TDX has a new tower and built an ACCU-keyer. W82RKF to Extra Class. Pearl River High participated in Rockland emerg. drill. Traffic: WA2PJL 288, W82RKF 250, WA2BRV 79, W82BW 52, W82TGL 51, W82CNE 42, WA2BLM 31, K2SIN 28, K2TTG 22, WA2PAU 17, W82TDR 7, W82EMU 5, WA2FBI 1.

NEW YORK CITY-LONG ISLAND — SCM, John H. Smale, WB2CHY — Asst. SCM/PAM: Art Malatzky, WB2WFJ. SEC: K2HTX. RM: W82LZN. The following are traffic nets in and around the Section:  
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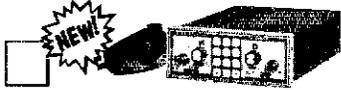
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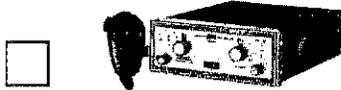
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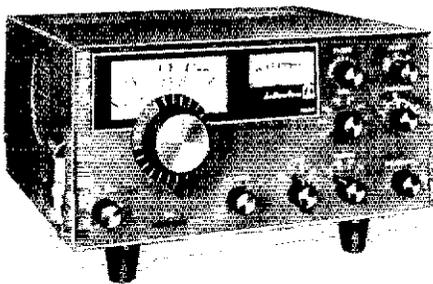
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ESS	3590 kHz	1800 Dy	K2UIR Mgr.
NYSTPEN	3925 kHz	1800 Dy	WA2RSP Mgr.

\*Denotes Section Net, all times are local. Attention fellow hams; lots of neighbors complaining about your causing TVI and the trouble is actually in their sets! The RFI Bill has been introduced in Congress, called HR 7052; write your Congressman indicating your support of this bill. K2VVG with new job, doing a lot of traveling and enjoying his TR22C. Congratulations to recent upgrades: WB2WBH, W2IVA (son of W2PF), W2NCL, WA2KFN, WA2VOS, WA2JUF all to Advanced, WA2YXA, WB2FUL to General. WA2YAY now getting active in traffic on NLS. Welcome to newly affiliated clubs: Brocton Tech. H.S. ARC and Great South Bay ARC. Also W2MLC has upgraded to Advanced. W2LYH enjoying 2 watt QRP rig using the big rhombic antennas at RCA. Smithtown. RACES Net has welcomed new General WA2TSE to its ever growing ranks. WB2LZN still having trouble with new rig, phone nets are awaiting his first QNI. Welcome to new Novice WN2ZPC who expresses much thanks to WA2WSQ, WB2CJS and WA2HGG for making it all possible. Tu Boro Radio Club will again sponsor a two meter RTTY contest, on Sun, Sept. 7 on 145.620 MHz, from 6 AM to midnight local time. Address all inquiries, logs and applications for certificates to Tu Boro Radio Club, 149-14 14th Ave., Whitestone, N.Y. 11357. Don't forget the annual NLI picnic and softball game the end of Aug, for further info, please check in to the Fone Net. As usual, NLI will be accepting challenges from NNI and ENY for the Directors Trophy. LIMARC and Hall of Science ARC both had successful flea markets. WB2EAV now Extra. K2LDK named "Man of the Year" by the I.L. Trust Company. There's a new "machine" on L.L., 146.115 in, 146.715 out. Don't forget LIMARC's Public Service Net every Mon. on WR2ADM. It is with regret to list W2BW as Silent Key. W2LH has retired from the "salt mines" and is now living in Wading River. K2HTX now with an FT 101. Traffic: (May) WB2LZN 204, W2EC 193, WA2VPA 95, W2MLC 85, WA2ROK 75, W2LYH 67, WB2EDW 61, WB2WBH 55, W2WKH 55, K2ITU 50, WB2OYV 39, WN2WRT 39, W2HXT 31, WB2WJF 27, WB2VTN 18, WA2USJ 16, K2IFE 14, WB2CHY 10, WN2YAY 10, W2PF 8, WA2KXE 4, KS2FBM 3. (Apr.) WB2EDW 57, WA2ROK 40. (Mar.) WA2VPA 58.

NORTHERN NEW JERSEY - SCM, William S. Keller, III,

Net	Freq.	Time(PM)/Days	Sess.	QNI	QTC	Mgr
NIN	3695	7:00 Dy	31	419	145	WA2DSA
NIN	3695	10:00 Dy	31	276	118	WA2DSA
NIPN	3950	6:00 Dy	4			WA2DVE
NIPN	3950	9:00 AM Su	4			WA2DVE
NISN	3730	8:15 Dy	31	270	90	WB2RMK
NIPON	146.52	10:00 SuTh	7	62	21	WA2EPI
(VHF)						
PVTEN	145.71	8:00 Dy	31	150	16	WA2DPT
NNJ/VHF	145.8	8:30 M-F	22			K2DQY

SEC: WB2PBO, PAMs: WA2DVE, WA2OPY(VHF). RMs: WA2DSA, WB2RMK. All NJ stations encouraged to participate in 1975 NJ QSO party, Aug. 17-18. See Operating Events section for further details on this and the 1975 Southeast Asia Net Worldwide Contest, Aug. 30-31, 1975. The Oakland Repeater Assn. invites all to attend their picnic Aug. 23-24, at Branchville. Contact WR2QOO or WB2RKK for details. The NJIT Radio Club, K2MFF, announces officers for the coming year: WB2RMK, pres.; WB2DTV, vice-pres.; WA2VCI, treas.; W2FHN, secy. Many NNJ clubs and individual amateurs participated in May 15 state CD drill. Welcome new amateurs: WN2AMH and WN2AYI. NNJ congratulates the following amateurs on FB accomplishments: WA2DJM, WB2YJV, WA2WBT, upgrading to Advanced Class; WB2WBR General Class; WA2WDT, receiving the CP-15 code award; K2JFJ on measuring to within 3 ppm in May RMT. New equipment: WA2DIW, a TR22C; WA2NPP, an Icom IC22A 2-meter fm rig; WA2GEZ, a five-element beam on 15 meters; W2VAV, an NC1200 line amplifier; WA2SLF, an FM27B; WB2WBR, a Tempo one. W2JDF, recently restored an NC100 receiver. W2CVW reports new filter and varactor for use on 1296. WA2NAV announces the Elizabeth Emergency Repeater. WR2AGV, operating on 147.885/147.285. WA2F2W now on 220 with 40 watts to a twenty-element array at 45-ft. He and W2HIK and WA8ZLP/2 provided communications at recent sailboat regatta at Lake Hopatcong. WA2GEZ reports tropo scatter on 144 and 220 MHz, plus short skip on six meters. We wish WA2DVE a speedy recovery from recent serious hand injuries. Traffic: (May) WB2RKK 454, WA2DSA 404, K2BHL 204, WB2UJD 178, WA2BSU 148, WB2HSG 96, WB2RMK 81, K2OOJ 80, WB2VTT 65, WA2NPP 52, W2ZEP 50, WA2PCP 43, WA2DIW 41, W2GTF 35, WA2DVE 30, WA2TLA 30, WA2OPY 25, WA2SHT 24, WB2KNS 22, W2CVW 20, WA2KFE 20, W2CU 19, WA2SLF 19, WB2EIT 15, WB2TIS 15, WA2OVE 12, W2WJQ 12, WA2SRQ 11, K2ZET 10, WA2CCE 8, WMOARS 7, WA2QNT 7, W2NSW 7, K2EK 6, WB2HSD 6, WB2PBO 6, WA2UCQ 6, WA2WDT 6, K2MFC 5, WB2VFT 5, W2ITU 4, K2DQT 3, W2JDF 2, WB2RJJ 2, W2SHM 2, WB2VUF 2, WB2NOM 1. (Apr.) WA2KFE 32, WB2FIT 25, WB2HSD 9.

### MIDWEST DIVISION

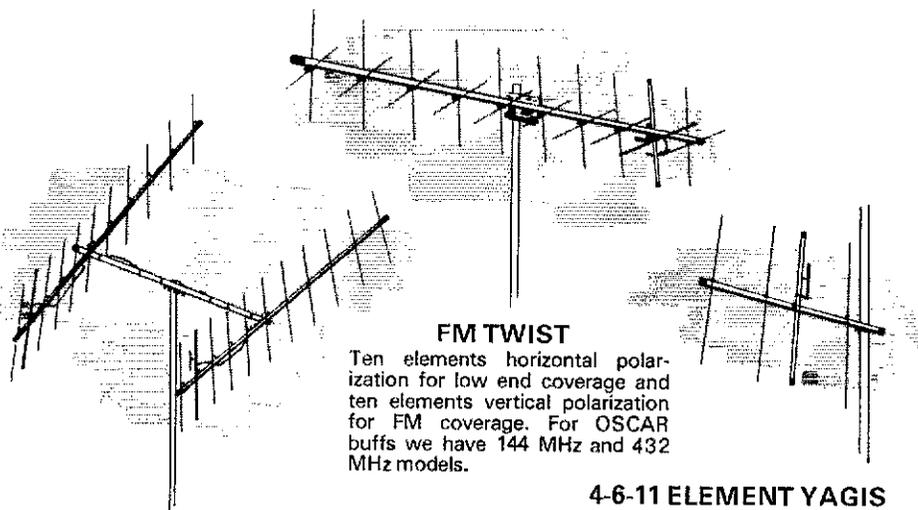
IOWA - SCM, Max R. Otto, W0LEF - Many Iowa Hams kept busy assisting OMMH, W0FFR, W0GGO, W0LID racked up 45 hours and 160 H-W messages. Others helping W0IYN, W0SLEU, W0QWVO, WA0VZH, WA0KVB, W0E5F, W0IKL, K9VSO and many relays and backups by W0KHF. Omaha operators should be commended for their professional type operation. Rag Chewers ARC of Cedar Rapids declared an ARRL affiliate. WA0HPF has a new TS520 and lost the use of it in one week when XYL became

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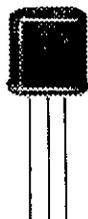
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WN9PMA, congrats Judy. Congrats also to WN0PLZ, WN0PIU, WN0PIU for new tickets and to K0ARA and WA0TJ now Advanced Class. WR0AJF on 3/191 in Ft. Dodge. K0SVW sporting new Alpha-374. DX in Seant area to be Aug. 30/31. "CQ Seant" (phone) "CQ Sea" (cw) W0YI antenna is back up. WA0VBX, WB0DGF helped Omaha cleanup in person. Radio WOJ ran film clip of Amateur Radio in action with WB0FTD and WB0KVS camera. WB0DGF at K0VST gave assist to Gov. Ray's motorcade. WR0AD and WR0ACU will have auto-patch. W0EMA is a lifer. ARRL that is. Hope to see all at Marshalltown Aug. 24 at the 75-Freem. Nets, Freq., Time/Days, QNI, QTC, Sess., Mgr.: Iowa 75 Meter, 3970, 2730 M-S, 1440, 81, 27, WA0VZH; Iowa 75 Meter, 3970 2300 M-S, 911, 47, 27, WA0ACX; Tall Corn, 3560, 2330/0300 Dy, 291, 78, 60, K0AZJ. Traffic: (May) WA0KHF 676, WA0AUX 321, K0AZI 208, W0YLS 65, W0LXC 42, WA0LKM 40, W0JP 38, W0MOQ 32, W0LEF 22, K0VST 21, WB0AVW 16, W0OMV 13, W0BW 6, K0GHH 5, WB0ENL 2. (Apr.) K0JGI 511

KANSAS - SCM, Robert M. Summers. K0BXF - SEC. K0JMF, RM: K0MRI, PAM: WA0SEV, WB0BCL, YHF PAM: WA0EDA. K0LPE again back in the hospital. Congratulations are in order for WB0JFI who got married May 23. Understand his brother WA0TVH won't be long from the altar either. One of our more active YL operators in Kans. recently received a station appointment as OPS. WA0KVP has been really HAMMING with NCS duties, hamfests and the whole bit. Let's take note. I noticed that W0QF just missed the FSHR ranks by a one point margin again. Another recent multiple station appointee is W0KL, OO, ORS, OPS. WB0HBM has added OO. W0YZE OO. WA0VCE, W0WOB OPS. And a big welcome back to WA0MLE ORS. WA0OMB, net mgr. of Central States Traffic Net (Oie Ks. Po Net) reports having quite a work out after the Tornado that danced thru Omaha. Tex reports net activity for May as QNI 622 and QTC 37. Ks WX Net QNI 462 and QTC 131. KSNB QNI 825 and QTC 89, KPN QNI 100, QTC 21, QKS QNI 472 and QTC 193. No report from QKS-SS. WB0HGG reports the Wichita Area Severe WX Network was activated 2 times in May. Funnels were sighted but no damage reported. Traffic: W0HI 125, K0MRI 124, W0FIR 117, WA0MLE 97, W0CHJ 83, K0BXF 64, WB0HBM 60, WA0LBB 57, WB0HTR 49, K0JMF 48, W0PB 44, W0CZR 41, WA0SEV 38, WA0KVP 20, WB0KWI 19, W0FCL 17, W0RBO 13, WA0VCE 12, WA0LKA 11, WA0JFI 10, W0KL 7, WA0OWH 7.

MISSOURI - SCM, R.H. Moschenross. WA0FMD - Asst. SCM/SEC: CHF Chamney, K0BIX. Net: QNI, QTC: MOSSB 1012, 46; MON, 196, 121; MON2, 139, 163; MSN, 106, 24; STLAREC, 66, 4; PHD, 49, 11; SCEN, 44, 6. W0OTF is acting Net Mgr. of MSN while K0ONK's rig is in the hospital. WN0NIE has earned a MSN certificate. WN000B is NCS of a new net in the Centralia/Mexico area. It meets at 9 PM on 31,159 kHz Sun. Summer vacations and other outdoor activities are playing havoc with most nets. Let's all take a few minutes a week and support our state and local nets. W0GLZ has loaned W0OOD a rig while hers is being repaired. Another example of ham cooperation. WB0ERL, PHD ARA amateur of the month has been elected Net Mgr. of the MONSB Net. Thanks to WB0TFND for a "job well done" during the past year. Congrats to WB0MTX, WB0NMS, WA0YEF, W0NZG and K0GSV for upgrading to Advanced. Also to K0VPI for Extra and W0KRC for passing General. Welcome to new Novice W0GLK. The Dam Site ARC is now an ARRL-affiliated club. W0HBB operated as W0JTIU during ITU week. W0GCL has a new Swan 350. W0REIG motored to Fla. for some interesting dialogue. W0BV vacationing in Calif. Traffic: W0OTF 158, WB0JWM 114, WB0HSP 94, WA0FMD 71, WB0LMV 31, WA0EMX 22, W0EPI 21, W0GJI 16, W0RTW 16, WA0QOA 16, W0VZK 16, W0RTI 14, WA0YNC 14, W0RTW 12, WA0YEF 12, WA0KUH 9, WA0FKD 8, K0ENH 7, WB0FKY 5, K0AHL 4, K0RWL 4, WA0MOF 3, WB0LTD 1.

NEBRASKA - SCM, Dick Dyas, W0JCP - Omaha Hams were quickly organized and for the next several days handled a tremendous amount of welfare traffic resulting from tornado which struck on May 6. Congratulations on an FB job.

Net	Freq.	GMT/Days	QNI	QTC	Mgr.
NFB 1	3700	0000 Dy	13	1	WA0GHZ
NSN 1	3982	0030 Dy	675	27	WA0LOY
NMN	3982	1230 Dy	1157	9	WB0GWR
WNN Wx	3950	1300 M-S	527	3	W0NIK
AREC	3982	1330 Su	157	14	W0IRZ
CHN	3980	1730 Dy	1520	24	WA0GZ
SHN WX	3950	1830 M-S	166	5	W0PL
NAN	3980	2000 M-F	266	5	WA0AUX
OCWA	3980	1400 S	65		W0FOB
NSN	3982	2330 Dy	920	41	WA0LOY
EA NEB	1676	0200Z Dy	625	56	K0GND
AREC					

NFB 1 CW discontinued 'til Oct. 1. Afternoon net informal 'til Sept. 8. Traffic: WA0HWR 78, WA0LOY 71, WA0CBI 32, W0GKK 32, W0HFB 31, W0HOP 31, WA0PCC 30, W0VBE 29, W0FQB 27, W0VYX 23, W0GWO 16, W0FCP 16, K0SEA 16, W0DI 13, W0DIU 12, K0ETT 12, K0DGW 11, W0GMO 10, W0DMY 7, WA0QEX 7, W0NIK 6, W0HTA 5, WA0EEI 4, K0HNT 4, K0ODF 4, W0WKP 4, W0YFR 3, WA0GHZ 2, WA0HAL 2, WB0CAK 1, W0PL 1.

### NEW ENGLAND DIVISION

CONNECTICUT - SCM, John McNassor, W1GVT - SEC: W1DGL, RM: K1EYR, PAM: K1YGS, VHF PAM: WA1OYE.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900 Dy	e2	515	375
		2200			
C/N	3965	1800 M-S	31	457	202
		1000 Su			



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**Economy 2-element Tribander** Light enough for standard TV rotator but

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**Heavy duty 2-element 40-meter Beam**  
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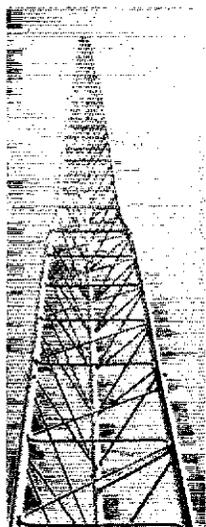
SWAN BEAM ANTENNA SPECIFICATIONS							
Antenna Model Number	Boom Length & Diameter	Longest Element	Turning Radius	Maximum Wind Survival	Wind Load @ 20 mph	Wind Suction Area	Net Weight
TB-4HA	24' x 1.5"	28'-10"	18'-6"	100 mph	148 lbs.	6 sq. ft.	54 lbs.
TB-3HA	16' x 1.5"	28'-2"	16'	100 mph	110 lbs.	4 sq. ft.	44 lbs.
TB-2A	6.5' x 1.5"	27'-8"	14'-3"	80 mph	60 lbs.	1.8 sq. ft.	18 lbs.
MB-40H	15.75' x 1.5"	30'-4"	17'-6"	100 mph	80 lbs.	2.5 sq. ft.	40 lbs.



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CSN 3725 1730 Dy

High QNI: CPN - WA1HLP, WINOO, WA1RUR, WA1RXA and WA1TGE. SEC WIDGL working on area concept for EC coverage with 50% of towns now covered by ECs. May reports from WA1JYP, WA1QME, WA1RXA & WA1LWM. WA1NGS new EC for Meriden, replacing WA1QME who is moving to Colo. - good luck Bob! Director WA1BHR enjoyed attending Tri-City Annual Banquet meeting. K1EIR CN Bulletin: regret losing WA1QME to Colo. & WA1SHO to Ohio (CPN & CSN loss also!) but best of luck to both! Danbury CARA reports FB Conn. QSO Party & thanks to all who helped. Shoreline ARC Annual Supper meeting will include elections. Tri-City Annual Banquet chmn. W1QV thanks all for attending. Murphy's Marauders repeater WR1AEP operating on 222.70/224.30. [CRC 25/88 WR1ABM now has WR1AFU active on 442.85/447.85. W1BDI vacationing in Maine. W1WEE & K1ZZEE take first place for 2-meter am operating! Our VHF PAM, WA1OYE, had prolonged stay in hospital. Best wishes from all Net members. Congratulations to: WA1QME May BPL; WA1SZJ Extra Class; WA1MYX Advanced Class; WN1TNK General; WA1SCV for WAS; MASJ ARC, Stratford and WELI ARC North Haven on ARRL affiliation! Repeater activity is increasing every day. VHF is the way to go - benefits for EC work unlimited! Join a Club! Traffic: WA1QME 404, WA1FCM 172, WA1TGE 160, WA1GFH 160, WA1HLP 99, WA1RUR 96, WN1UAX 92, W1EFW 90, WA1SHO 78, WA1RYL 62, WA1RXA 58, W1CTI 56, WA1STN 47, W1QVT 45, K1YGS 40, WA1AW 34, WN1TNR 28, WA1JCN 25, W1KW 18, W1DGL 17, WA1SW 16, WN1UHN 11, WA1RZC 10, W1QV 8, WA1OPB 7, WA1QQU 7, W1BDI 4, W1CDH 4.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, W1ALP - W1AOG received reports ECs: WA1RTR, W1BAB, K1ZUP, K1NEW, W1FTI. WA1QOK EC for Watertown. W1RM now has old call W1HI held in 1913. Endorsements: K1FMM, WA1QEK, W1HI, K1CCW as ECs; WA1AER a new OO. W1FJL, WA1UZZ helped provide communications for Prov. RI parade. W1AOV, WA1HPS, W1BAB, K1UQA, WA1RTR, W1AOG helped in communications with Red Cross in Medford parade. K1LDI, WA1IMN, W1FSN are Silent Keys. Our sympathy to WA1UJ on the death of his son. WN1TWA had an operation. WA1VM 3YL of WA1UQE. WN1UMA out with a DX-60. WR1ADR phone patch working. W1PEX Lif member of Wireless Pioneers. EC WA1AER appointed W1ZMJ as assistant. K1EPL had eye operation. W1BB on 160. W1M1KP worked P2S1 & 20 States with 2 watts. New affiliated Clubs: Univ. of Lowell Wireless Soc., So. NE DX Assn., Charles River Wireless Soc. WA1LGY and her OM trip to Bermuda. W1ASI has 50 yr. pin and plaque. WA1OKD had PSHR of \$7 for Mar. WA1DEL & W1DKD have over 1500 QSOs. WA1IFE worked Wps, W4s on 6. WA1QKD, WA1GGL, WA1GNB operating on the Islands in Narragansett Bay. W1DMS has large Hy-Gain Tri-band beam. W1GNM moving to AZ. WA1PAZ back on 2. GM3UA, G8VG visited WIPL, he is going to EP-Land. WA1ENM has 2-meter mobile fm. W1ANB on trip to KH6-Land. WA1CTS has Extra Class. K1FHN of ARRL spoke at Dorchester ARC. K1YTC has radio repair shop. EC WA1QEK says Lawrence has 2 & 6, 10-80 and is working with the Emergency Medical Services Comm. staff. K1FMM on public service comm., of the HMR4 with 3 repeaters. K1BHN did phone patch for KC4LUX, 125 of them. W1AGN has call K7DP when he moves to Phoenix. K1QKE in hospital. WA1SDZ, WA1EMN, W1SML to Rochester hamfest. WA1RTO & WA1LGY have 40-ft. towers. W1IM in hospital and has ITC Multi-2000. RMS flea market big success. W1DQM moved to Ohio. Net reports: EMFN had QNI 177, QTC 102; EMRI had QNI 347, QTC 245; NENN QNI 76, QTC 23; NEEPEN QNI 71, QTC 10; EM2MN QNI 72, QTC 33; Clearing House QNI 432, QTC 397; EM2MN for Apr. QNI 48, QTC 65. New officers of NAHC: WA1DUZ, pres.; K1YBS, vice-pres.; W1DKD, secy-treas.; WA1EZA, awards; W1DFR, WA1QLI, trustees. Capeway RC met at W1GPL. South Shore RC had Ladies Night at the Alamo. W1AAI with WBZ-TV-4 for awhile. W1GNK Quartermaster of the Norwood ARC. W1BHV is working in Visc. New officers of Quannapowitt RA: W1MXX, pres.; WA1QV, vice-pres.; K1ZTA, secy.; W1JKE, treas.; W1QKB, W1EIH, WA1MTS, dir. Traffic: (May) W1PEX 283, W1UX 270, WA1MSK 248, WA1QZX 219, WA1OKD 203, W1EWH 173, K1PNB 158, WA1QWQ 95, WN1UGJ 88, W1DMS 86, W1EMG 85, K1PAD 80, W1CE 58, WA1QJU 46, W1MX 42, W1DMH 35, W1GNM 32, WA1IFE 23, WA1PAZ 14, W1AOG 9, W1PL 6, WA1POY 6, K1LCO 5, K1WVW 2. (Apr.) W1CE 47, WA1POY 20, K1LCO 8. (Mar.) K1LCC 5.

