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IN THIS ISSUE — NOVICE ROUNDUP — BIGGEST EVER!

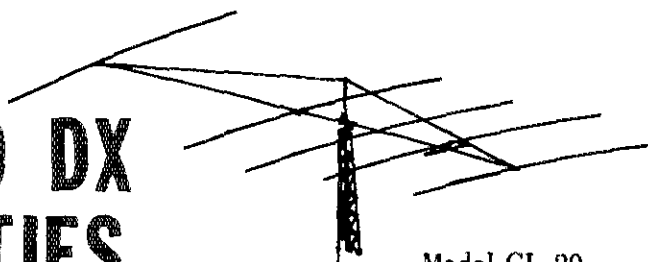


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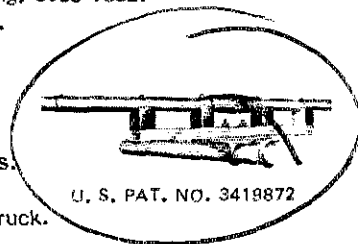
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- SHIPPING WEIGHT: Approx. 145 lbs. via truck.



For detailed brochure write . . . Dept. 198

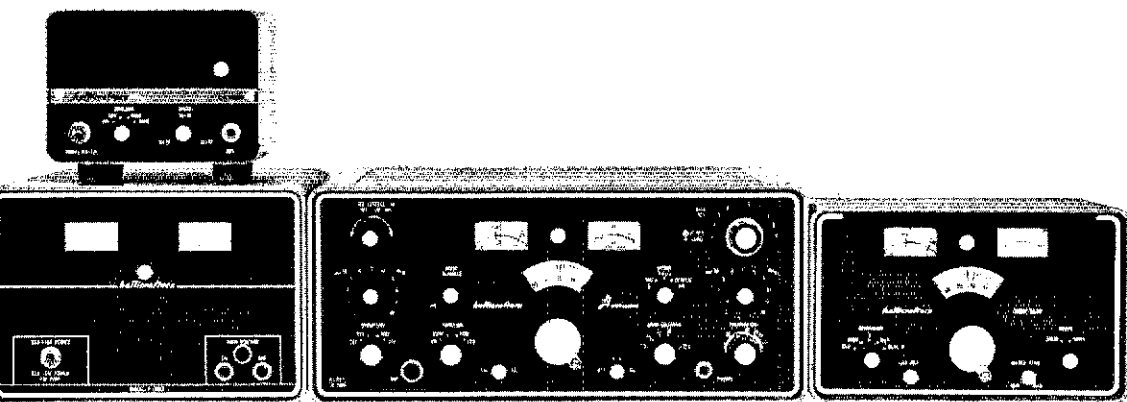
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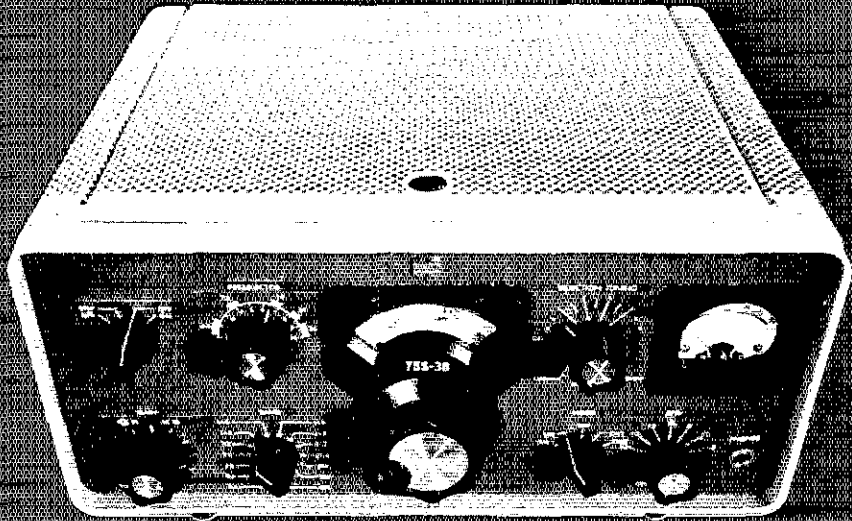
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QST

JUNE 1970

VOLUME LIV NUMBER 6

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OUR COVER
This month's cover pictures but a few of the many entrants in the Annual Novice Roundup. They are from left to right, top to bottom: WNØYMK, Robert; WN5-WOW, Bill; WN7-MKQ, Bill; WN2-HID, John; WN3-NPS, Craig; WN6-OMK, Chris; WN9REITZ, Rich; WN9QAZ, Richard and WN4OPG, Gregory.

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