NEW HAMPSHIRE - SCM, Robert C. Mitchell, W1SWX - SEC: K1RSC, RM: WA1GCE, PAM: K1YSD. Welcome to WA1UXZ, WN1UYQ. W1BVX won the New Hampshire sweepstakes. W1PP back from Fla. K1LMS planning new antenna farm. W1JB operates on 160 meters, look for limit on 1820 kHz. WA1SD's mini beam back up and snagging rate DX. K1PQY & XYL spent two weeks on the Maine Coast. W1OOV's NHTN reports show 39 traffic, 166 check-ins in 27 sessions. Attendance increases on Sat. nights when WA1QCO is Net Control. W1BBH, Rochester gave W1OKVY NH for his last state for WAS. Traffic: K1LMS 53, K1POV 26, W1JB 12, W1SWX 4.

RHODE ISLAND - SCM, John E. Johnson, K1AAV - SEC: W1YNE, RM: WA1POJ. PAM: WA1RFT. RI broke all records last month with new hams. New Novices are WN1s UYJ, UXP, UXV, UZK, UYW, VAT, UZT, UZS, UZJ, UOZ, URE and URO. New Techs are WA1s UQH, USA, VAL and VAI. New Generals are WA1s VAP, UZI, UZE, UOH, URY and Advanced WA1UQL WA1POJ is still very active with Oscar. WA1RFT made a new home brew keyer and is working DX on 40 meters as well as Oscar 6 and 7. K1JNJ operating all bands and building a 2-meter rig for FAX operation. W1LPT formerly W1KGR of RI is now located in Va. He operates W1USS in the basement of the Senate Office Bldg. in Washington, D.C.; we all miss Mort Blender in RI but know he will be an asset to the Washington, D.C. Recently W1JFF led the following members of Newport RC W1PDL, W1AGB, K1UFR, WA1AUL, W1IAG and

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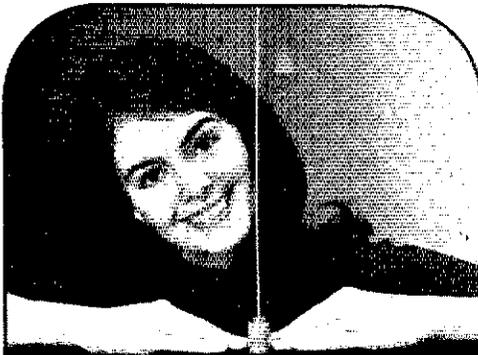
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Fred Carr as a Communications Group for the Red Cross to furnish communications for Girl Scout Festival 1975 at Narragansett Park. They set up on 50.9 MHz and fully covered the area without mishap. Traffic: (May) WA1POJ 152, WA1RET 29, W01ITU 6, RIJNJ/1 4, W1OP 4, (Apr.) WA1POS 255, WA1RET 40, W1KMV 9.

**VERMONT - SCM, J.H. Viele, W1BRG - SEC: W1VSA.**

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
VTSB	3909	2200 M-S	519	73	WA1PSK
		1130 Su			
Carrier	3935	1300 M-S	452	24	W2DSK
Green Mt.	3932	2130 M-S	544	43	W1LZ
Vt. Phone	3909	2130 M-S	91	4	W1KKN
VTRED	3909	2300 Su	76	25	K1QB

Welcome new amateur WN1UYU, WA1QOP finished building house and ham shack, now back on the air, W1LMO assembling gear and going teletype. We all mourn the passing of W1FN, WA1KAH had his two meter gear stolen from his car by a CBer, recovered the next day by police due to alert con job by WA2SHD and WA1REL on the air. W1BZD has new IC230 on the air. Traffic: K1QB 76, W1LMO 9.

**WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BVR**

- W1STR new EC for Hampden Co. replacing W1ORT who resigned. WM AREC Repeater Assn. is now an ARRL affiliate. PAM WA1MJE will be on vacation and plans to cover 1,2,3,4,5,7,8,9 & 10 FCC districts. RM W1DWW reports WMN 31 sessions, QNI 137, traffic 126. PAM WA1MJE reports WMPN 21 sessions, QNI 224, traffic 46, 53 different stations. SEC WA1DNB reports WMEN 4 Sun. sessions, QNI 60 (plus 23 checking in thru 2-meter repeaters). W1BVR/PAM WA1PLS reports WM AREC Repeater Assn. 22 sessions, QNI 197, 32 different stations. Thanks to Baypath AEC (Sturbridge) for first copy of bulletin received; editor was W1HGT. New officers are WA1RTX, pres.; W1HGT, vice-pres.; W1FGA, secy.-treas.; K1PSF, act. mgr.; K1JNS, editor. CMARA speaker was W8PEY/1. W1HGT and WA1OLK now Advanced Class. WA1TA

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of Search and Rescue. A DATE TO REMEMBER July 29, 30, 31, 1977 NW Division ARRL Convention in Seattle. See you there. W7JW planning Chairperson. Thanks to Mike & Key ARC for copies of letters of appreciation from several groups for radio support during their functions. The Boeing Bear and repeater groups worked with the club. "The dedication, time, expense, and all out efforts of individual amateurs, repeater owners & operators really makes me darn proud to know there are special people like this left in this world." Thanks Al, I will second the statement. Traffic: WA7BDD 118, W7DZX 106, K7OXL 98, W7BQ 56, K7OZA 54, W7LG 52, WA7VHW 44, WA7ZNW 41, W7BUN 38, W7SYS 31, W7PWP 26, K7KEI 14, WA7RCR 13, W7IEU 9, W7AIB 6, K7EFB 4, W7AXT 3, K7VNI 2, WA7GVB 1.

### PACIFIC DIVISION

**EAST BAY - SCM, Charles R. Breeding, K6UWR - W6LZM and W6FDH** have become Silent Keys. Once again NPG took first place on Armed Forces Day. With a score of over 2400 points all of you who took part can be very proud. Your Division Dir. W6ZRJ and Vice-Dir., W6VZ1 gave a most outstanding report to a Section meeting of appointees and club reps. Doc and Al went into great depth on the ARRL Board meeting and Docket 20282. Doc also presented the Charter of Affiliation to W6JKK pres. of the Lake County AR Society. Congratulations. WB6VWG reports that plans are going well in organizing RACES in Lake County. W6RGG spoke on the ARRL OO program to the Novice class of the Hayward RC.

At a special meeting of the Northern Calif. Contest Club and Northern Calif. DX Club, XU1DX gave a talk on his operation from Cambodia and his fast helicopter departure. Watch for him from CT1-Land. W6TYM has been doing a fine job working as liaison between NCN and RN6. WB6MRB and W6TIG are active on the Napa 450 repeater. WA6SMK active on Newby MARS from Napa. The Northern Calif. Contest Club hard at work on the Oct. Calif. QSO Party. This will also be a good way to work all Calif. counties. Full contest rules will be in Sept. QST. Traffic: K6HW 477, W6TYM 133, WA6PI 109, W6JKK 70, K6PMG 27.

**HAWAII - SCM, Pat Corrigan, KH6GQW -** If you have not heard of action taken yet on the RFI Bill before Congress, please write your congressman in support of HR 7052, Rep. Vanik's bill. W161J reports arrival of YL Jr. op on 5/5. Woody IAC has been grabbing good openings to Eu on 20. WestPacNet did outstanding job handling overwhelming amount of Viet refugee etc. Good job, K6GSI! Woody, IAC did almost all of KH6 relay by himself. Where was everybody? Anyone interested in a little cw t/c practice, write me & I'll put you in touch with W7TH. Nice note from KH6BWT while he was on mainland business. Nice to note that Maui ARC is a 100% ARRL Club. Congrats to Fred (ex-KH6LJ) who av. 5.1 ppm in last FMT and picked up new call, KH6CZ. KM6BI is becoming more active again under 3 current licensees as reported by Julie Haile. EARC has two new solid state repeaters and more improvements coming. We wish K2SIL (KH6RS) all the best in his new QTH. Send news to your column! Traffic: KH6IAQ 870, KG6IAQ 219, KH6GQW 7, KH6BWT 4.

**NEVADA - SCM, John D. Weaver, W7AAF - K7VYT** was Field Day chmn. for K7UGT, the Sierra Nev. Amateur Radio Society. Their FD site was Galena Creek Campgrounds. WA7WYF was FD chmn. for K7UGS, the Las Vegas Radio Amateur Club. LVRAC planning code and theory classes again during fall semester. Contact W7ZTA for information on time and place. Results of the spring semester classes were several new novices and a few upgraded license holders. SNARS is sponsoring code and theory classes at Sparks Fire station. WA7IPA attending school during summer vacation. W7ILX was bitten by poisonous spider but had a speedy recovery. WA7NLG and WB7AVL registered for AREC. W7ILX has been checking into Cactus Net on 3.915 at 0100Z. Capon Net on 3.917 at 0300Z, and DRN6 on 7.265 at 2100Z. Traffic: W7ILX 184, K7OHX 29.

**SACRAMENTO VALLEY - SCM, Norman Wilson, WA6JVD - SEC, W6SMU.** New officers for the J.I. Sabin Pioneer RC are: W6DJQ, pres.; W6LJR, vice-pres.; K6ENQ, secy.; W6OPQ, treas.; K6FD and W6JAC, dir. Correcting the NHRC administration, V.P. K6RLY and Editor W6KYA. The GEARS and I regret to note the passing of W6LYQ of Corning. The Nev. Co. ARC has WR6AKL operational on 147.72/147.12. WA6HAF is constructing a 6-meter beacon station and is a new QV5. K6KWN has returned to Lake Amador and has added 2-meter capability. The U.C. Davis RC provided communications for the International Collegiate Reduced Emission Devices Rally and the Heart of Cal. Double Cent. Bicycle Tour. WA6JVD made 5BXCC. The Sacramento Hemisphere

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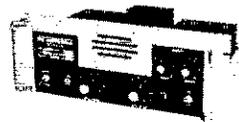
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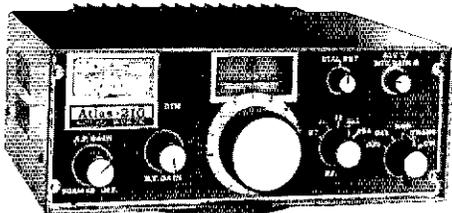
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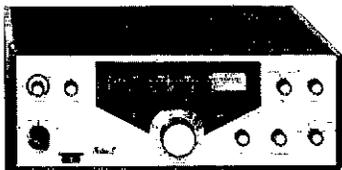
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Breakers marathon - anything for a contest! Cal. Slow Net (Novice) handled 11 msgs in May. NCN/2 still needs QNI from Santa Rosa and Redding. Traffic: W6RNL 156, WA6BYZ 114, WA6BTF 23, WB6DDL 20, WB6UPV 17, W6OAT 3, W6GGK 1.

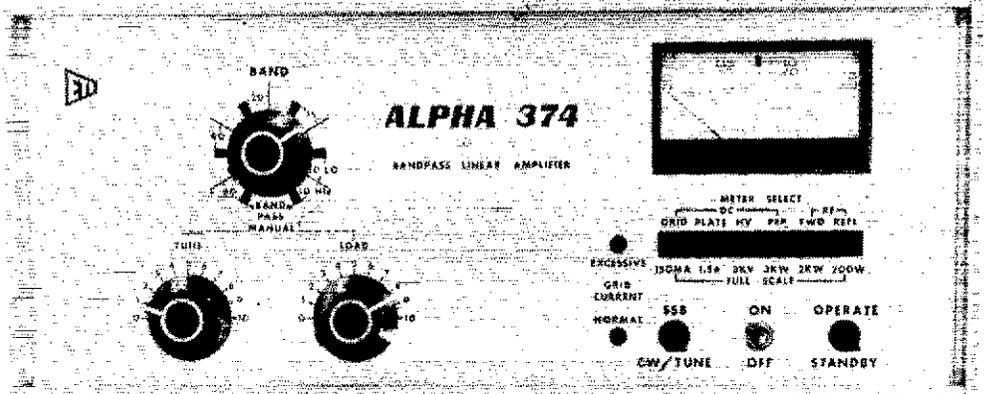
SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - It is with deep regret that I report WB6YCK as a Silent Key. He had recently passed General Class exam. W6VTH also joined the long list of Silent Keys. ODSCS, Lebanon, now located in Fresno. K6SEV has beam and tower up for 20 meters, chasing DX. W6YKS reports 6-meter activities locally are slow. WB6JNO passed General. WB6DEJ passed Advanced Class exam. WA6ONI also passed her General exam. WA6PKC and WA6SIA have Clegg FM27R also WB6KHQ. WB6RCN has a Tempo and all are on 2 meters fm. WA6EYK, K6QHC received DXCC. WA6EYK on RTTY. WB6DTF building a 6-meter Transverter. WB6DTF has a TS-520, WA7BCS/6 a HW202. WB6GTJ busy installing repeater station WR6AHS. W6DPD has a 301-1 Amplifier. 2 Meters am is not dead, the following are on 145.35: WA6FWS, W6LLE, WB6KKB, WB6QWZ, WB6NFZ, WB6EYC, K6PKO, WB6DYS, W6NRO, WA6HMB, W6SMS, W6FEE, W6EOM, WA6UUM, K6RAU passed Extra Class exam. WA6RXI putting up Quad and tower. WN6WRR now WA6WRR. WN6FVI passed General exam. Traffic: WA6RXI 40, WN6FPV 12, WA6CPP 2.

SANTA CLARA VALLEY - SCM, Jim Maxwell, W6CUF/K6AQ - SEC: WA6RXB, RMs: W6RFF, W6QNB, W6BVB, W6RSY made RPL, W6RFF made PSHR. Best wishes to WA6HAD for a speedy recovery after recent hospitalization. The long bedridden hours are made more endurable by a bedside receiver for the ham bands! NCN secy. W6QNB now an RM. Details on NCN activities available from QNB for an SASE to his Callbook QTH. All serious flea marketers will find the May, 1975 PAARAGraphs must reading. WB6JNN reports WB6LRT planning a new 440 MHz repeater. K6UQH worked W6ZMW in Fresno on 1296. Congrats to WB6EXW on passing his Advanced Class exam. The Santa Cruz County ARC will operate another novice class this fall, reports instructor K6QJZ. W6RFF heard lately working 2 meters. W6EFC, the North Peninsula Electronics Club, meets on the 2nd Fri. monthly at QTH of W6QIE. Contact Prexy WA6RII for additional details. WA6UC using an invisible antenna on the roof of his new condominium. It works! Members of all clubs are invited to attend the CCRC picnic on Angel Island Sept. 14. Active on 2M ssb mobile from SCV are WA6UAM, K6KBE, WB6INN, WB6MYC and WA6VAB. The gang can be found on 145.005 USB. K6ITL has been elected chmn. of the Regional Disaster Communications Council. Recent spell-binding speaker at SCCARA was SV1DB, pres. of the National Radio Soc. of Greece. SCCARA meets monthly 7:30 PM the 2nd Mon., at the San Jose Red Cross Bldg., pres. W6ZM, Traffic: (May) W6RSY 96a, W6BYB 261, W6RFF 185, W6BVB 76, WA6UC 67, WA6VBG 53, W6DEF 40, W6KZI 12, WA6HAD 3, W6QNB 3, WA6WEI 4. (Apr.) WA6UC 51.

## ROANOKE DIVISION

NORTH CAROLINA - SCM, Chuck Brydges, W4WXZ - SEC: K4FBG, PAM: WB4JMG, VHF PAM: K4GHR, RMs: K4MC, WB4EYF. EC of the month is long-time Durham County stalwart W4LEN so please coordinate with Lew when possible. Call-letter license plates again came up for price increase in the State Legislature as did the plates for CAP, National Guard and Officials. After house passage these bills went to the Finance Committee for review at which time our SEC, K4FBG entered the picture with a four page handout to Committee members which caused them to report unfavorably on our bill thus keeping our fee at the present level while all the other groupings passed thru. A big "thank you" to K4FBG. W4EHF now has twenty-two elements on 2 at 50 feet. WB4CES back on after equipment problems. K4AII ran phone patches for church group rebuilding church destroyed by tornado. K4BEC continues cw bulletin transmissions on 3573 between 8:30 & 9 PM. Carolinas Net (CN) Early Session on 3573 7 PM had 28 sessions with traffic total of 121. Thanks to WA4TA/4 for reports and sorry to see Lee moving to Fla. New mgr. for CNE after departure of ATA/4 is WB4OBZ of Moncks Corner, SC. NC and SC alternate mgrship of CN which is for North and South Carolina. WB4TNB heads for college and will continue OO work with RK. Special thanks to W4JG for his early warning on the recent license plate bhttle and all of us should be on the lookout for such items. The Carolinas-Virginia Repeater Assn. (CVRA) Journal is packed with good info so if you are not a member contact W4IZI and get on their list. Traffic: (May) W4OFO 109, K4FTB 87, K4MC 78, W4WXZ 61, WB4OXT 45, K4FBG 42, WB4FFX 41, WB4KHZ 38, WA4EFZ 30, WB4MXG 26, K4FZH 18, WA4HWT 13, WA4MUW 12, W4EHF 11, K4AII 10, K4DJ 6, W4FMN 4, WB4CES 3. (Apr.) K4EZH 27, W4ACY 26.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, Jr., W4THV, SEC: WA4YLL, Asst. SEC: WA4PBG, RMs: W4SHJ, K4IAE, WB2VYK/4, WA4AVN, WA4DHY, PAM: WA9NEW/4. Regret to report that XYL of WA4PBG suffered a heart attack but is recuperating. WB4GMC back from paying job to assist poverty in Va. W4MK has chronic noise problem. K4EZI had an excellent time at FCC dinner in Spring Valley, N.Y. W4YZC got No. 1 VN certificate as first with 100 points! Work in interfering with WA4HUB. New TR4C at W5VZ/4. WA4JF got his BS (E) at UVA and is reporting to work with FCC July. I look for WA4DUX at K17A/2 for a year. W4UQ giving up Sun. night TCC sted after 12 years. W4THV changing from open wire center fed to double bazooka. W4TZC passed Advanced; WB4YXN got his Extra. W4KX too busy filling out FCC license renewal forms. WA9NEW/4 reports good local PR coverage from ham radio. Medical license exams preempting activity at WB4DRB. HF antenna up again at WB4RDV. WA4YU been sick - OK now. Nets: VSN QNI 381, QTC 129; VSNB 1089/538; VEN (Apr.) 661/31; CV2FMN 628/39; CV6MM 86/0; Va PON 52/12. CV2FMN meeting at 0030Z for summer



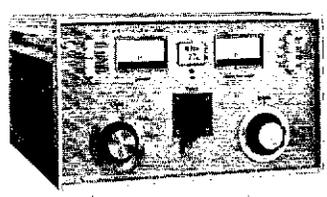
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months. K4MSG putting a 4CX250 on 2. Congratulations to Eastern Monticome College ARC on ARRL affiliation. Welcome to WB6SRS/4 in Vienna. W1KGR now WALPZ in Arlington. W4UJ back from three weeks in Europe. Manassas Hamfest had a fine turnout; let's hope they make it an annual affair (Ole Va. Hams)! Also heard from WA4U. HRRR Vienna Wireless Society, LARC. Va. Beach/Norfolk AREC. BPLs: WA4AVN, K4KDI; Apr. BPL: WB4DZL Traffic: (May) WA4AVN 596, WA4VEW 424, K4KDI 138, WA4UJ 274, K4KNP 243, K4GR 195, WA4QDY 176, WA4CLK 135, WB4YKM 112, WA9NEW/4 104, WB4KET 93, W5VZ0/4 80, K4JM 77, WA45MR 73, WA4YZC 48, W4FEK 47, WB4DZL 45, WB4YNX 43, WA4EPJ 40, WB4JMD/4 39, K4KA 32, W4SUS 29, WB4FDT 27, WA4PBG 27, WA4DOX 24, W4THV 22, WA4HUB 20, W4TZO 20, WA4YIU 19, W4DM 13, WA4AJF 8, W4LGM 8, W4MK 7, WB4DRB 3, WB4GMC 3, K4EZL 2, WA4WQ 2, WB4RDV 1. (Apr.) WA4QDY 162, WB4DZL 122, WA4YIU 12.

WEST VIRGINIA — Acting SCM, Kay Anderson, W8DUV SEC: WA8NDY. PAM: W8DUW. RM: W8HZA. Phone Net Mgr.: W88DQX. WV mourns the passing of K8KRW of Grafton, W88PAV moved to Vienna, Ohio — our loss, their gain. W88NFZ trying to contact Chile for exchange student in Huntington. W88DSE, math professor at WVU, recently designed 1930's type wooden rack for his station (interesting picture!) W88KJ active with VHF contacts and monitoring. He hopes to organize a weather watch net soon. Three WV stations obtained special ITU call signs: W8BT, W8NR and K8LOU worked as W8VITU, K8VITU and W8ZITU, respectively. WV Fone Net had 712 stations and 126 messages; WVN (wv) delayed due to RM W8HZA going on vacation. W8NN: QNI 95, QTC 25. Mid-day net still growing with 536 stations handling 109 messages. TARA (Huntington) Hamfest big success June 1. Bluefield planning annual picnic at City Park Aug. 24. New appointments: W8LGT OQ; W8BOJ, W8RLE ORSs. Traffic: W88JW 107, W88DQX 74, W8SOO 64, W8HZA 57, W88PAV 44, W8EUE 32, W8IWX 30, K8QEW 16, W8FZP 15, W8DUV 12, K8ZDY 10, W88CPU 5, W8CKX 4, W88NFZ 4, W88DSE 1.

### ROCKY MOUNTAIN DIVISION

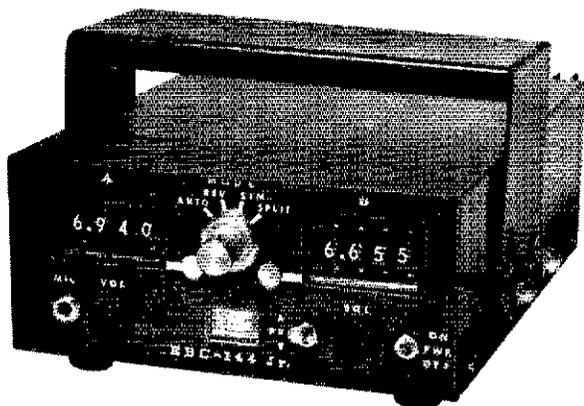
COLORADO — SCM, Clyde O. Peaney, WA6HLO — SEC: K8FLO. RM: W8GHK. PAMA: K8CNU. WA6YGO. Newly elected officers of the Mile Hi DX Assn. for 1975-76 are: K8PVI, pres.; W80IWL, vice-pres.; W80CGJ, secy-treas. The club has 18 members and is a 100% ARRL Member club. T.C. freq. change to 3715 has met with great success. Latest additions to the net are W8QWU, W8QMDI and W8QNZW, and total net check-ins have tripled in the month of May alone. W8HRS/0 now has an ICOM 22A on two meters mobile. K8SPR received a Transcontinental Net Certificate in May. WA9KZV worked a VK5 station barefoot on 20 meters phone, and says it's the best DX ever for him. Net Tfc. for May: Columbine QNI 1142, QTC 71, informals 238, 27 sessions, 1365 minutes. CCM QNI 177, QTC 117, 31 sessions. Hi-noon QNI 613, QTC 18, informals 110, 30 sessions, 907 minutes. SSN QNI 77, QTC 41, informals 23, 23 sessions, 330 minutes. (Apr. QNI 83, QTC 52, informals 4, 23 sessions, 315 min.). Traffic: (May) W8WYX 1467, K9ZSO 904, W8QIBS 358, W8WHK 251, W8HXB 134, W8HRS/0 101, W8ETT 92, W8OLU 36, K8SPR 34, WA6YNO 31, W8SIN 27, W8BIZO 25, K8TIV 25, WA6TMA 12, K8PVI 11, W8PT 9, WA6YED 7. (Apr.) WA6TMA 13.

NEW MEXICO — SCM, Edward Hart, Jr., W5RE — Asst. SCM: Joe J. Knight, W5PDY. SEC: W5ALR. RMs: W5UH, K5KPS. PAMA: W5DMG, W5PNY. Southwest Net meets 3585 kHz daily at 7:15 PM MDT. Reports for May QNI of 180, QTC 117. K5KPS reports the net has fallen on hard times due to bad conditions and consequent low activity. Any of you reading this is urged to report in, as net is run at as slow a speed as the slowest station reporting. W8HRS/0 reports traffic of 101 and expects to be back at Ute Park soon with 2M capabilities. W8KSS was off the net most of June for surgery in Washington, D.C. on a bad shoulder. You may hear him from K4C10. New Mex. Road Runner Net on 3940 daily at 8:00 PM MDT. Traffic: K5MAT 147, W8KSS 124, K5KPS 121, W5ENI 97, W5PDY 49, W5RE 48, WA5OHI 12, W5YQ 6, W5QNR 5, WA5MIY 3.

UTAH — SCM, Ervin N. Greene, W7UE — Summer activities have been full swing throughout the area with Utah amateurs again supplying communications for the Friendship Cruise. Those assisting were WA7UUI, K7HFV, WA7QKF, WA7SYU, K7CVB, WA7TID, W7HBL, W7VEO, WA7WQ, WA7SYV, WA7ZRG and WA7OJS/7. Field Day this year under the chairmanship of K7HFV for UARG successful despite late spring snow melt at higher elevations. The novice class was well attended under the direction of WA7WQ. W7BE is back from a nice mobile vacation to Mont. He kept in touch with home base via BUN for his mobile. The new Snowbird repeater will be known as the Hidden Peak repeater. Also a 450 MHz repeater at the same site offers extended coverage on that band. Utah Hamfest a great success with many activities drew from all parts of the state. W7QDY reports Field Day activity from the northern part of the state. WN7AYK and WMEL sporting new EPM-300 rigs and K7ZVT with a new Atlas 215. Traffic: K7HLR 129, WA7MEL 97, W7OAU 56, WA7TSB 35, W7OXC 17, W7EU 4, W7UTM 4, WA7GWU 2.

WYOMING — SCM, Joe Ernst, W7VB — The Sweetwater ARC met in Rock Springs, elected officers, meetings are 1st & 3rd Thur. each month at the Mt. Fuel Bldg, pres. K7ORA. The club working on a 2-meter repeater for area. WA7LIK moved to Mont. WN7BIF a new ham in Thermopolis on two meters. WA7WGF has good signal on 3920. WA7NHP returned after touring Eastern States in Motorhome, will be calling Sun. morning net from around the State. The Annual Wyo. Hamfest, spearheaded by W7RNI held at Meadowlark Ski Lodge in Big Horn Mountains, July 19 and 20. The Casper Club helped with registration. The Fremont Co. Club tickets K7VWA Women's events, schedule and reservations. W7VB pub. PA system and equip. Quite a number will be attending the WIMU

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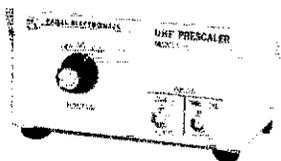
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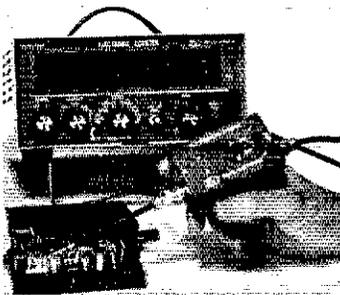
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Hamfest Aug. 1, 2, & 3 at Mac's Inn near West Yellowstone. Traffic: W7TZK 78, K7VWA 40.

## SOUTHEASTERN DIVISION

**ALABAMA** - SCM, Jim Brashear, WB4EKJ - Congrats to WB4UKU graduating Huntsville HS tops in a class of 500; WA4BDW receiving an "Excellence in Journalism" award from Troy State Univ; W4WYP recipient of the Ala. Naval Reservist of the Year award, was cited by Gov. Wallace for his ham radio public service work. WB4SVH reports UA ARC WB4LDG on the air. After 5 years of ham radio, K4VF finally received necessary cards for WA5. Missed an eye-ball with K4UMD, W4UQH and W4WLG. WB4FZC and WN4LKI rig problems. Officers of Huntsville ARC are K4RHC pres.; K4OWV, vice-pres.; WA4LAF, secy-treas; K4BY, asst secy-treas. W4HFU resigned as RM. Welcome new hams: W44 MJB, MLC, MLK, MNB, MNE, MNE, MQL, MQN, MQU, MWV, NBM, NFY, NIT, OQY, QOZ, QVA, KCB, RJK, RND, RSZ, WB4 MJD, NFZ, NGA, NJK, NIZ, RNW, WN4s MHY, MHZ, MIA, MID, MIF, MIX, MIV, MKA, MKB, MLN, MLO, MNS, MRE, MRG, MRF, MRQ, MTC, MVV, MWD, MWF, MXE, MXT, MXW, MYU, MZO, MZW, MZY, NAT, NBQ, NCB, NCS, NDE, NEV, NFD, NGT, NGY, NHO, NKB, NKS, NKI, NLL, NLM, NLN, NMR, OJY, OJZ, OJW, QKC, QKG, QKH, QLH, REA, RHD, RIR, RZK, RMP, RMR, RND, RQK, ROY, RSB, RTK. Don't forget the North Ala. Hamfest Decatur in Aug. Appointed W4UAR and WB4FZO OBSs. W4UAR OVS. Traffic: (May) WB4EKJ 143, K4AOZ 124, WB4KSL 54, WN4JDH 41, WB4FZO 38, K4LY 5, WB4SVH 20, WB4TVY 18, K4VF 16, K4UMD 15, WA4AJA 13, WALNN 2, K4UCU 5, WA4BDW 7, WB4FJP 5, WB4ZQF 5. (Apr.) WALNN 83, WN4LKI 23.

**CANAL ZONE** - SCM, Roderick J. Isler, KZ5PI - Final plans were discussed at recent CZARA meeting for Field Day. A large Canal Zone turnout expected for Field Day and again the call KZ5FD was used. KZ5FI discussed working Oscar from the Canal Zone and reports increased activity with contacts all over the world. A new Canal Zone 75-Meter Net was established for Sun. evenings at 7:30 on 3800 kHz. We had a good turnout for this net the first night and hope we have more participation in the future. The Net is run by KZ5WA was designed for Canal Zone hams to get together once a week to keep abreast of activities within the Canal Zone.

**GEORGIA** - SCM, A.H. Stakely, K4WC - Thanks to K4IJO for good job as SCM. K4KZP new SEC. WA4AJY advises NE Ge. Emerg. Net now meets 1830Z on 3.975 (note freq. change). W4BIT, W4EJU, W4ORI, WA4AJY, WA4DCL, WA4EPK, WB4GFE, WB4KCD, K4JAO, K4OSW, K4VCB, K4WC, K4YGI and K4YVI helped with Conyers' America Day Parade in spite of heavy thunderstorm. W4KCD, WA4AKU, WA4EPK helped show for Scouts ham radio in ARC trailer at Scout reservation south of Covington. Confederate Signal Corps fixing up a new trailer. WB4GFI, WA4BZY, WB4DYQ are pres. w/ep and secy-treas. of Alford Memorial KC and responsible for keeping Stone Mtn's "Miss Calabash" happy. K4FLR makes PSHR. W4JM enjoyed newly acquired amplifier on Fla. vacation. Radiograms really work - sent SCM one on first of each month. Traffic: K4FLR 45, WA4LLI 33, K4WC 7, W4JM 4.

**NORTHERN FLORIDA** - SCM, Frank M. Butler, Jr., W4RKH - SEC: WA4WHM, RM: WA4FBI, PAM/75: WB4VDM. My appreciation to W4IKB, WB4DXN, WA4LZM for FB job. K4IKY and K4RKH new ECs of Jefferson and Dixie Co's. WB4JHO OOV. WB4DVM OPS. The EH White HS ARC and N. Fla. DX Assn. affiliated with ARRL. SNCs for NEFN earned by WA4CLY, K4HJC, WB4MLV and W4VNM; also K4DDY & WB4UJPI for EAST NEF. W4SIZ elected "Gator of the Month" on G.M. WB4NIP new on asst. WB4BSZ worked 20 states in 6m SMIRK contest. WB4PGQ, W4WNY, W4RKH and other Ft. Walton area hams busy handling traffic to Edin Vietnamese refugee camp. Gainesville ARS picnic had 80 people attending. Gainesville/Ocala repeaters have reciprocity membership agreement. WB4RKH helped catch a purse-snatcher via 2m FM. North Fla. DX Assn. scored high in several ARRL and CO contests. NOFARS Novice Class had 10 graduates. WA4HOL won scholarship to Ga. Tech. WB4HKP & WB4GHU operating K4BV a shopping center traffic display. W4MB appointed to WARC freq. allocation committee. Officers: DBRA: K4TIN, K4IMG, WA4MO & W4PLO. WB4BMZ has 51J-3 and Parks 6m converter. W4ZYV: now K4DZ, W4MJJ, WB4LTF, WA4GGE, K4V6V and WA4V7. provided comm. for Bike-a-Thon. K4YPN a Silent Key. NM W45H reports North Fla. well represented on 4RN. Traffic: WB4GHU 428, WB4HKP/4 293, WA4FBI 254, WB4JHO 125, W4COE 120, W7EM/4 112, WB4DXN 109, W4LDM 98, W4RKH 98, W4SJR 79, K4BV 60, K4VND 60, W4KIX 56, K4CVO 41, WB4NJI 39, WB4DAD 30, WA1QAH/4 25, WA4BAX 24, K4DDY 24, WB4VDM 17, WB4ADL 10, WB4NH 9, WA4EYU 8, K4RNS 7, WA4CRI 6, K4FLV 6, WB4VAP 6, WB4RMZ 3.

**SOUTHERN FLORIDA** - SCM, Woodrow Huddleston, K4SC - SEC: W4YIT. Asst. SEC: W4SMK. RMs: K4EBE, W4EF, WA4GBC, PAMs: WA4NBE, W4OGX. New appointment this month: WB4KSG/4 ORS/OPS. OOs reporting: K4DAS, K4JTP, W4MML, K4QG, WA4UVG. OVS reporting: None. K4DAS has new Triton II transceiver. WB4ZSO now active on RTTY. WA4QL deserves a "Well Done" for working up a schedule to ensure Miami area is represented every day on each of the 8 section-level nets. We need more of this for each community. K4QG sporting a new Aiph 77 linear. WN4JWN reports Early Bird Net, 3715 kHz going great! 1000 GMT daily. The St. Petersburg hamfest May 4 had 800 in attendance with prizes for nearly everyone, including two Regency 2-meter transceivers. Prizes included many donations from local business firms, thanks to the hard work of WB4VWC. WA4CTM reports considerable 6-meter am RTTY activity in St. Petersburg area, with a net meeting on 50.325 at least once a week. K4KIK is sponsoring a 2-meter fm repeater for RTTY, hoping to be on the air soon. WA4GCH expects to have his new 6-meter repeater

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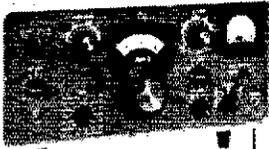
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WR4ANA on the air soon on 52.55 input, 53.55 output. WAAPV has received a new VHF Engineering 230 MHz Repeater which he expects to put on the air soon for Tampa Bay Repeater Assn. on 223.34/224.94. Traffic: (May) K4SJI 38S, K4SCL 343, K4A1Z 181, WB4WYX 148, WB4KSG/4 140, WN4JWN 109, WA1RA 105, WA4IWH 101, W4EH 86, K4TH 79, W4WYR 78, W4BM 77, WB4AID 75, WB4TRI 70, W4DVO 68, W4DGS 60, W4DGN 47, K4CFV 32, WA4UQQ 26, K4BLM 24, W4IYT 24, K4QG 24, WA4KKE 20, WB4ALH 14, W4AELC 14, WA4LWL 9, W4SMK 9, W4NTE 8, WB4TFP 6, W4GOG 5, K4DAS 2. (Apr.) WB4ZSO 58, WB4BNH 11, K4GFW 1.

### SOUTHWESTERN DIVISION

ARIZONA - SCM, Marshall Lincoln, W7DQS - RM: K7NHL. PAMs: WA7KQE, W7UQQ, WA7JCK resigned as mgr. of the Ariz. Traffic and Emergency Net, and WA7KQE has been appointed to the job, which carries with it appointment as PAM. W7HTQ is the new mgr. of the North American SSB Net. The Prescott Amateur Radio Assn. now affiliated with ARRL, K7JWB and WA7NXX have been leading members of the Ariz. ARC installing radio equipment in Phoenix Red Cross vans. Tucson Repeater Assn. members assisting the Tucson Jaycees with communications at the National Circle Track Championships were K7KNP, W7CEN, WA7RKL, K7P01, WA7DRO, W7HSG, W7GMR and K7LW. The Ariz. Repeater Assn. has been chosen to handle all communications coordinating the Fiesta Bowl parade and football game in Dec. In charge are WA7QJO, WA7GEP, K7YDI and K7VOR. Nets: Cactus Net QNI 1315, QTC 394; ATEN QNI 643, QTC 46, certificates to WA7VTM, WA7JCK, K7NTG, K7NMQ, K7GLA and WA7KQE. Traffic: K7NHL 142, K7NTG 99, W7UQQ 69, K7CC 58, WA7EXL 35, WA7VTM 29, W7DQS 17, WA7JCK 16, K7GLA 11, WB2WPF/7 10, WA7YKM 9, WA7KQE 8, K7NMQ 3.

LOS ANGELES - SCM, Eugene H. Violino, W6INH - RMs: WB6OYN & K6UYK. Another great year for our section's big event, The Lockheed Hamfest. The FCC was present on Sat. and 17 people took their FCC test and believe it or not 14 of them passed. This was a two day affair with plenty of prizes, approx 1800 attended some for two days. W6CL, W6PHE hosted the OCWA booth in their efficient way. Never found out who won the QLF contest but there were sure a lot of contesters, just plenty of fun. As usual that hard working United RC of San Pedro group were giving away printed circuit boards, thanks gang. The SOWP had their luncheon at Brotherhoods in Pasadena with one of the largest attendance of recent years. Thanks to W6VH and his chairmanship we had a total of 98 members and their XYs present. For the DXers, the So. Calif. DX Club sends information bulletins each Wed. at 8 PM on 13263 MHz and WR6AAC 146.377/146.97 MHz. Sorry to hear WA6ADL is a Silent Key, he will be missed very much by the local hams especially the St. Charis RC. WB6YD reports of having helped save the crew of disabled sailing ship the "Lucayo" with a crew of three one of which was a woman who was very ill. By using ham radio with the vessel he was able to establish contact with a tanker who in turn picked up the survivors. This was done with the aid of the Long Beach Coast Guard, thanks to Ron except for the sailing vessel everything ended in good stead. Another station which helped was W6MAB. WB6JFD has been very active lately on 75- and 40-meter mobile using Swan 350. K6VCL reports he had a good trip to SM-Land and had many eye hells with the local hams, says was unable to even hear the Wes all the time he was there. WA6TCH was seen at the Henry Radio booth at the LERC hamfest also gave a talk and demonstration at the local clubs. WB6OYN, WA6TLV, WB6ZVC spent the week end at Tree's mountain cabin after a recent SCN meeting at his FB retreat. K6UYK back on SCN after spending three weeks cruising around Wash, DC, NJ and Penna. The Ramona RC had a nice turn out May 3 for the City's emergency drill, those present were AS6CTE, W6MLZ, W6RHUZ, W6BNGC, WA6NRB, WB6ATV, W6MLC and WB6SQN. W6RIG was responsible for planning of the recent TRW RC Swapmeet, a very successful operation. Traffic: WB6VAC 204, W6INH 196, W6HLU 91, WA6TLV 70, W6QAE 49, K6UYK 35, W6GEO 25, W6WFO 21, WA6BCO 20, WA6LDN 18, WA6TCH 14, WB6YD 12, W6USY 10, WA6ZRI 5, W6VLC 4, WB6JFD 3, W6NK 3.

ORANGE - SCM, William L. Weise, W6CPB - Asst. SCM: Dick Birbeck, K6CID. SEC: WA6TVA. RM/PAM: WB6AKR. Your SCM off on a well deserved vacation so this month's column is written by your SEC. OBS WB6AM celebrated 50 years as a licensed amateur on June 30 and 50 years a league member in Aug. Shelley has held an ARRL appointment for about 40 years - quite a record! Congrats, and keep up the good work. W6CPB has passed his Advanced and looking at that Extra. Congrats! WA6ZY is pedestrian motion for on W6ACI with a new band: talkie. WA6YWS: EC Inyo County off for a week vacation touring Canada and Alaska with an old friend who is with the FCC in Detroit. Bill will return to set up his new station at a new QTH in Independence. W6TN filling in for him while gone. WN6LFF passed the Advanced Class exam. WA6TVA has his new Altair 8800 computer up and on the air as an RTTY self-call, non overline (both TX and RX) and selectable diddle generator. WB6GWT in Yucaipa and WA6NAG in Westminster have both enjoyed "rolling dice" over the air on RTTY with Steve's computer. W6DMS back on the air at new QTH in Yorba Linda. W6MN, expects to be back in operation from Fullerton on SCN after finishing up work on a new patent. By the time you read this, the RTTY repeater (WR6ACA 146.10n/70out) should be back on the air. Traffic: WB6AKR 206, K6GMI 154, WB6VTK 63, W6WRJ 49, WA6TVA 40, K6LJA 30, W6CPB 21, K6GGS 10, K6UZ 4, W6BUK 1.

SAN DIEGO - SCM/SEC, Cy E. Hvarar, Jr., W6GRF - New appointee as OVS is WA6MHZ. Thanks to W6GFB, W6INI, WB6PVH for representing the Section at SCN meeting in Forest Falls. Congrats to W6LRU on his retirement. Don was RM of RN6 for six years and it will be difficult to find a successor. WB6MNT West Coast VHF/UHF conference coordinator reports 200 amateur

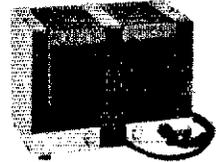
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turn out with outstanding Technical talks. Kudos to top scorers DX phone contest are W6ONV, K6SDR, K6UA and W6MAR who also is on DX Committee. Over 400 amateurs and families turned out for the first of many we hope get-togethers. Sponsored by SDCARConnell and affiliated clubs. Big thanks to Paul Hower and congrats to K6BWT receiving Appreciation Award. Everyone write your Congressman, request support and fast action on new RFI bill HR-7052. Let it be known that RFI problems must be solved now. Six mtr. beacon at SMOG on 50.14 MHz for propagation predictions call us WA6MHZ, WB6DQY promoted to Ev and new duty station USS Onskany. WB6IHF, WB6SSP, WB6SLW now Advanced. WN6CUG passed General; Novices are WN6KAR and WN6KLM. K6JFP now WSTPP; W3PWB is W6SCL and K5KHG is W6SCD welcome to the Section. W6SK and W6HCD recouping after serious illness. WA6WZU moving to Lone Pine. Thanks to all who handled refugee t/c. PSHR: WB6PVH. Traffic: WB6PVH 23, W6BGF 17R, WA6EY 42, W6PZU 40, W6GBF 36, WB6ERF 4, WA6IHK 4.

**SANTA BARBARA** — SCM, D. Paul Gagnon, WA6DEI — SEC: WB6HJV. PAM: K6YX. RM: K6QPH. Write your Congressman supporting bill HR 7052 requiring filters on home entertainment devices. W6POU hosted a reception for K7CBZ (ex-KU1DX, MS3DR, etc) in Santa Barbara. Bob also assisted a ship in trouble and called the coast guard. New officers of the Estero ARC in Morro Bay are K6TOF, pres.; W6IT, vice-pres.; W6ECC, secy. WA6DEI spoke at the Estero Club on Docket 20282. WA6IHK showed slides from Antarctica at the Ventura County Club. WA6WYD handled 92 usgs on MARS. CP5FZ is departing Ventura to return to Bolivia. K6CFJ is teaching another Novice class for the MAKRAC in Camarillo. New Hams include WN6LGI, WN6LBS, WN6LPY, WN6LPV, WN6KYW. WN6IGH passed his General and WN6JKM passed his Advanced Class exam. Plan on attending the Division Convention in Ventura on Oct. 24-26. Remember, items for this column come from your reports. PSHR: WA6LBO 42, WA6DEI 39, W6POU 21. K6TOD passed his Advanced and bought a TS-520. W6POU is new pres. of Santa Barbara ARC. Traffic: WA6LBO 101, WA6VBS 54, WA6DEI 44, W6POU 16.

### WEST GULF DIVISION

**NORTHERN TEXAS** — SCM L. E. Harrison, W5LR — Asst. SCM: Frank E. Sewell, W5IZU. SEC: W5SHN. RM: W5QU. PAM: W5GSN. Irving ARC meets 2nd & Jefferson Central Fire Sta. WASPCF. pres.: WASTHB, vice-pres. Ed Victoria PK 13/73 active. Records show 15 open & 3 closed rpters Grt Dal/FTW area including 1 in Mineral Wells. RWK spring auction complete. Temple ARC pres. W5HDO says FCC license fees reduced to \$4.00. Big ARC meets 3rd Fri. monthly UTA campus. K5TIB pres. plus VP K5VYL accepting donations of Old Cops, QSTs, antique radios, etc., call 282-0984. WASKHE returns to Engco comm. fold. New net Dir. as is new Repeater Directory now out. Comm. Advisory Committee rep our area is W5RUB. Eastex State, Commerce has new affiliated Club, pres. WBSMAJ. Dallas ARC QSO party completed. Dallas RS submitted special rpt covering docket 20282 along with several other members. WASKU working on 2 & 6 mtr appt (ie OVS) will qualify. Worked much DX plus t/c. W4UMF Sec ARRL RFI committee prepared HR-7052 for introduction into House by Hon. C. A. Vanik (Ohio). W5SHN clearing deadwood from EC files. Temple club moves to new meeting place (Parks & Wildlife Bldg.). SCM moving out of Dallas after 50 years of residence therein. New QTH 49 Loa Robles Drive, Arlington, TX 76011. K5WIQ reports opening on May 11. Panhandle ARC Amarillo last rpt Mtg Aug. 23/24 grand prize choice of Swan MB-40/80 or Icom IC22A. Jogg Electronics providing eqpt. ARRL opposes dual ladder license as presented by FCC. Member survey shows such result. West Gulf received 56,000 responses from our membership. I'm sure our Dir. was well pleased. WBSGZL Advanced Class, age 16 Pampa TX inquired regarding teenage nets including Jingo Valley net plus the 20 YL system. WNSLAT reports on Novice Class in Graham TX. Traffic: (May) WSTI 240, WBSMFO 179, W5DXB 115, W5MTN 108, W5SHN 104, W5GSN 51, W5GY 22, W5YK 6, W5LR 5, W5HY 2. (Apr.) W5SHN 104, W5BFEN 80, W5GY 11.

**OKLAHOMA** — SCM, Cecil C. Cash, W5PML — Quite a number of Public Service certificates were issued from the Communications Department, in Altus, Duncan, Lawton, Marlow for service rendered during the Feb. 72nd storms. I'll not try to name them all for fear I might miss someone but congratulations to all. The Muskogee 25/85 repeater stands all storm watches and aids in the testing of the Civil Defense sirens each month as reported by the Muskogee County EC. W5JJ spending most of his time on the air rendering public service to the military men in the Canal Zone, running phone patches for them on 20 meters. Congratulations to new General Class WBSKGP also to new Advanced WBSKRD. WBSKRD left this week for vacation in Spain, of all things, said he was going to spend the eight and one half weeks there going to school at the Univ. of Madrid then return to O.U. next semester. Fred says the Norman 28/88 machine is up and going fine. Congratulations to K5HXK new EC of Canadian county. Traffic: W5RB 213, WNSKNK 113, WNSNKC 51, WBSAZS 40, WNSKRD 40, W5SELG 39, WBSHQX 36, W5SLG 27, W5FLR 18, W5CSB 8, W5WF 5, W5ASOU 5, W5PML 5, W5HLR 4, WBSKGP 4, WBSQR 1.

**SOUTHERN TEXAS** — SCM, Arthur R. Ross, W5KR — SEC: W5SCUR. PAM: W5SAMN. RM: W5UGL. QSO reporting this month: W5RB, W5LTO, W5NGW, W5ZBN, OVS reporting by W5SCIT. OO/ORS WASZBN reports he and WASRON, WBSHRL on 220 MHz with converted URC-11 walkie-talkies. FCW5TFW reports 220 MHz activity increasing, with WBSDDW latest to get on the band. OPS WBSHJV says enjoying 2 meters. WBSLHY has new 58-401 and is working on antenna systems. OVS WBSCT running 20-meter RTTY and 449.0/444.9 MHz fm; only one hand opening in May. This is a short report. All hands had better start putting reports in mail on first of month. SCM mailing deadline is 7th of month. Mail service in this part of world is peculiar, to say the least. Get reports in mail early so that the idiosyncracies of the Postal

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See July "Electronic Electronics" page 92

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Service don't hurt so much. Traffic: (May) WSUIJ 300, W5TOP 252, WSUGL 212, K5HZR 209, W5VBM 203, W5KLV 181, W5ZBN 100, W5SAMN 85, W5BGE 40, W5AYEA 36, K5ROZ 26, W5IJR 19, W5TFW 11, W5RBB 10, W5SHVJ 5. (Apr.) W5RBB 32, W5AYEA 27, W5SHRI 8, W5SHVJ 6.

## CANADIAN DIVISION

**BRITISH COLUMBIA** - SCM, H.E. Savage, VE7FB - The next three reports will be from our Route Manager, VE7QO. VE7FB is off across Canada as is our Asst. Director, VE7LL and OO VE7TT; also others all away to see Canada's East. East Kootenay ARC's new officers are VE7BWY, pres.; VE7AIT, vice-pres.; VE7ADI, secy. Their annual Bowling Banquet was again a success with a large turn out. The ICFMwC Assn., VE7RPT and VE7RAG new station is progressing to completion. If your interest is in 2 meters join and receive the benefits. "Static" Nanaimo ARC's paper is rich in news. Traffic: VE7ZK 157, VE7CDF 76.

**MANITOBA** - SCM, Steve Fink, VE4FO - The summer Joldrums have again set in. Hopefully you are enjoying the season. MTN is observing a summer schedule until Sept. 1 and meets only three times a week. VE4IX has been issued a MTN certificate. Please note that the new traffic count categories are now in effect. You may claim one extra point for originating a message from a third party. The new WARC exec. for 1975-76 is: VE4EW, pres.; VE4DB, vice-pres.; VE4YM, treas.; VE4DS, secy.; VE4RV, past pres. MTN: 29 sessions, 136 QN1, 52 QTC, MEPN: 31 sessions, 875 QN1, 9 QTC. Traffic: (May) VE4FG 39, VE4IX 25, VE4FO 11, VE4JA 10, VE4XP 10, VE4OW 8, VE4GJ 7, VE4VJ 5, VE4NE 3, VE4CR 2, VE4FK 2, VE4IR 2, VE4XN 2. (Apr.) VE4TY 38.

**MARITIME** - SCM, W.D. Jones, VE1AMR - SEC: VE1SH. The 2-meter repeater at CFB Summerside (VE1CFR) held its official opening of June 1, at a time of writing the frequency is 146.22/146.82 but a change in frequency is planned. The new executive of the ARL of PEI is VE1ADV, pres.; VE1UO, vice-pres.; VE1BCM, secy.-treas. Traffic: (May) VE1AR 82, VE1ZH 70, VE1ST 47, VE1AA 44, VE1AM 21, VO1GW 13, VE1AMN 9, VE1AU 4, VE1BCB 4, VE1FAM 1. (Apr.) VE1ZH 63.

**ONTARIO** - SCM, Holland H. Shepherd, VE3DV - VE3HJA, 17 year old Brampton high-schooler will have no trouble remembering the effective date of issue of his ORS: May 28, the same date a fellow student ran amok killed a teacher and a student injured 14 others then turned the gun on himself. A terrible traumatic experience. Congratulations to VE3EIM on receiving his DXCC. VE3UD, ex-SCM Ont. 'way back in 1929, has recently retired from the so-called work force headed up FD for OARC; also looking after the technical program for the RSO Convention being held in Ottawa in Oct. of this year. VE3BCQ is getting married again - best wishes George. VE3IX recently celebrated his 54th wedding anniversary. VE3DV is on extended sick leave due to a faulty heart and is getting his exercise by putting around the garden. VE2MS, Can. Div. Director, was made an Honorary Life Member of the Niagara Peninsula ARC for past duties in the club and his work on behalf of Canadian amateurs through his executive office in the ARL. The Ont. traffic handlers fraternity is invited to attend a picnic on Sat. Sept. 6 at Niagara-on-the-Lake. For additional information contact VE3DVE. The members of the SARC are to be congratulated for organizing a fine display of amateur radio at the Scarborough Town Centre in May. SARC members: VE2FRZ, VE3HFX and VE3HX are to be congratulated for their super effort in preparing 27 candidates for their DOT amateur license. Metro ARC is proud of their group who prepared 60 candidates for DOT exams and so are we. Traffic: VE3GL 331, VE3SB 202, VE3HJA 192, VE3FQZ 151, VE3FRG 145, VE3GJ 116, VE3DPO 96, VE3EHF 89, VE3GFN 83, VE2AWE 76, VE3GT 52, VE3DVE 42, VE3EKC 38, VE3CYR 37, VE3EWD 27, VE3AIR 23, VE3GCE 12, VE3BZB 7, VE3FHQ 7, VE3GEG 7.

**QUEBEC** - SCM, Larry Dobby, VE2YU - All local Montreal Clubs were busy preparing for Field Day. More emphasis was placed on cw due to the added points called up in FD rules. Montreal and surrounding areas were well represented at the Rochester Hamfest in May. Spies from the Montreal Hamfest group were seen taking notes. The Montreal Hamfest is scheduled for early Aug. in Ste Anne de Bellevue. VE2JH and his colleagues at RASO are busy in preparation for the Olympics in 1976. VE2DRC is looking after the traffic aspect of this work. The Seaway Valley ARC and surrounding clubs sponsored a picnic early in June. The VE2RM frequency change went off well and only a few were lost in the shuffle. VE2MRC, a new repeater atop the CBC building in Montreal was activated at the end of June. It is operated by VE2ALH. I was informed by VE2OJ that the end of June '75 marked 22 years of service on traffic nets from VE2. Jim is moving out to the west coast and his regular and reliable attendance on the nets will be sorely missed. His many friends in VE2 and west him and his wife every success and happiness in their new QTH. Traffic: (May) VE2AP 22, VE2ALH 98, VE2DRC 87, VE2EC 35, VE2BP 31, VE2APT 22, VE2DEA 5. (Apr.) VE2ALH 99, VE2BP 37, VE2EC 36.

**SASKATCHEWAN** - SCM, P.A. Crosthwaite, VE5RP - Now that summer has finally made it to Sask. changes have been made by some amateurs to their antenna structures. The two meter skip was at its peak and VF5SO made a couple of VE3 contacts. I hope all those who participated in Field Day had many good contacts and enjoyed the week end. We expect to have some more interest added to the Sask Phone Net this fall so tune in to the Net and participate. Traffic: VE5DN 16, VE5RP 2, VE5JT 8, VE5FT 4, VE5EX 4, VE5MP 4, VE5QL 2, VE5RE 2, VE5NJ 1, VE5SM 1.

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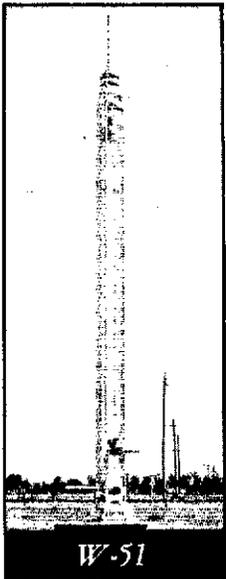
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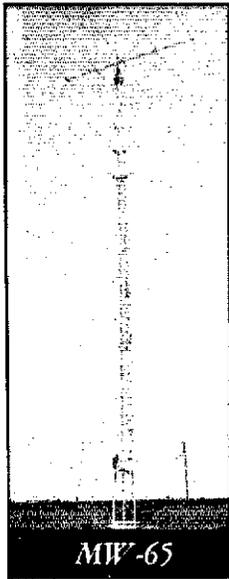
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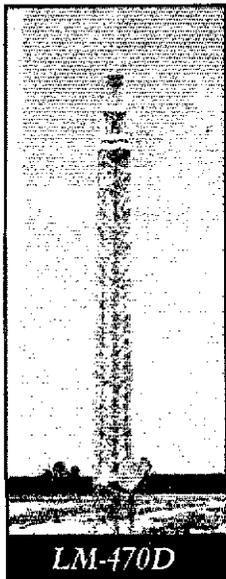
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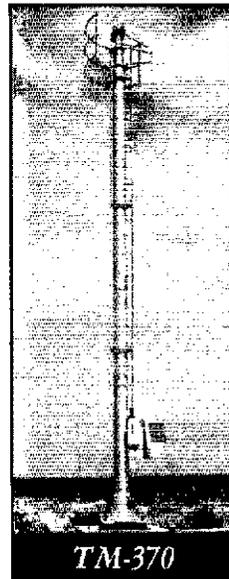
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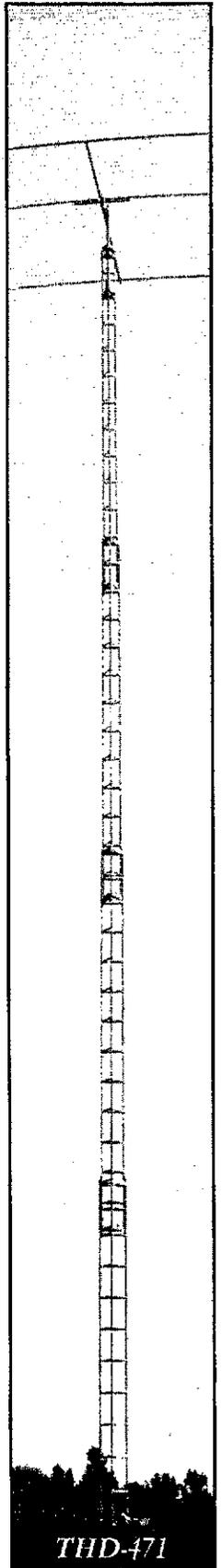
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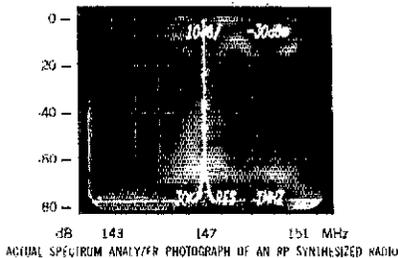


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(Continued from page 73)

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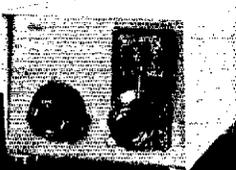
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### Public Service Diary

- Fayetteville, AR - Feb. 20. WB5EPD and K8YUW/5 handled health & welfare traffic on the MSBN and Interstate Net for a hospitalized heart attack victim and his family. - (WB5DCY, SCM MS).
- Dundee, WA - Feb. 22. An emergency net was established on 3987.5 kHz to provide state e.d. officials with information on conditions during a tornado alert. Thirteen amateurs took part. (WB5DCY, SCM MS).
- Memphis, TN - March 12. As the area was in danger of being inundated, amateurs began providing communications for the Red Cross and monitoring of water levels. Information was gathered and relayed on WR4AEX and MARS repeaters as well as on the Fenn. Phone net. - (W40QG, EC Shelby Co.)
- Toledo, OH - March 14. Heavy winds and rain caused flooding and the Red Cross asked amateurs to provide communications for shelters that were being set up in the area. Twenty-two amateurs took part in the day long affair. (WA8HGH, EC Fulton, Lucas, Ottawa and Wood Cos.)
- Tulsa, OK - Apr. 13. While tuning 75 meters, K5HDO heard a distress call from a maritime mobile. The ship's location was determined and relayed to the Coast Guard in Miami. A rescue vessel was deployed to the scene. - (K5HDO)
- Neosho, MO - Apr. 24. EC W0SIV activated the AREC for the purpose of providing communications after a tornado. Health & Welfare traffic was passed through local and section nets. - (W0SIV, EC Greene Co.)
- Santa Marta, CA - Apr. 26. When a four-year-old boy was reported missing, five local amateurs provided assistance in the search by utilizing WR6AEB. The boy was eventually found sometime later in good physical condition. (W6DKQ)
- Galena, AK - May 5. When KL7MD became ill on an expedition into the wilderness, means were provided to evacuate him. Close watch on his condition was kept through the night. KL7MD was evacuated the following morning and given a complete examination. - (KL7JDO, SEC AK)
- Ontario, OH - May 7. Amateurs provided communication when a bus carrying 47 Senior Citizens was hit by a semi-trailer truck. The Maser Net was called to order and reports of injuries and number of injured were relayed directly to hospital personnel in the emergency room. - (WB8CGR, EC Richland Co.)
- Baja, Mexico - May 8 & 9. Amateurs on 75, 40 and 2 meters assisted authorities in the search for a missing hiker. - (W6GBF, SCM SDgo.)
- Fairbanks, AK - May 12-14. When flooding became apparent, KL7CFX activated several nets. Some motorists became stranded as water levels began to rise and means were provided for their evacuation. - (KL7CFX)
- Cedar Rapids, IA - May 13. Following the tornado that hit Omaha, NE, many eastern IA residents were becoming concerned as to the health and welfare of friends and relatives in the stricken area. Seven stations from Cedar Rapids Radio Club started a service in conjunction with the Red Cross to handle the requests. In a total of 45 hours, the group handled some 186 requests. - (K0FLY, EC Linn Co.)
- Baja, Mexico - May 13. KF2EBE requested assistance on WestCARS. His vehicle had broken down south of Tijuana. W6GBF and WB6SPF moved off frequency to handle the traffic. - (W6GBF, SCM SDgo.)
- Ashcamp, KY. - May 17. Emergency traffic was handled by AREC members in KY during flash flooding. - (WA4DSD)





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- Pike and Letcher Cos., KY May 17. Twenty-three stations were active on 75 meters providing emergency communications during severe flash flooding. (W4CID, 5CM KY)
- Baja, California May 18. WA6HXB was called by KF2BY on WestCARS for emergency medical traffic. An individual was critically ill on a ranch in Baja, California and required a doctor's diagnosis and treatment. Phone patches were made to the family physician and the necessary medicine was flown in by the San Diego County Sheriff's Aero Squadron. (W6GBF, 5CM SDgo)
- Lahui May 20. HP9LXH/R2 aboard the "Lucayo" requested help when the ship was immobilized by a storm. W6MAB and K7LRA/R2 maintained contact with the vessel while WB6YID notified the Coast Guard. (WB6YID)
- Georgia/Florida May 21. D4RN stayed in special session in order to locate WB8MTR/4 who was traveling through the Ga./Fla. area on vacation. His mother was on the critical list in a Pa. hospital. He was located and the emergency traffic was passed. (WA4AVN, Mgr. D4RN)
- Owensboro, KY May 22. The AREC was alerted to the fact that six people were missing in a small boat. A search party was organized. It was later found that the people were safe but had had motor trouble and spent the night further down stream. (W4OYI)
- Tegucigalpa, Honduras May 22. HR0DHX/HR1 responded to a call from W3RR/M2 regarding medical instruction for treatment of an ill seaman aboard SS Texico Georgia. The patient progressed satisfactorily and was able to disembark at port four days later. (W4RFA)
- Allegheny & Westmoreland Cos., PA May 22. When severe thunderstorms moved through, the Allegheny and Westmoreland AREC net was activated for a weather watch and traffic alerting system. Several traffic mishaps were reported to police. (K3ISO)
- South Kingstown, RI May 24. The R.I. FM Repeater Group assisted the police department in the search for a missing five-year-old boy. (W1YNE, SEC RI)
- Milford, MI May 25. Severe storms moved through the area and WR8AAA was utilized by amateurs during the alert. Mobiles were deployed as sky watch and the path of the storms were tracked as they moved through the area. Reports were relayed to the police. (K8SWW, EC Milford Township)
- Ohio Co., KY May 26. The county sheriff called the Daviess Co. Sheriff for assistance in recovering a drowning victim. The local AREC aided in the recovery and provided communications during the entire operation. (W4OYI)
- Harris Co., TX May 30. An American ship, the "Delta Mar" was in a collision in the Gulf of Mexico. After using all standard communication facilities to no avail, Radio Office W0MWO used 40 meters to contact WA7SAU, W5TT and W5EVZ, who notified officials. (W5BJN)
- Lafayette, IN May 31-June 1. Members of the Tippecanoe Amateur Radio Association supplied communications for the over 400 riders in the 4-H Century Bike Hike. First aid was also administered by the mobile stations. (K3YWI/9, EC Tippecanoe Co.)
- Miami Beach, FL June 1. The captain of the 86-foot yacht Honey Bee suffered a heart attack, leaving the crew helpless as he was the only capable seaman aboard. The victim's brother aired a plea for help via amateur radio gear on board. WB4SJQ responded to the May Day call and patched in Coast Guard officials who gave first aid instructions. When the captain later died, WB4SJQ, W4SEZO, VP5GT and 9Y4HP among others, were responsible for "talking in" the ship to safety on Grand Turks Island.
- Sanford, FL June 9. A hospital needed parental permission for further treatment of one of the victims of a prison fire. The parents resided in the Canal Zone. Two hours after the request for

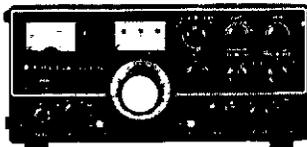
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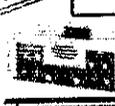
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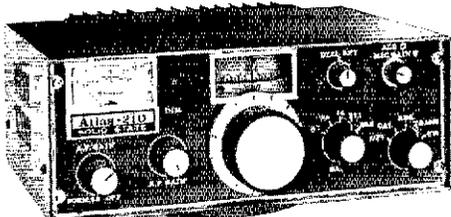
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assistance, the parent had been located and had contacted the hospital, WB4HVE, K4BLM, KZ5BH and W4WYR assisted authorities on 20 and 75 meters. — (W4WYR)

■ **Tumwater, WA** — June 9. Several amateurs assisted in the search for the daughter of state Rep. John L. Hendrickson using the Tacoma Baw Law Mountain repeater. — (W7QGP, SCM WA)

■ **Repeater Log.** According to reports received, repeaters were used to report 46 traffic accidents, 29 dangerous situations, two fires and provided individuals with five types of miscellaneous types of special services. The following repeaters were involved: WR1ACA, WR2ACD, WR3s AAA ADG, WR4s AAD ABR AGS AKV ALM, WR5s AFB AGA, WR6AJI, WR8AAA and VE3DRW.

■ **Special Activities, January.** On Jan. 21, twenty five Shelby Co. (TN) amateurs assisted the March of Dimes in its annual fund raising drive. Amateurs were deployed to pick up donations. — (W4OQG, EC). **February.** Amateurs from the Shelby Co. (TN) AREC provided communications during the Heart Association annual fund-raising Feb. 23 campaign. — (W4OQG, EC). **April** The Univ. of Calif. Davis ARC provided communications for the International Collegiate Reduced Emission Devices Rally Apr. 10-14. — (WA6JVD, SCM). On Apr. 12 members of the Glen Falls (NY) AREC provided communications for the annual canoe and kayak races at the Clear Water Derby. Both six and two meters were utilized. — (K2AYQ, EC). On April 12, several amateurs participated in a massive clean-up sponsored by the Washington State Dept. of Ecology. More than 55 tons of litter were picked up along Washington's Pacific Coast. — (Washington Dept. of Ecology). On Apr. 12-13 amateurs supplied communications for the bike-athon in Jefferson Co., KS — (W8GCZR, EC). On Apr. 19 members of the Miami Valley Repeater Association coordinated necessary communications for a March of Dimes walk-a-thon held in Montgomery Co. (OH) at the local fair grounds. Fifteen amateurs participated. — (W8ILC, EC). Twenty-three amateurs used WR4AEX during a walk-a-thon held in Memphis, TN, on Apr. 20, for the benefit of the March of Dimes. Several check points were set up along the route. — (W4OQG, EC). Communications for the Olympic bicycle race tryouts in Alpine, CA were handled by W6INI and WA6QMH on Apr. 20. — (W6GBF, SCM). Five members of the local AREC provided communications for the Easter Seal Committee sponsored Wheelchair-a-thon in the Boston, MA, area on Apr. 21. — (W1GHM). On Apr. 25 amateurs worked in conjunction with the 4-H Club's "Wake up America" bi-centennial celebration. The reenactment of the Hunterdon Co., NJ, section of the Boston to Washington, DC, Paul Revere mail ride was monitored by amateurs using WR2ADD and auto patch. — (WB2GGE). Members of the Sangamon Valley Radio Club, (IL) provided communications for a fund-raising walk-a-thon on Apr. 26. WR9AFA was utilized for the affair. — (W9PRN, SCM). Eleven checkpoints were set up along a walk for mankind in the Kansas City, KS, area on Apr. 26. Two and six meter FM was utilized throughout the affair. — (WA0LHK, EC). On Apr. 28, W1TT and HK3BLD set up a schedule so that school students in Newtonville, MA, could talk with their pen-pals in a fifth-grade school in Colombia. — (W1ALP, SCM). The 38th annual Bureau of Home Appliance Show from Apr. 30 to May 4 featured an amateur radio display sponsored by the San Diego Co. (CA) Amateur Radio Council. — (W6GBF, SCM). **May.** On May 3, the Will Co. (IL) American Cancer Society sponsored a bike-a-thon. WR9AAA was used to answer several calls from mobile units at various checkpoints along the route. — (WA9CXY). Fifteen amateurs provided communications for a walk-a-thon in Owego, NY, on May 3. — (W2EWC). On May 3, amateurs using WR8ADC in Toledo, OH, coordinated communications for a march against drug abuse. — (W8HGH, EC). Amateurs assisted the third annual treeborn Co. (MN) Cancer Bike-a-thon with two-meter mobiles

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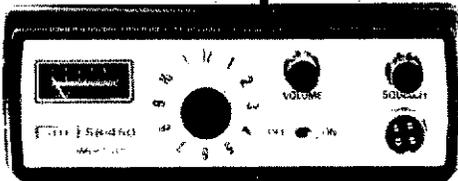
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along the route using the 28/88 repeater, on May 3. (WB0F11). A local Texas two-meter net provided communications for a charity walk-a-thon on May 3. (WA5EWS). The March of Dimes walk-a-thon in Tioga Co. (NY) on May 3, was furnished communications by area amateurs on two fm. - (W2MTA). On May 3, the Univ. of Calif. Davis ARC and several Yolo Co. (CA) hams provided communications for the "Heart of Calif. Double Century Bicycle Tour." - (WA6JVD, SCM). Six amateurs handled communications via two-meter fm at the Handicapped Olympics on May 3, in San Diego. - (W6GBF, SCM). Nine amateurs of the West Valley, (CA) AREC provided communications during the annual Knights of Columbus 26-mile Marathon race. Various check-points were set up along the route to monitor the races progress. - (K6IU, EC). On May 10 the Ridgewood AREC handled communications for the Englewood Memorial Track Meet in Englewood, NJ. Six amateurs participated. - (WA2CCF). The Huntington (NY) AREC was requested to supply communications for the Huntington Auxiliary Police who had to escort two simultaneous walk-a-thons on May 10. Both affairs totaled more than six hours. - (W2GLE, EC). On May 11, amateurs in the Dundas, ON, area provided communication for a Canadian bicycle group on the Hamilton repeater. (VE3FHQ, EC).

### Public Service Honor Roll May 1975

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their St. M). Please note maximum points for each category: (1) Checking into cw nets, 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

WB5AMN	72	WB5GI	52	W1FH	44
WA1LGE	65	WB8PAV	52	K1PAD	44
WB0HOX	63	WB9HDS	52	WA1POJ	44
WA1QMF	64	WB2RX	50	WA2BSU	44
WA3PHQ	64	WB3WBH	50	WA2DW	44
W4OGG	64	WB4DI	50	W2MLC	44
W5KIV	63	WB6JYN	50	WA2PCJ	44
WA1MSK	61	WA9OVT	50	E3KAJ	44
WA2DSA	61	W1DWW	49	K3OBD	44
WB2PYM	61	WA1QJU	49	WA3VRM	44
WB4EZO	61	WA2PJL	49	WB4LKJ	44
W5GHP	61	WB4OXT	49	K4F1B	44
WA5IQU	61	K5MAT	49	WB4HFD	44
WB5MGN	61	WB5MTG	49	WB5KIA	44
WA5ZZU	61	W5MYZ	49	WB5MIO	44
W7OCX	61	W5UJJ	49	K5ROZ	44
WB1BK	61	W5REI	49	WB6AKR	44
WA5ZNC	61	W7GHI	49	WB6DW	44

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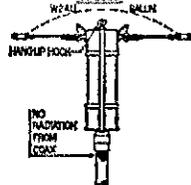
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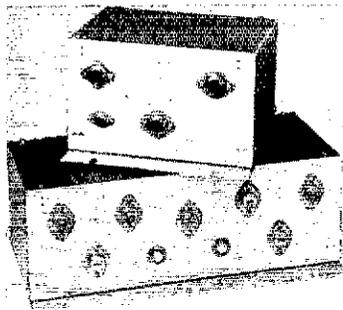


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Happenings

(Continued from page 80)

On motion of Mr. Thurston, after discussion, the following resolution was unanimously ADOPTED:

RESOLVED, that the Charter Oak Bank and Trust Company of Hartford, Connecticut, is hereby designated as a depository of the American Radio Relay League, and that a checking account be opened and maintained in the name of this Corporation with said Bank; that any of the following officers of this Corporation are authorized, on behalf of this corporation, and its name: to sign checks, drafts, notes, bill of exchange, acceptances, or other orders for the payment of money from said account; to endorse checks, notes, bills, certificates of deposit, or other instruments, owned, or held by this Corporation, for deposit in said account, or for collection or discount by said Bank; to accept drafts, acceptances, and other instruments payable at said Bank; to waive demand, protest, and notice of protest, or dishonor of any check, note, bill, draft, or other instrument made, drawn, or indorsed by this Corporation; and

FURTHER RESOLVED, that the above named bank be and it hereby is authorized to honor, receive, certify, or pay all instruments signed in accordance with the foregoing resolution even though drawn or indorsed to the order of any officer signing the same or tendered for cashing, or in payment of the individual obligation of such officer, or for deposit to his personal account, and said Bank shall not be required, or be under any obligation to inquire as to the circumstances of the issuance, or use of any instrument signed in accordance with the foregoing resolution, or the application, or disposition of such instrument, or the proceeds thereof; and

FURTHER RESOLVED, that the Secretary or Assistant Secretary shall certify to said Bank the names of the presently duly elected and qualified officers of this Corporation and shall from time to time hereafter as changes in the personnel of said officers are made, immediately certify such changes to the bank, and said Bank shall be fully protected in relying on such certificates of the Secretary or Assistant Secretary and shall be indemnified and saved harmless from any claims, demands, expenses, loss or damage resulting from, or growing out of, honoring the signature of any officer so certified, or refusing to honor any signature not so certified; and

FURTHER RESOLVED, that the foregoing resolutions shall remain in full force and effect until written notice of their amendment or rescission shall have been received by said Bank, and that receipt of such notice shall not affect any action taken by the Bank prior thereto; and

FURTHER RESOLVED, that the Secretary or Assistant Secretary be, and he hereby is, authorized and directed to certify to said above named Bank the foregoing resolution and that the provisions thereof are in conformity with the Charter and By-Laws of this Corporation.

On motion of Mr. Arnold, unanimously VOTED to grant affiliation to the University of New Hampshire Amateur Radio Club of Durham, NH

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SN7409	\$.19	SN7480	\$.52
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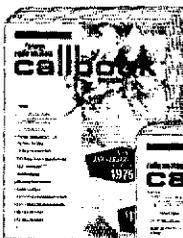
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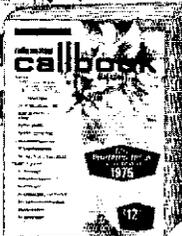
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On motion of Mr. Griggs, unanimously VOTED to grant approval for the holding of a Delta Division Convention in Memphis, Tennessee, on October 4-5, 1975.

On motion of Mr. Albright, after discussion, unanimously VOTED to approve the proposal of President Dannels to file with the House Subcommittee on Communications a statement by the League supporting H.R. 7052, a bill to give the Federal Communications Commission stronger authority in dealing with radio interference matters; and to request that the bill be scheduled for committee hearings, to include testimony by League officials.

The Committee was in recess from 10:18 to 10:35 A.M., and again for luncheon from 12:30 to 1:05 P.M.

At this point the Committee and others present engaged in extensive analysis of and discussion on the draft of material to be filed by the League in response to the FCC proposals in the "restructuring" Docket 20282. With recesses from 2:00 to 2:20 P.M., and again from 3:55 to 4:05 P.M., the procedure continued until 7:05 P.M., at which time the Committee adjourned until the following day. It reconvened at the same place at 8:05 A.M. on June 8, 1975, to resume the detailed review which, after a recess from 9:25 to 9:35 A.M., was completed at 11:48 A.M.

On motion of Mr. Albright, unanimously VOTED that the General Counsel is directed to request an extension of time, at least 60 days, for filing comments in Docket 20282.

During the course of its meeting, the Committee discussed, without formal action, the subject of "comparative" advertising in QST; a study in progress by the State of Texas concerning possible limitations on amateur power stemming from potential of damage to human tissue; the use in zoning cases of the argument that a higher tower rather than a lower one will provide more relief from TVI; and additionally reviewed plans and tentative program schedule for the 1975 National Convention.

There being no further business, the Committee adjourned, at 12:42 P.M.

Respectfully submitted,  
JOHN HUNTOON, W1RW  
Secretary

## Operating News

(Continued from page 103)

### SCM ELECTION RESULTS

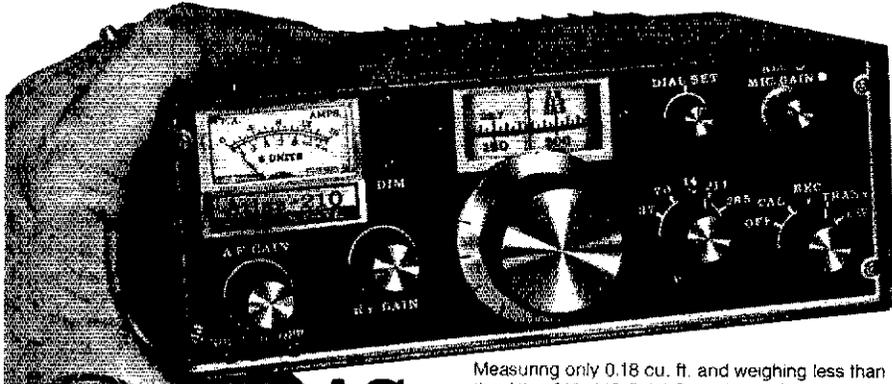
Valid petitions nominating a single candidate were filed by members in the following sections completing their election in accordance with applicable rules, each term of office starting on the date given.

W.Va.	K.C.Anderson, W8DUV	6/21/75
Canal Zone	R.J.Jsler, KZ5PI	6/21/75
N.Mex.	F.Hart, Jr., W5RE	7/2/75
W.Mass.	P.C.Noble, W1BVR	8/1/75
Alaska	R.Davie, K17CUC	8/1/75
S.Barb.	D.P.Gagnon, WA6DEI	9/2/75
Tenn.	U.D.Keaton, WA4GLS	9/11/75
E.Bay	C.R.Breeding, K6UWR	10/10/75
S.Diego	A.R.Smith, W6INI	10/24/75
R.I.	R.H.Simonton, K1GMW	11/12/75
Hawaii	J.P.Corrigan, KH6GQW	11/12/75
Wisc.	R.A.Pedersen, K9FHI	12/11/75
Maine	E.B.Bristow, WA1MUX	1/28/76

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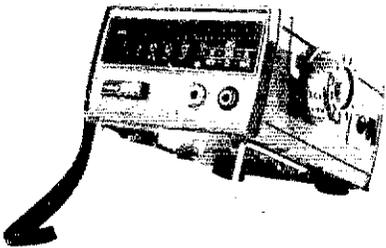
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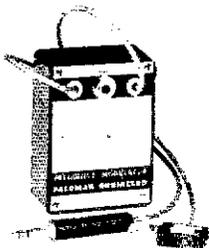
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## World Above

(Continued from page 90)

basis? If so, what bands and what specific slices? What about the use of pulse transmission?

For inputs applicable to frequencies between 27 and 1296 MHz, address Robert Haviland, W4MB, 2100 S. Nova Rd., Box 45, Daytona Beach, FL 32019. Comments regarding the rest of the spectrum above 1296 MHz, should go to Charles Dorian, W3JPT, 4444 Chesapeake St., Washington, DC 20016.

### National Convention Plans

As you are undoubtedly aware, the 1975 ARRL National Convention will be held in mid-September at Reston, VA, near Washington's Dulles Airport. Of particular interest to vhf/uhf amateurs will be the Space/EME Forum scheduled for Saturday, September 13. Among the papers to be presented will be one reporting on work done by Tom Clark, WA3LND, assisted by Will Webster, WB2TNC, in detecting 144-MHz noise originating in the center of our galaxy. The operation of Oscar 6 and 7 as well as Amsat's plans for the Phase 3 program and other future spacecraft will also be featured. Another highlight of the forum will be an EME panel consisting of a number of accomplished moonbouncers. Playing their tapes, they will discuss the challenges and rewards of this very exciting and dynamic amateur vhf/uhf activity.

### Repeater DXing

The June column carried a statement that citations have been issued by the Norfolk Field Office of the FCC for DXing through repeaters in violation of Section 97.1(i) of the Commission's rules. It turns out that this statement was in error and that no such citations were issued. The confusion arose, apparently, from a misinterpretation of informal statements made by one of the field office employees.

### OVS and Operating News

50 MHz. After a somewhat late start, about mid-May, this year's  $E_s$  season got underway with excellent conditions for about a week. There was more than an average amount of double hop and very strong single hop signals. Then the bottom dropped out, and things were pretty dead for a few days. The same process was repeated several times. With this kind of performance as of mid-June, the 1975 Summer  $E_s$  session can be categorized so far as "fairly good." If frequency and reliability of openings are below par, the relative high occurrence of double hop more than makes up for many 6-meter, state hunters. The weekend of the June Vhf QSO Party saw spotty but fairly widespread openings, at least from here on the east coast. Unfortunately, conditions were not reported to be as good during the SMIRK Contest held Sunday, June 1. Maybe next year it will be a longer affair with better chances of catching good conditions.

As usual this time of year, it is impossible to recount all of the 6-meter activity reported, but here are a few highlights. For a couple of days around June 9, the Bahamas were active in the form of WB2RLK/C6A. Bob managed to provide this rare 6-meter spot to a goodly number of the gang despite his necessarily short stay. Unfortunately I was not one. K4EJQ reports 6 open almost around the clock on some days near the end of May. Bunky says that he worked all call areas

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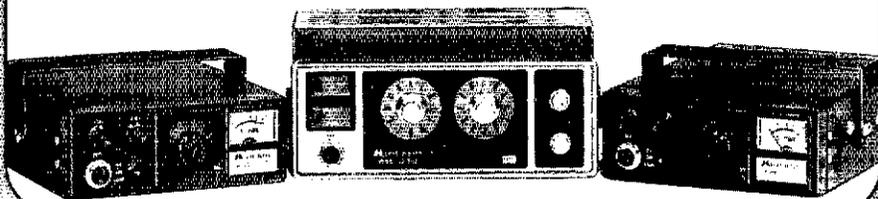
## Mobilize with Midland

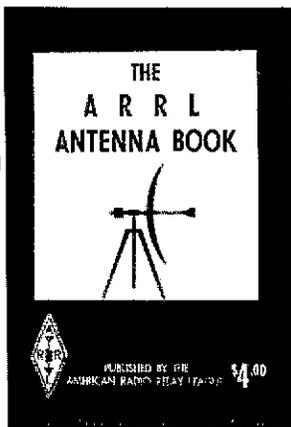
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during the month. WA7TDU comments that the "10-6 game," often recommended by W1HDQ for detecting 6-meter openings, does indeed work. Sam adds that if the fellows on 10 aren't active, there's always 11 meters! K7ZCB phoned information on his plans for a month's stay in Montana. But the word did not come in time for inclusion in the July column. Dave also notes that while going through Idaho on his way to Montana, he came across some resident activity of which many of us are not aware. He states that WA7YAX and WA7WXI are both on. Looking for band openings, Gloria, WA7YAX, regularly monitors on 6 meters. Idaho hunters take note. WA0TRO recalls having a 3-way QSO on May 22 with WA3NZZ in Maryland and WB6VIN. Larry also reports working many other stations on both coasts and in Canada during that opening including K3KMV???

A couple of items in the DX department have been passed along. Ray, K5ZMS, notes that Monty, VE3EYW, will take 6-meter gear with him when he returns to Montserrat this fall. The call on the island is VP2MJ. From Swan Island, it has been learned that Jeep, K3HVG, using the call HR6SWA, will be active on 6 starting about July 15. The rig is a 62S1, permitting Oscar operation as well as possible terrestrial 2-meter work. From Jakarta, Indonesia comes a note from LU8BF who is with the Argentine Embassy in that country. Presently 50-MHz operation is not permitted but efforts are underway to secure permission to work the band. This should prove to be a very interesting location for 6 meters. The call is YB0ABN.

Closer to home, K7HZ, of Apache Junction, AZ, informs us that he is running an attended beacon on 50.103 using cw with about 30 watts to a "squalo." Don monitors 50.140 for calls.

144 MHz. As with 50 MHz, the activity and conditions on this band pick up markedly at this time of year, making it impossible to cover anything but the high spots. On the West Coast ssb activity is accelerating at a rapid rate, reports WB6JNN. Jim lists 30 stations now active, 19 of which are either new appearances or reappearances within the last few months. Many of these stations operate mobile with 50 to 75 mile working range quite common. The most used West Coast frequency is 145.005. K7ICW, Las Vegas, and WA7BPC, Phoenix, are both active on that frequency looking for contacts with the population centers to the west as well as in other directions.

WB6JNN mentions an idea under discussion to tie the northern and southern parts of California together for skeds as well as to fill in some of the gaps for mobiles. Borrowing a leaf from the book of our fm brethren, the construction of an ssb repeater, or more properly a translator, on a suitable mountain somewhere between the San Francisco area and southern California is under consideration. Jim feels that coverage for home stations would extend from Santa Rosa in the north to the Mexican border. If the Californians can solve the technical and legal problems associated with such an installation, the concept might be put to good use in other parts of the country.

The plight of vhf enthusiasts located in these areas remote from other stations active on their favorite band was observed first hand recently by W3TMZ. On a trip to Charleston, SC, Jack visited K4KAF and W4USW. Although these fellows have fine stations, they have few chances to use them because interest in 144-MHz ssb and cw operation is essentially non-existent in the immediate area and, in fact, within their normal tropo range.

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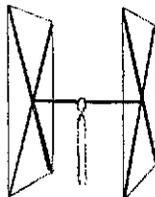
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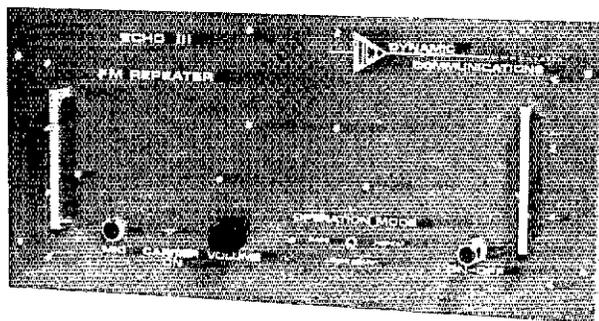
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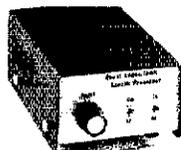
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Nevertheless these fellows monitor 144.110 almost every night hoping to work someone. Certainly there are many more vhfers in the same boat in various parts of the country. Let's try to make life a little more interesting for those in this situation. One recommendation which Jack makes is to settle on an agreed frequency and time for concentrated operation. In the East, 144.110 seems to be the most popular spot but cannot currently be used by Technician class licensees. Possibly this limitation will be rectified before too long. A time of 2100 local is suggested. If this idea is to pay off, we must not be guilty of the common sin of always keeping our beams headed in the direction where most activity is found. All too many of us do this regularly. Try CQs in various directions and set up schedules with some of the fellows who need encouragement.

WB5LUA near Dallas reports good tropo conditions around May 17 to 21. On the 17th, running 10 watts from an Echo II ssb transceiver to a 7-element beam, Bill Smith, WSUSM, former conductor of this column, worked into Wisconsin (station not given). Others in the Dallas area making similar contacts were K5WXZ and W5SD. On the 21st, WB5LUA reports having worked K0MOS with S9 ssb signals. Apparently the same weather pattern moved east, as K4FJQ reports good tropo conditions to the Gulf Coast and Midwest on May 25. Unfortunately Bunky was not able to scare up any customers on 144 but did hear a number of repeaters which he cannot usually receive. The value of those repeaters as propagation beacons is frequently demonstrated. Speaking of beacons, a list of airport stations operating in the 110 to 135 MHz region is still available from headquarters for an s.a.s.e. Just ask for the AFIS list.

Over in the EME camp, K1WHS passes along an impressive list of stations worked for the EME box to appear in the September issue. Dave is running a pair of 4CX250s into 94 feet of 7/8-inch air Helax feeding a 160-element collinear on a polar mount. The preamp is a 2N5397 mounted in the shack. Although only acquiring moonbounce capability last January, he is well on his way. Another station coming up fast in the EME department is W4DFK. Dana made his first QSO via the lunar route on June 7. By the 16th he had worked a total of 6 stations and heard 4 others including VK5MC and SM7RAE. State hunters will welcome the appearance of Virginia to the moonbounce scene.

The 2-meter gang along the East Coast will miss Brownie, W3HB, who passed away on June 2.

220 MHz. WB6JNN/6 of Santa Cruz, CA reports that 2000 local time each Sunday evening is the appointed hour for the 222.0 MHz net. All modes, am, fm, ssb, or cw are welcome. A note from K7VNU of Sequim, WA (on the Olympic Peninsula west of Seattle) states that he is on 220, when not busy on 50, 144, or 432 (including chasing Oscar 7's Mode B transponder). John finds the vhf going a little rough what with 7,000 foot mountains immediately to the south.

The results of a recent membership questionnaire conducted by the Rocky Mountain Vht Society Boulder, CO, indicate that 11 of the 50 respondents are interested in getting on 220 MHz. Let's hope they do. VE2BHP of Chambly, Quebec, writes that he has finished the construction of an fm repeater with an input frequency of 222.9 MHz and an output frequency of 224.5 MHz. The machine will soon be installed atop Mount Bruno about 60 miles north of the U.S./Canadian border.

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# RCA

With about 100-watts erp, the new repeater should have very good coverage, and Gary extends an invitation to American hams to use it. He also mentions a 220-MHz repeater, under the call VE2HH operating in Quebec City, although he failed to provide the frequency combination.

WA2FZW, Plainfield, NJ, reports being operational on 220 with 40-watts output to a 20-element array up 45 feet. When 2 meters is good for tropo, don't fail to check 220. WA2GEZ of Edison, NJ, reports both 144 and 220 MHz in excellent shape on the night of May 20. An OVS report from WBSHR1 mentions that he is converting an ARC-TV-10 to 220 MHz. How about some more dope on this when you get it perking, John?

**420 MHz and Up.** A new convert to 432 is W3IMZ of Mount Airy, MD, 30 miles north of Washington, DC. Jack got going on the band May 19 and proceeded to work 7 states with just 5 watts from a tripler. A K2RIW type of Yagi at 90 feet didn't hurt, but nevertheless it is amazing what can be done with low power on our 70 cm band. For the June contest Jack resorted to a K2RIW amplifier and added 5 more states as well as re-working the ones he had previously salted away. W3IMZ finds 432 to be a lot of fun and recommends it highly. W1IAA, who has been complaining about poor tropo conditions on 432 for some months now, is more hopeful with improving conditions arriving with the warmer weather.

For 432-FME state hunters, K2UYH took his portable station consisting of a 1-kw amplifier and array of 8 Yagis on a trip through the West in June. Results of this operation should be apparent in the 420 Standing next time it is updated as well as in the FME box when it appears. Incidentally, Al tells us that his totals should read 28 states, 9 call areas and 10,000 miles. May was a good month for 432 FMEers according to the monthly newsletter which Al publishes. Many QSOs took place among the more seasoned operators and VE4IX joined the moonbounced ranks with his first successful 2-way.

K5LLL, Houston, TX, says that he would like to hook up with W4ZX1 in an attempt to extend the 1215 terrestrial record of 847 miles which he presently holds with K4NTD. Ron is also interested in attempting some 2304 MHz work across the same path. Speaking of records, PA0SSB tells us that on February 22 he worked VK3AKC via the moon on 1296 MHz. The distance is in the order of 10,000 miles, sufficient mileage to eclipse the old 1215 FME mark of 5492 miles set by G3LTF and WB6IOM in 1969. PA0SSB also informs us of the existence in Europe of several linear repeaters similar to the Oscar 7 Mode B transponder in input and output frequencies and operation. Jan says that these provide a very good means of checking conditions. Sounds interesting. Jan. We hope to hear more from you as well as from others in various parts of the world concerning conditions and activity in their locales.

K3WIK passes along a tip on a piece of surplus equipment which can be put to good use in amateur microwave shack. The over-all equipment family designation is AN/TRC 24. The mixer portion is the AM-3204A/TRC 24. It uses 2C39s and, according to Jeff, can be used on either 432 or 1296. There is also an amplifier, the A-1178/TRC 24 which employs a 4X150A driving a 4X150G. The mixer unit requires substantial oscillator injection but this can be provided by a reworked 432 tripler or a converted 1m strip. **QST**



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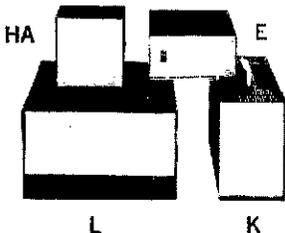


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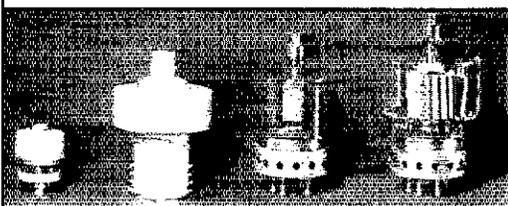


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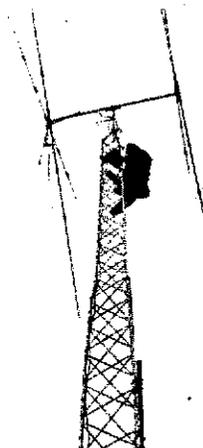
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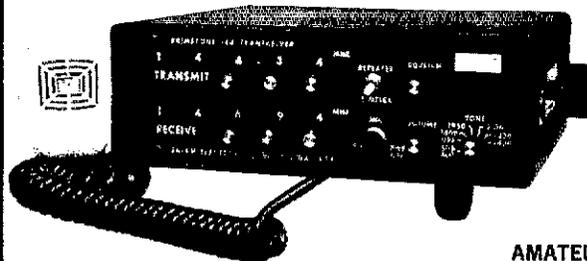
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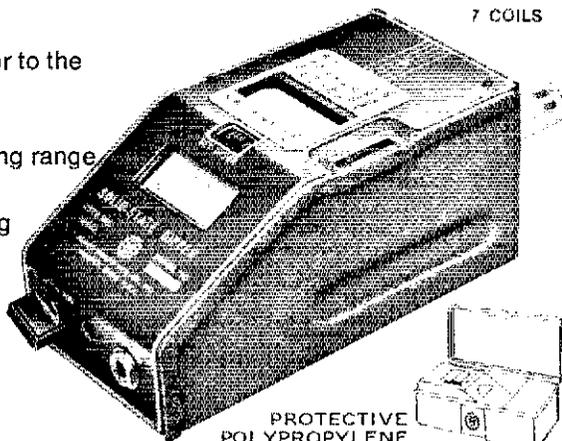
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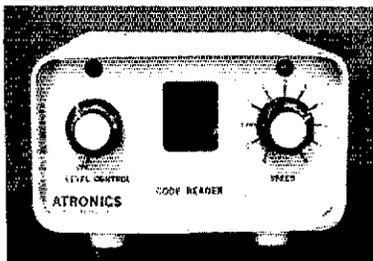
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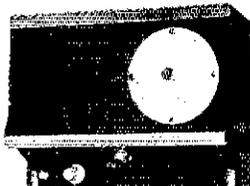
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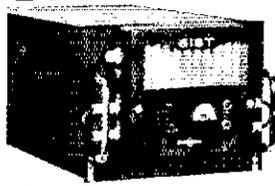
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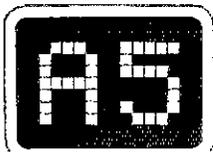


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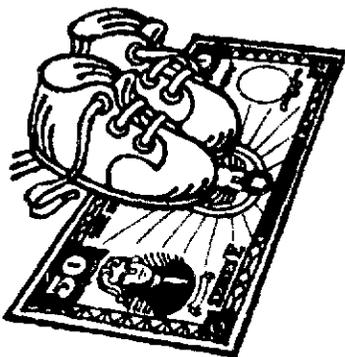
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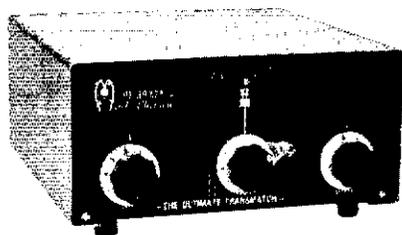
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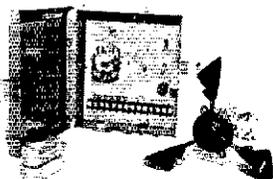
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extra ROMs for field day, traffic operations, or just about any special call/ID you'll ever need. The 2550/ID operates on 115 VAC or 12 VDC with grid block or cathode keyed transmitters. Add the super-sensitive FYO key and you'll have one of the best fists on the air!

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(1) Advertising shall pertain to products and services which are related to amateur radio.

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(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 20 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 20-cent rate. Address and signatures are charged for, except there is no charge for zipcode, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 60-cent rate. Provisions of paragraphs (1), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

*Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., 2012 Rockingham St., McLean VA 22101.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers - W7GA/Q6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size a.s.e. to the L.I. DX Assn., P.O. Box 75, Westbury NY 11590.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Rosemary Willis, 9276 Borden Ave., Sun Valley CA 91352.

THE New York Radio Club invites Hams to club meetings, 2nd Monday of each month, 8:00 PM at the Williams Club, 24 E. 39th St., NYC. For information: Box 614, NYC 10028.

RADIO museum now open. Free admission. 25,000 pieces of equipment from 1850 telegraph instruments to amateur and commercial transmitters of the 1920s. Amateur station W2AN. Write for information. Antique Wireless Association, Main St., Holcomb, N.Y. 14469.

PEORIA Hamfest - September 14, Peoria, Illinois. Same place as last year. Note change of date. For further details see Hamfest Calendar. Banquet Saturday, September 13, 5:30 PM at V. Junction - \$6 per person. Two motels within walking distance. Reservation deadline August 30, cancellation September 8, 150 maximum, so get reservations in early. For hamfest tickets, \$1.50 advance (\$2.00 at gate) write Earl Kimzey, WA9SCA, 840 J. Hanna City, Illinois 61535. For banquet reservations write Harry Pearsall, W9FDY, 2224 W. Herold Ave., Peoria IL 61604.

FOUNDATION for Amateur Radio annual Hamfest Sunday October 19, 1975 at Gaithersburg Maryland Fairgrounds.

FINDLAY Hamfest - Sept. 7, Riverside Park, Findlay, Ohio. For advance information, write Clark Foltz, WBUN, 122 W. Hobart, Findlay OH 45840.

WARREN Hamfest, Sunday, August 17, Yankee Lake, Ohio. Dealers' displays. Swimming and picnicing. Giant Flea Market (Vendor's fee: \$1/year plus registration). A \$3 registration includes XYL tickets. Info: Hamfest, P.O. Box 809, Warren OH 44482.

BLUEFIELD, W.VA. Hamfest August 24, bigger this year. Big flea market, free space. For information contact K4CGF, Ralph Rocky Gap VA 24366.

QSLs??? Samples 75c. Deluxe \$1, Religious 75c. (Deductable). Sackers, WRDED, Box 218, Holland MI 49423.

TRAVEL-PAK QSL Kit - Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wyanntskill NY 12198.

FREE Samples - Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

QSLs, samples 20c. Fred Leyden, WINZL, 454 Proctor Av., Revere MA 02151.

QSLs 300 for \$4.65, samples 20c, W9SKR, Ingleside IL 60041.

QSLs "Brownie" W3CJI, 3035A Lehigh, Allentown PA 18103. Samples with catalog 35c.

DELUXE QSLs, Samples 20c, Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

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RUBBER stamps \$2.50 includes postage. NJ residents add tax. Clinis Radio, W2UDQ, 32 Cumberland Ave., Verona NJ 07044.

QSLs catalog, Samples 35c. Ritz Print Shop, 5810 Detroit Ave., Cleveland OH 44102.

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3-D QSLs - Hallmark of discriminating operators. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLs Deluxe Variety. New Bicentennial Cards. Samples 20c. Earl Shipley, W8GZX, Box 145, Dabel Stn., Dayton OH 45420.

CANADIAN Surplus Catalog and flyers \$1. Eteox Electronics, Box 741, Montreal Canada H3C 2V2.

DO-it-yourself DX-pedition, stay at ZFISB, Cayman Is. Vertical antenna and Caribbean at your doorstep. Diving, fishing if band folds. Write Spanish Bay Reef Resort, Box 800T, Grand Cayman, B.W.I.

WANTED: Viking Navigator. Mint Cond. Quote net price first letter. Advise how ship. Roland Croff, VE4RS, 414 Talbot Ave., Winnipeg, Man. Canada. Zip R2L0R3.

MEMPHIS is beautiful in October! The Memphis Hamfest, bigger and better than ever, will be held at State Technical Institute, Interstate 40 at Macon Road, on Saturday and Sunday, October 4 and 5. Demonstrations, displays, MARS meetings, Flea Market, XYL entertainment, informal dinners Saturday night. Dealers and Distributors welcome. Talk-in on 3980, 34-94 and MARS. Contact Harry Simpson, W4SFP, Box 27015, Memphis, TN 38127 or telephone 901-358-5707.

THE ORIGINAL FM Hamfest August 3, 1975, near Angola, Indiana. Free flea market, picnic grounds, swimming, boating available. Talk-in on 146.16/76, 146.94. For information contact Ft. Wayne Rept. Assn., Box 8022, Fort Wayne, Indiana 46806.

F.R.R.L. Hamfest - August 17th. U.S. Rt. No. 30, East of Aurora, IL. Phillips Park, picnic, zoo, family fun. Advance donation - \$1, \$1.50 at park. S.A.S.E. to P.O. Box 443, Aurora, 60507.

20TH ANNUAL York County Hamfest August 31, 1975. 10 miles west of York; 1/2 mile west of York Airport, just off U.S. Rt. No. 30 at Elickers Grove. Talk-ins 146.04-64, 28-88, 52-52. Registration begins 9 AM, FEE - \$3, XYLs-children free. For information write K3POR, LeRoy Frey, 170 S. Albemarle St., York PA 17403.

CINCINNATI Hamfest: 38th annual, Sunday, September 21, 1975 at the New Stricker's Grove on State Route 128, one mile west of Ross (Venice) Ohio. Flea Market, contests, model aircraft flying, food and beverages all day. Advanced tickets \$7, covers everything. \$8 at gate. For tickets or further information: Carl J. Dietmar, W8NCV, 8630 Cavalier Drive, Cincinnati OH 45231.

WANTED: Jensen Triaxial speaker, model G610B. Write: VE3CTP, 2 Adirondack Gate, Agincourt, Ont., Canada, M1T 3E7.

CARIBBEAN Ham shack and equipment for sale. Excellent retirement opportunity. \$B200, 60' tilt over tower. Hygain quad, HW101, Two bedroom house, glass doors, overlooking the ocean. Complete with Ford Cortina. About 43K, inquires 416-755-2117 or 60 Amsterdam Ave., Toronto.

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LAFAYETTE 460 6-meter xcvr, mint cond. - \$90. WA2DOH, Clark, 235 Park Ave., Nutley NJ 07110.

WANT: Intact X-tal filter for HRO-50 T WTAUZ, Box 141, Government Camp OR 97028.

DESPERATELY need single subband radio transceiver for missionary work. Tax receipt for your valuation of radio and shipping charges. Rev. Dale Whalley, P.O. Box 61, Bethnapan, Belize, C.A.

FOR SALE: A great collection Germany-war RXPY (1932-45) 200 pieces, with many accessories. Good price offered. Hueter, A-6844 Altach, Emmestret 2, Austria.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY NY 10012.

CALL toll-free (800) 327-7798. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Farnam, Amperex. Address: 412 27th Street, Orlando FL 32806. In Florida call collect (306) 843-9551.

SPIDERS for boomless quads, Helvar welded aluminum, A's Antennas, 16473 Greentree Blvd. No. 32, Vicotville CA 93322.

VERY interesting! Next 5 big issues \$1. "The Ham Trader," Sycamore IL 60178.

TRANSFORMERS rewound, less Price, W4CLJ, 507 Raehn, Orlando FL 32806.

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, PO Box 6018, Norfolk VA 23508.

WE BUY electron tubes, diodes, transistors, integrated circuits, semiconductor. Astral Electronics, 150 Miller St., Elizabeth NJ 07207. (201) 354-2420.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. WANYF. Buy parts, late machines.

WANTED: An opportunity to quote your ham needs. 36 years a ham gear dealer. Collins, Drake, Ten-Tec, Swan, Kenwood, Tempo, Regency, Icom, Hy-Gain, etc. Trades, terms. Request catalog. Chuck, W8UCG, Electronic Distributors, 1960 Park, Muskegon MI 49441. (616) 726-3196.

SWAP-Net ads free in Tradio. Box 4391, Wichita Falls TX 76308.

AMSAT/OSCAR 6-7 slides, set of 5 - \$1.25 Lift-off and Equipment. Proceeds AMSAT, K6PGX, P.O. Box 463, Pasadena CA 91102.

WANTED. Make, Model and Serial Numbers of stolen ham gear. for big list. W7UD, 3637 West Grandview, Tacoma WA 98466.

FM receiver, preamp, scanner, UHF converter kits. Hamtronics, 182 Belmont, Rochester NY 14612.

COMING to Florida? Use our club station or your own rig and our all-band antennas to work DX or your home town. All hams welcome. Details - H.E. Saxton, W4QED, c/o Spanish River Inn, Delray Beach FL 33444.

GECHRON wanted: Electronic wall mounted map-clock, reviewed 1967. QST WB4SRQ, 908 Penn Avenue, Atlanta GA 30309. (404) 874-7726.

BUILD your own radio desk/console cabinet. Design drawings, photographs. \$4.75. Bill Morris, WA5RSC, P.O. Box 20302, Oklahoma City OK 73120.

SERVICE by W9YKA. Professional grade lab. FCC commercial license. Amateur and commercial SSB-FM equipment. Repairs, calibration, modifications, consultation. Low overhead, reasonable rates. Write or call Robert J. Orwin, Communications Engineer P.O. Box 1032, La Grange Park IL 60525. (312) 352-2333.

BUILDERS Teflon stock. Write W9TFY, Frank Wurt, Alpha IL 61413.

MANUALS for ham gear before 1967. Large s.a.s.e. for quote on specific manuals. W6JJK, Hobby Industry, Box Q864, Council Bluffs, IA 51501.

DISPOSE of 450 old magazines. 350 QSTs beginning Jan, 1931 - 1940s, 1940s, 1950s, all solidly complete. Plus 100 CQs, 73s, others. Bought, ready to go. \$75. Bob Farmer, 3009 N. Columbia, Plainview TX 79072.

WANTED: Schematic and information on Multi-Elmac Model PMR-8 receiver. Bruce Campbell, WA5HQY, 5114 Mercer #2, Houston TX 77005.

COLLINS 51S-1 receiver, approx. 7 yrs. old in excellent cond. \$1,200 or best offer. ETC, Box 402, Crested Butte, Colo. 81224.

UPGRADE your ham license NOW. Let Post-Check help you. Original, expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams. IBM sheets for self testing. Keenest answers with explanations. Novice Class - \$3.35; General Class (including latest rules and regulations) - \$5.10; Advanced Class - \$4.65; Extra Class - \$4.90. First class postage prepaid U.S.A. Air mail 25c extra per copy. Send check or money order to Post-Check, P.O. Box 3564, Urbandale Station, Des Moines IA 50322.

COLLINS 51W-2 w/rejection tuning and DX Engr. compressor - \$725. K1M6F2 sub-D-104. D-104. \$225. Standard SC-R146A 2MF2M with X'tals and all the toys, \$285. Mobile 2M ant. 15; Triasto MM-35 telescoping mast tower - \$135; Hy-Gain TH6DX X'talbrander - \$145. W1FDA (302) 935-2843, 864-0544.

ALL Solid State Swan SS-200, \$575. Heath SB 220 linear - \$400. W1WAO, 4511 Pannin, Midland, TX 79701.

WANTED: New used tower sections. Rusgrove (203) 582-6865.

SELL: K-390-A good condition - \$325. Will ship, also have few K-390-A parts at half anybody's price. George Tate, 306 Thornwood Dr., Taylor SC 29687.

MOBILE Ops. Fired off ignition noise? Please send s.a.s.e. for info on shielded ignition systems. Summit Enterprises, 20 Eider Street, Yarmouthport, MA 02875.

GALAXY 5 Mark 2, AC-35 power supply, calibrator, vox, turner mike, speaker \$3. Paul Johnson, WAQYMC, 1941 Karlin Dr., St. Louis MO 63131. (314) 822-0727.

WANTED: Mobile telephone equipment such as Delco, GE, etc. Also heads, duplexers, decoders. Greg Hyman, WA2OTG, 19 Sicard Ave., New Rochelle NY 10804. (914) 636-2494.

MOTOROLA HT220, HT200, Pageboy, and other popular 2M FM transceiver (Standard, Regency, etc.) service and modifications performed at reasonable rates. Hatfield, WA4FRV (804) 272-8403.

DRAKE R-4B, MN-4, MS-4, Heath DX-60R, HG-10B VFO, IM-1R, (all used less than 6 hours), plus tube tester, keys, crystals, 24-hr. clock, relay, dummy antenna, and innumerable accessories. Asking - \$650. George Mouza, WA1GQX, 32 Locust Ave., Lexington MA 02137.

ICOM, Swan, Larsen, Cushcraft and KLM. W0NGS, Bob Smith, Electronics, 1226 9th Ave., North, Fort Dodge, IA 50501. (615) 576-3886.

SELL: Yaesu FTDX560 factory reconditioned - \$375. WB8JIR, 6404 Westchester, Jackson MI 49205.

51S1 WANTED: W7FFF, 4108 E. Mitchell Dr., Phoenix AZ 85018.

TRADE-Sell: FB-7 and SW-3 with coils and power supplies. Barkin Crystal set and Audion panel. S.a.s.e., W6GPB, 522-Third St., San Rafael, CA 94901.

WANTED: CE600L, SP600JX, Swan 600T 600R custom two meter gear. Electronic organ, 16MM camera & projector Meg/Opt 2,1/4 X 3 1/4 Uher Nagra III Sync recorder. John Waskowitz, 35-30 73rd St., Flushing NY 11372.

SWAN 500cx w/new matching speaker & power supply - \$395. B. Heckert, Box 426, Elwood KS 66024.

CX7A owners: One completely reconditioned Nixie readout display unit, complete with IC's, Bargain at - \$75. W3VDA, P.O. Box 1333, Harrisburg, PA 17105.

HRO 60 5 coils, clean manual - \$220. K8DPV, 1483 Foxwood Drive, Cincinnati OH 45231.

COLLINS 75S-3B, 32S-3, 516F-2, 32B-3, 500 Hz. CW filter - sound emblems except 32S-3 - \$1495. New Clegg FM-27B in sealed cabinet - \$350; National HFS and supply - \$75; Hammerlund Comco Pro-Circs 1922 and preselector, exc. cond. - \$85; Heath SR-500, never used - \$150; T-Craft criterion converters 6M, 2M, 1 1/4M - \$95; B&W 650A kW inductor TCS rev., xmtr., original A.C. & D.C. supply - \$75; BC-669 & A.C. supply - \$65; Lafayette HA-144 - \$75; Hallcraftor PS-150 12V D.C. supply new \$75. F. H. Claus, W3VEQ, 104 Wetzel Rd., Pittsburgh PA 15209. Tel. (412) 486-6201.

SAVE time repairing counters, DMM's, Synthesizers, computers, calculators or anything digital, with a logic probe from Chesapeake Digital Devices, Inc., Dept. A, Box 341, Havre de Grace MD 21078. - \$19.95 wired, \$14.95 kit, postpaid.

FOR SALE: GE Procline, two meters, four channel with crystals and control equipment. WB5GRZ, Courtney Duncan, Box 336, Hubbard TX 76648.

SB-104, SB-604, and HP-1144. Used two hours. Working perfectly, with cables and manuals. Don't need two rigs! - \$895 plus UPS. K8NGY, 26496 W. McNichols, Detroit MI 48240.

WANTED: Any manuals or alignment specifications for RCA FM transceiver CMCT-30, WA2DGO, 322 Broughton Avenue, Bloomfield NJ 07003.

FOR SALE: Zenith Transoceanic Royal 300 portable. Like new, original cost \$300, will sell for \$100. Furry, Tel. (312) 546-4896.

TV Cameras with manual zoom lens, solid state NEW (from Cartrivision bankruptcy sale) - \$125 each. Power supply for camera - \$30. Close-up lens set - \$14 (add \$5 for shipping). California residents add 6% tax. Bob Allen, W6WGD, 124 Lundy Lane, Palo Alto CA 94306. Phone (415) 493-6146. Front panels for Cartrivision VTRs - \$28.

SELL: Argonaut - \$175; 405 linear - \$100. Both - \$250. Excellent coax., with mic. and manuals. J. H. Taylor, WB8RB, 925 South Madison, Junction City KS 66441.

FOR SALE: FPM-300 MKII transceiver with cables. Want Clegg FM-27B with antenna, trade anyone? Also, sell Ten Tec Triton II. Write WAZRUD, Bill Levy, Polly Park Road, Kye NY 10580.

GONSETT GSBE-100 - \$140. NC-190 receiver - \$120; QST 1931-1963 complete - \$60; CQ, 1945 (8 issues) - 1970 - \$45. 73, 1st 5 years - \$15; Ham Radio, 1966-1972 - \$9; 200 Meters and Down - \$10. Radio News Signal Corps Editions, 1, 142 and 2/44 - \$2 each. Misc. Handbooks, Write please. Will shipping. Ruffis, K1FTR, BR2 Box 341, Sebago Lake ME 04075.

WANTED: PP-2765A/JRA-36 (PS-4A) low voltage power supply for TARC F.W. linear amplifier. AM-2785A/JRA-36 (PAI-1K(A)). Have spares. BY supply (PP-2765A/JRA-36) for above to trade. K4CFJ, 265 Kenlock, Lexington KY 40503.

COLLINS station - \$1380. In mint condition except linear amplifier which needs minor repair. Linear Amplifier 30L1, receiver 75S1, transmitter 22S3, station control. Custom made hickory desk, dummy load, J. A. Warren, 508 Ronnie, Indian Harbor Beach FL 32937. (306) 773-2619.

EWM-1 with 516-F1 AC supply. Manual. Never mobile. Excellent - \$275. W6NIU.

FOR SALE: All with manuals and working. Heath IO-105 dual trace triggered scope — \$250; Sencore PS-163 dual trace triggered or free running scope without probes — \$350; B&K 1440 single trace scope — \$100; B&K E-1016 sing-square audio generator — \$80; Leader L60-302 3" dual trace triggered scope — \$350; B&K E2000 RF generator, solid state, metered, crystal calibrated, AM modulation — \$150. Wanted. Operations handbooks for AN-TRM-1 and AN-USM-16. Will pay to copy. Richard Matassa, 941 Army Trail Rd., Addison IL 60101. (312) 543-2186.

KENWOOD twins R-588 w/2 meter converter, T-589, good condition — \$400; Yaesu FT-2 auto 2m 15w transmitter — \$200. George, WA3LQN/Q, 338 W. Powers Ave., No. 305, Littleton CO 80120. (303) 795-3531.

KWM-2 516F-2, very fine cond. — \$750. K91YT (317) 476-7955.

ANTIQUE DeFoster receiver D-112, no loop. Best offer. WPRS, 91 Priest St., Leominster MA 01453.

YAESU FR-4x-400 receiver, matching speaker, Ameco SWR meter, #22KBK, 1803 Lincoln Ave., Pompton Lakes NJ 07442. (201) 835-4711.

SELL: Globe King 500C, HQ180, HQ10 scope, antenna rotator, 811As, many spare tubes and parts, phone patch. — \$450 everything, or part out/swap for Drake, Swan transceiver. R. Sturdevant, CallCoun NY 12722.

FOR SALE: Heath Scope 5" Olson capacitance-resistance analyzer, signal generator, Eico No. 466 tube crk. Olson 1 1/2 amp variable power supply — all for \$100. Dave Thomas, 81 Rosewood Terrace, Lakeview NY 14085.

COMPLETE station — SB-301 (all filters) — \$225; SB-401 — \$250; SB-630 — \$60; SB-610 — \$60; HD10 — \$25; SB-600 — \$15; HDP21A — \$15; HN-31 — \$9; All expertly wired, flawless condition, under 50 hours use. All manuals, cables included. Also new SB-200 kit, assembly just started — \$245; TA-33 Jr. beam with MP-33 conversion — \$80; 40-foot, 3-section free-standing spire tower — \$120. Both excellent condition. T-244 rotator, needs repair — \$35. 50-foot new 2G8/U coax — \$10. WA2BZY, 55 Deepwood Dr., East Aurora NY 14052. (716) 652-0321.

FREE: 8 extra crystals of your choice with the purchase of a new ICOM IC-22A at \$249. With the 10 crystals which come factory-installed in the IC-22A, this gives you a total of 18 crystals. For equally good deals on Collins, Drake, Ten-Tec, Kenwood, Regency, Swan, Atlas, Midland, ITC-200, Standard, Tempo, Alpha, Genave, Hy-Gain, Antenna Specialists, CushCraft, Hustler, Mosley, and others, write or call Hoosier Electronics, your ham headquarters in the heart of the Midwest, and become one of our many happy and satisfied customers. Hoosier Electronics, P.O. Box 2001, Terre Haute IN 47802. (812) 894-2897.

SELL: Mint Drake R-4-B — \$280. You pay shipping. Gene Hagan, 1048 McCarty St., Duncelm FL 33528.

SINGLE sideband converter CV591A in daily use. Improves reception of FR 9R, 1C 890 and similar receivers. Not MARS issue. WB2VND, Box 31, Corbettsville NY 13749.

CLEGG 66'er. Brand new, 6 meter transceiver. 22 watts input, 117VAC & 12VDC built in p.s. & manual — \$120 and UPS; Heathkit SB301 w/filters, SB600, SB401 w/xtal pack & manuals, mut. \$450 & UPS; Henry 2K-4 linear amp, crystal, mut. \$885 & Shipping. J. A. LaTorre, P.O. Box 521A, Lawrence MA 01842.

DRAKE station, SPR4, with TA4 and SCC4, T4SC, C4, AC4, M4, and L4B. Will sell separate or \$1700 for complete station. WA1DFN, Box M, Fall River MA 02724. (616) 674-3531.

FOR SALE: Johnson Thunderbolt w/2 spare final tubes. Instruction manual — \$285. HA-1 keyer — \$40. Model 15 RTTY — \$80. All FOB Lasiter Box 2382, Sierra Vista AZ, 85635. (602) 458-8859.

WANTED: External VFO for Heathkit SB101. Tommy Gossett, Rt. 1, Box 301A, Pearland TX 77581.

FOR SALE: Bonton 202E AM/FM signal generator, \$150; Measurements 210A FM signal generator — \$60; Teletoni SN3 UHF sweep generator — \$80; Scott R30 stereo generator — \$125; all in A condition. Glenn Schmidt, 5123 N. Chester, Chicago IL 60656.

COMPLETE Ten-Tec novice rig: RX 10 receiver; TX100 transmitter; model 200 VFO — \$99. K7UKP, Hamlet 1025, Seaside OR 97138.

NCX-3 with matching power supply and speaker. Now on the air. Sell both for \$185. Will ship, but prefer pick up. Certified check or money order only. Rev. George F. Ott, WA0VPP, 543 E. 13th Street, Baxter Springs KS 66712.

SIDESWIPER Fans: Beautiful Scandinavian-styled, hand-made sequins on teal base, only \$13.00 airmailed. KUNGSIMPORT, Box 257, Kungsbacka Sweden

E-7 Way tower, 65' with Ham-M — \$195. You remove. Philip Harrington, 117 Highland Ave., Rowayton CT 06853. WN1UWR.

SELL: Novice station, Heath "Chevenne", power supply, mike, manual, HR-10 receiver, calibrator, manual. Best offer above \$70 takes all. Rick, WB7YUQ, 91 Hawthorn Rd., Bellingham WA 98225.

FOR SALE Collins 6281 — \$675. 75S3B — \$650. 3281 — \$325. 6142 — \$115. SP600 TX17 — \$250. Central Electronics MM2 — \$65. A slicer — \$30. Heath SB630 — \$65. SBE450 (new) — \$240. Motorola 4 freq. MOTRAN — \$325. 2 freq. U44DBT — \$75. LAMPKIN 105B — \$100. WB0BZC, 1640 Spring Valley Road, Golden Valley MN 55422.

DRAKE DC-4 powt supply — \$95. WB2PRC, Bob. (914) 477-2173.

DRAKE R-4, Eico 720, Heath KB-1100, RCA 2-M/FM. All FB w/manuals. WA8QBJ, 6305 Redbird Terrace, Clinton OH 44216.

HEATH: SB-303, ex — \$305; HW12A, mike, homebrew supply \$120; HW-7, HWA-7-C — \$75. All mnt. manuals, shipped. Gonset Communicator II (2 meters). Excellent — \$105. Knight R-195 receiver. Wanted: Heath monitor scope, HDP-21A mike, telescopes, WB4YLL, Buddy Wilkins, Route 3, Box 150, Stanton VA 24401. (703) 885-3978.

JOHNSON Adventurer, good condition with manual — \$25. WA2GMC.

HEATHKIT HW-16 transceiver (absolutely new, factory aligned); Slinky Dipole antenna; ten crystals; mounted key — package price — \$115. V. M. Solomon, The Parkway at 18th St., Apt. 19A, Phila PA 19103. (215) 557-3259 days.

WANTED: Collins 200 cycle filter for 75S3B. Bruce Bouvier, 2609 Finlay Ave., Pennsauken NJ 08109.

WANTED: Eico 7512 DC power supply. Also transmatch. D. Peak, 17539, Methil, Spring TX 77373.

HYBRID quad, with Bslun — \$110 value, for — \$65. Zachart Rotwink, 4721 NW 19 Court, Lauderdale FL 33313.

32S-3, 75S-3B, 516F-2, SM-2 (mike), 500 Hz filter — complete \$1350. Ranger I — \$75; TQ-Drive and vibropex — \$65. W1BPW, Peter K. Butler, 3 Elizabeth Key, Merrimack NH 03054.

WANTED: Any type of parts for the R-390A. W6ME, 4178 Chasin Street, Oceanside CA 92054.

THIS is and has been a good outfit — Drake R4A, T4X, AC4, M4, Astatic D10A, Heathkit HD-15 cables & manuals. Have other interests. \$600 and you ship. Ralph, WB5DHA, P.O. Box 6261, Fine Bluff AR 71601.

SELL: HQ170 — \$185, A-1, manuals, plus shipping. Prefer pick up. W2JFV, Box 42, Roosevelt NJ 08555.

WANTED: clean Collins 310A-3 or 310B exciter, National HFS, and Heaters SP-44. Also, I'm interested in pre-1948 TV sets — need help locating: 5" RCA and other interesting small screen or projection sets. Sam Thompson, W6HDU/6, 1133 Polk St., San Francisco CA 94109.

HEATHKIT SB104 xcvr, HP-144 ps, SBA104-I NB, SBA-104-3 filter, mike, spkr. All mnt. — \$850 or best. Will consider deal on the C Line WA4AOS, Glenn, Box 4612, Columbia SC 29240. (803) 754-8582.

WANTED: Older, low power transmitters, and receivers suitable for novice operation. Example DX-80's, DX-40's, and old but usable receivers. Contact: John H. Deady, WB7JB, 2457 Dayton Road, Springfield OH 45506, state price and condition.

FOR SALE: Used Kenwood T-599 — \$250. Used Allied AX-190 amateur receiver — \$125. WB0MCT, Bill Johnson, 610 1/2 Sycamore, Tipton IA 52772. (319) 886-2697.

SELL: Robot SXTV Model 70B monitor: 80A camera with lens; less than 6 months old — \$500. W4KGR days (919) 767-5250, J. R. Reagan, Winston Salem NC.

SELL: National 270 Xcvr, w/manual — \$125; Knight T/60 xmtr, w/manual, w/VFO and power supply — \$70; Dow Key relay — \$10. Mimmie Walker, WB5KYQ, 1410 Richmond Road, Apt. 213, Texarkana TX 75801.

SELLING: New Mini-Beam Hybrid Quad HQ-1 and Newtronics 4BTV 4-band vertical with RM-75 resonator, for best offer. Moving to apt. W2HBV, P.O. Box 634, Newark NJ 07101.

LINEAR amplifier, Gonset GXB 201, 1500 watts SSB, 100 cw, 300 A. Covers 10-80m, heavy duty, 4-8112's used; only 10 hours, like new, original carton. Im a low power CW operator and never used the linear. Mint condition — \$320. WB2TYR, 21 Hill Rd., St. James NY 11780.

YAESU Owners — present or prospective — listen for FT Net! Saturdays 1700 GMT, 14-355. Discuss new equipment, modifications, questions, answers. International Fox-Tango Club. SASE brings complete club information and free sample newsletter. Milton Lowens, WA2AQQ, 3997F Sedgwick Ave., Bronx, NY 10463.

\$150 certified for FT-100 that works 2 or 400 for KWM2 that works. W0BNF, Box 105, Kearney NE 68847.

COUPLER — Murch transmatch UT2000A. — \$125. W1KVP 506 Orange Street, New Haven CT 06511. (203) 481-3188 nights.

QUAD kits — \$14.50 to \$25. Boneless spider mount. — \$12. Send s.a.s.e. for information. WHC, 404 Sanders Rd., S.W. Huntsville AL 35802.

FOR SALE: A rare, unmodified 1930 Scott All Wave 12 tube receiver, complete with tubes, coils, amplifier-power supply chassis and speaker. Make offer. Original unmodified 1927 television receiver with 24 inch three spiral scanning disc, tubes, Davon amplifier, rheostat speed control, all in 54 inch console. Truly a conversation piece. Make offer. Roy Merkel, W3HPP, 959 Georges Lane, Warminster PA 18974. (215) 675-5864.

THIS equipment mint condition. Very few operating hours. Galaxy GP-550A, AC400 power supply and G-1000 DC power supply. Must sell the 3 units as group — \$390 or best offer for quick sale. WA5SFM, Borger TX 79007. L. A. Bliss.

ICOM Demos: IC-21, GLR-400B — \$399; IC-21-A — \$379; IC-2-A — \$219; IC-30-A — \$349; DV-21-A — \$329; IC-230, \$399; IC-3P — \$74.95. Crane Radio Co., Rte. 1, Ex. 2, Kirby Maine (207) 439-047/Box 615 Portsmouth NH 03801. (603) 436-2884 after 7 PM.

I NEED a schematic and trouble-shooting help for a National NCX-3. Please advise cost. Mike Jacobs, 1177 N.E. 8 St., Delray Beach FL 33444. Phone Collect (305) 276-6655.

MUST sell: Going to college. Johnson KJowatt match box w/ directional coupler, never used - \$200. SB144, 34/94, 16/76, w/ 50K Newtronics ant., - \$185. Don't have time to complete DA60. Kmt & HIG TORVFO - \$95. All ppd. T. Leshor, K3NGU, RDI, Elfers PA 17319.

FOR SALE: Johnson K.W. Matchbox with SWR meter and coupler - \$150. HV-Gain rotator and indicator, model 400 - \$85; Heath SB 630 scope - \$95; Heath SB 610 scope - \$100; PDB, W2AOM, 47 Juniper Street, Dumont NJ 07628, Tel. (201) 384-1264.

ANTIQUe for sale. National FR-7 ham receiver with speaker, type AB power supply and 14 coils (most ok). Offers accepted with the right to reject any or all offers. Dick Benner, 13600 West Center, Lakewood CO 80228. (303) 985-2149.

CLEGG FM 27-B with PL - \$250. Paul W. Haczela, K2BQU, 8 Yale Place, Amherst NY 10604. (914) 273-9067.

SEVERAL Simpson model A solid state 6 watt 2 meter transceivers with 34/94 crystals. Unopened. - \$135 postpaid, some extra crystals at \$4 each. KASG, Box 6, Gary NC 27511.

FOR SALE: Heath SB-303, solid state receiver. Mint condition - \$285 plus shipping. Wanted, 29 meter beam, HAM M, W1WXY, 37 Conch Road, Narragansett RI 02882.

FOR SALE: 3 bdrm, 1 1/2 bath 1500 sq. ft. home with 72 ft. bay duty free-standing tower, in Fullerton CA Call W6ABN (714) 871-0975.

HEATH linear SR220 - \$375; Tempo One transceiver with ac supply - \$360; wattmeter - \$50; All units new, used less than 2 hours. W8DSW, R.F. Hudson, 6646 Crane Ave., Detroit MI 48213.

FOR SALE: Swan 350 W117X Hx Gain 18 AVT/WB - \$360. All very good condition. J. Fidel (212) 331-0028. 13-65 W. 7th St., Brooklyn NY 11204.

STATION Sale: SB102, SB220, two homebrew SB VFOs, HD10, 63R mike - \$730. HIG-DXCC beam, 50' tower w/rotator - \$125. No split, you ship or pick-up. K1IGO, Clinton CT 06913. (203) 669-2456.

TEMPO FMH 2 meter Handy Talkie, Tiny Tone pad, five sets crystals, ac charger, NiCADs, case, rubber ant., mobile antenna. Brand new - \$300. Kellersman, 1433 Redding Rd., Fairfield CT 06431. (203) 259-7033.

FM: GE transistorized Progress line NBFM transceiver, easily converted to 6 or 10 meters with service manual - \$80. DX60 transmitter - \$40. Send s.a.s.c. for list of parts for sale. M Gordon, 487 Commonwealth Ave., Boston MA 02215.

SELL: BC-221 w/PN, mint condition, new 4-125 tubes; very large Tesla Coil, 42 inch dia. Want: Heath Impedance Bridge, HW-101, and 30 MC counter and 201A tubes. George A. Masten, WOLPW, Mt. Pleasant IA 52641.

SR300 & 5B400, all filters, both mint - \$400 or offer. Pair 813s - \$30. WA3HH, (215) 754-6286.

HEATH SB-100 and P.S. mint - \$300; Heath Two'er - \$30; TA-33 beam - \$70; TR-44 rotator - \$30; HA-26 two and six mtr. VFO - \$25; Clegg 99'er - \$35; Marvin Lager, 69-23 228 St. Queens NY 11364. (212) 229-9064.

DISCOUNT prices plus full warranty on new guaranteed items; CDE Ham-2 \$117.00; Belden 8443 rotor cable 12c/ft; Hygain TH6DX (240. list) cost \$192.00; TH3MK3 \$160; Mosley Classic 33 \$179; 15% discount Triex W. MW towers, supermast - \$08 Calif; Belden 8214 RFBFOAM 22c/ft; 8237 RG8/U 18c/ft; RG628/U 8c/ft; Central 100PF & 15kV transmitting cap \$5.95; CLE 00110K5 AC regulator \$150; Quate TS520, Atlas; Sorenson ACR2000V.A.C. regulator \$150; Quate TS520, Atlas; old tubes, write notes; Collins Prices \$10B House; prices good until Sept. 1; Madison Electronics, 1508 McKinney, Houston TX 77002. (713) 224-2668, mic (713) 497-5683.

FOR SALE: Brand new Ten-Tec model 200 VFO. Never used. Only \$89.50. HQ106 receiver, good condition, aligned by Heath technician - \$65. Both for - \$110. Pick-up preferred. Len Martin, W2ZYA, NYC (212) 850-3275.

SELL: Drake R-4C (\$400); T-4XC (425); MS-4 & AC-4 speaker-power supply with mounted NYE phone patch (\$100); 1-4B (\$600); Murch UT-2000A antenna transmatch with Drake W-4 (8125). Only 6 months old. Mint! package deal - \$1600. 88VYV, Dwight (419) 782-1115.

DX-20 - \$25. HW-19 (CENER) - \$25. Pick up, W2AFD, 32 Eleventh, Haddon Heights NJ 08035.

WANTED: Good buy on linear amplifier. Phil Snyder, 753 James St., Syracuse NY 13203.

LAFAYETTE HA-410 10 meter am transceiver, microphone, manual. Perfect condition - \$75. Phil Partee, 12305 N.W. 5th Ave., Miami FL 33168.

WANTED: Millen Transmatch; Collins S-line station. Neil Botford, WB5DMM, 10308 Wuarra, N.E., Albuquerque NM 87111.

SELL: T-19/ARC-5 clean modification, full information, parts, also HV-Gain 12AVC vertical, Heath HO-20 Crystal Calibrator. Nussbaum, 19617 CR-2, Bristol IN 46507.

SELL: Intel SIM8-01, microprocessor prototype system, includes 8008 CPU, also Ten Intel 1702, proms, all brand new. Mike Siegel, 41 Middle Loop Rd., S1 NY 10308.

HEATHKIT SB-303 with cw filter, perfect condition. Best offer over \$285. WB0GSL, Qtrs. 4308B, USAF Academy, CO 80840.

WANTED: National KCU-50-2 crystal calibrator and speaker for HRO 60. E.G. Bickley, Johnny Creek Rd., Poestalt ID 83201.

SB-101 with cw filter, HP23, SB600, all new tubes and just aligned - \$380. James DeMont, Box 451, APO San Francisco 96235.

SELL: Sonar FM-3601 with 34/94 - excellent \$240; Drake SC-2, 2 meter converter, power supply, and calibrator, excellent make offer. A/S Mon-25 148-174 MHz preamp, used once - \$19. WALKY, Dan Horton, 34A Pearl Street, Provincetown MA 02657. (call 617-487-1372).

FOR SALE: HW7 - \$50; 2M FM walkie talkie H23 series Motorola w/charger less Nycad - \$40. Kever w/paddle - \$15. BM Gele, Yag \$20, Magazines - CQ 1968-1974; QST 1968-1974, and HR 1972-1974. \$3/yr. K3NBC, (301) 356-9010.

NOVICE and six meter rig. Hammarlund HQ-170 \$99. Hallcrafters HT-40 \$29. K4JCX, 121 Maple Lane, Oak Ridge TN 37830.

HRO Coils Wanted to complete my set. 400-1800 kHz and 7.015-0 MHz needed. Gary Johnson, WA1QMI, 567 Quaker Lane South, West Hartford CT 06110.

COMPUTER printout of your area for one year. Oscar 6 - \$1.50, Oscar 7 (2-10M) - \$2. Oscar 7 (both repeaters) \$2.50. Give time zone. Donovan Wade, WB5KNA, 813 Fontana Ave. Richardson TX 75080.

WANTED: B&W turret No. BTEL No. Junk. W9ALD, 80 So. Grace Ave., Lombard IL 60148.

KWM2 - Waters rejection unit - \$650; 30L-1 - \$400; DX100B - \$75; Hallcrafters SX101 - \$150. (\$1275). Excellent condition. Jack Lesser, 50-15 196th St., Flushing NY 11355. (212) 229-8592.

FOR SALE: Johnson 700W Matchbox with swr - \$80; Realistic P20 2B PNB monitor - \$50; Allied comm. spkr - \$5; WA2EXU (212) 996-6496 after 6 PM.

SELL: Mint 30L round emblem - \$375; Wanted, late 7583C, state price and S/N. W2EHR, 32 Bryant Rd., Blackwood NJ 08012.

TRIEX Selfsup. Xtra strong motorized with prop mtr. - \$950. one new DX Eng. Processor for Collins - \$50. Nick, WB6DXU, 10107 Lev Ave., Arleta CA 91331.

FOR SALE: Drake C-Line 14XC R4C AC4 MS4 MN2000 SR220, all mint condition, asking \$1550. Bob Yourwith, WA1JBN, Mott Hill Rd., East Hampton CT, (203) 287-0160, after 6 PM.

COLLINS 7583, mint cond., all new tubes. Best offer over \$375. M.B. Kassel, MD, K3MLR, 7561 Overbrook Ave., Phila PA 19151.

SELL: HT220 slimline 6 ch. with TT pad, xtal, desk chgr, anti-spare NiCAD, like new - \$500 or best offer; Standard 826M with 3 xtal, exc cond. - \$250; Regeney HK6 with xtal, mint - \$150; TPL pwr amps, 2M-10W, 90W out - \$90; 450, 450, 3M in, 20W out - \$90. Bob, 48 Winchester St., Medford MA 02155. (617) 396-2920.

GONSET HT-2M, ptt - \$75; Globe DSB-100; parts for 2 kw linear. Avator, Kent Model 20 - \$100; BC-654 AM/CW complete, w/bt, W1ETC, Box 747, Amherst NH 03031.

ALPHA-77, mint - \$1395; Alpha-374 demonstrator - \$1100; Signal/One CX7A - \$1395; Boards: counter, \$85; audio, \$39; power, \$70. Payne Radio, Box 525, Springfield TN 37172. (615) 384-2224. Box 525, Springfield TN.

CRYSTALS aimed: Novice, active FT-243, all frequencies, minimum five 40M, 15M, 10M - 99c each, 80M \$1.75. Less than five, 80M \$1.90, other \$1.50. Bob Woods, W0LPJ, "Crystals since '33", C-W Crystals, Marshfield, Missouri, 65706.

SAVE, SAVE, SAVE - Discounts on tubes-transistor-antennas-speakers-Rheostats. Tated Electronics, 2 Pine Tree Hill Road, Newtown CT 06470.

SWAN 350 with 117XC, mic, cal, SWR. Excellent condition - \$225 FOB. Mike Abrahams, 1835 Franklin St., No. 302, San Francisco CA 94109.

FOR SALE: Magnum Six for Drake TRAC - \$95, post paid. WIDBS, John Savouis, 410 Blake Rd., New Britain CT 06053.

DRAKE 23 & Hallcrafters HT-37 & SWR, mike, etc. All for - \$300, you pick-up or deliver. Fife, WA5TBA, Box 2052, University MS 38677.

SELL: SB101 kevr, excel cond. w/homebrew ac ps, mike - \$325 pld. WA1BCEJ3, Larry Rudner, 1612 Brightseat Road, Landover MD 20785, (301) 341-1067.

RTTY equipment for sale, model 2R ASR, keyboard and page printer. No punch. Very good condition, with some spare parts and complete set of manuals. Also, new model 15 tap reader set with motor and three readers. All for \$400 plus shipping. Frank Toth, K9VMI, 717 N. Gardiner, Rockford IL 61107.

SERVICE on Drake HF equipment, available to New York City area. Reasonable rates. Rich Yashner, WB2TCC, (212) 352-8289.

WANTED: TH-2 (exc) (W6RGZ) 1330 Curtis, Berkeley CA 94710. (415) 526-7345.

QST - Ferris Radio wants your business. In stock: Dentron, Husler, Arrestor, Komar, 2 mtr. fm xtal \$4 each pld; Lightning Arrestor, \$4.75 pld; 5 position ant. switch - \$15.95 pld; used gear: TR108 - \$75 pld; Drake 1A - \$50 pld; Write for list or quote. FERRIS Radio, 308 E. Harry, Hazel Park MI 48030. (313) 398-6645.

FOR SALE: Heathkit SB401 w/crystal pack, excellent - \$250; Allied SX190 rev. 1120, both - \$350. Will ship UPS. Phil Geninger, WB0MMS, RR4, Ames IA 50010.

COLLINS S-line: 75S-3C, 72S-3, 516F-2, 30L-1, 312B-4, - \$2200. C.T. Robertson, WB5LEE, Rt. No. 2, Box 14488, Boerne TX 78006.

WANTED: Radio handbook, 15th and 17th edition, Richard M. Blunt, W9NN1, 21W 260W Sunset Ave., Lombard IL 60148.

DRAKE 2R, 2RQ, 2AC, 10M xtal = \$165; Heath DX-60 and HG10B - \$75; Multiphase MM-2 RF analyzer - \$20; Mosley MB-15 - \$30; TA-36 - \$75; Ham-M - \$75; Tristao 54 ft. crankup tower - \$175; two RTTY models 158, one good, one for parts. Also, fl and lost of paper, all for \$50. KW linear parts: Xtrm 4200 VCT 500 mA, 2 kW modulation xvmr, 2-RK-65 2HF-200, 6 mUlliameters - all for \$40. Scotty WA2DF1, 112 Walworth Ave., Searsville NY 10583. (914) 472-3148.

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FOR SALE: Heath SB-301 receiver w/AM-CW filters, SB600 speaker - \$195; SB-200 amplifier w/extra pair pen finals - \$210; HX-10 Marauder transmitter - \$125; Collins 75S3-A receiver - \$350; Heath HR-10 receiver w/calibrator \$40; Ten-Tec TX-100 transmitter - \$35; Hallicrafters HA-10 VFO - \$50. Contact Debi Hawrysko, WB2XNY, P.O. Box 568, Boro Hall Station, Jamaica NY 11424. Phone AC (212) 647-2730.

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HEATH HR-20 receiver - \$50; HP-23A supply/speaker - \$65; PM-2A QRP - \$35; Vibroplex - \$15. Dave, WB2VQF, 6 Hail Lane, Willingboro, NJ 08048.

275 JOHNSON Matchbox \$75; Heath xmtx DX40 - \$35; Vibroplex - \$25. WB5FDB, Box 302, Tyrone NM 88065.

HY-GAIN TH6DX Tri-Band Beam - \$100. Kirk 3 El. Tri-Band Quad - \$100. K2BQO, Paul W. Haezela, 8 Yale Place, Armonk NY 10504. (914) 273-9067.

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SWAN 350C, 117KC supply, Shure 444 - all excellent - \$350 or trade for better 35 mm or larger format SLR camera. Abel P. Moran, WA9WJL, 1111 Emerald, Madison, Wisconsin 53715. 255-5059.

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OSCAR Drake TC-2 CC-1 SC2 CPS-1 SCC-1 T4X factory prepared for TC-2 use, and connecting cables. \$650. WB2QMU, Box 452, Spring Lake NJ 07762. Tel. (202) 449-4705, weekdays (212) Tel 9100.

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WANTED: Manual for Knight, T-60, Garry F. Swither, 23D West Apts., Big Rapids, MI 49307.

WANTED: SR840 LMO front panel or entire unit. Eric Johnston, WB9PNI, 1912 Mohawk Circle, Olathe KS 66061.

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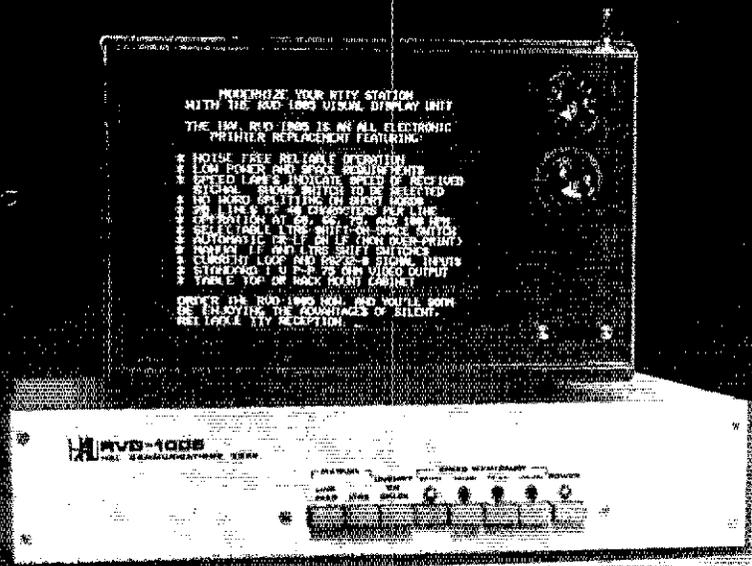


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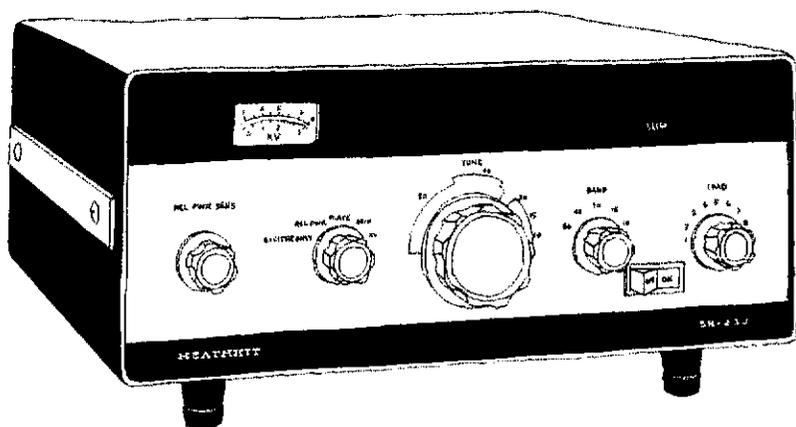
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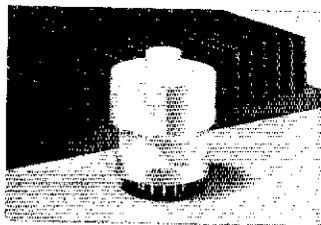
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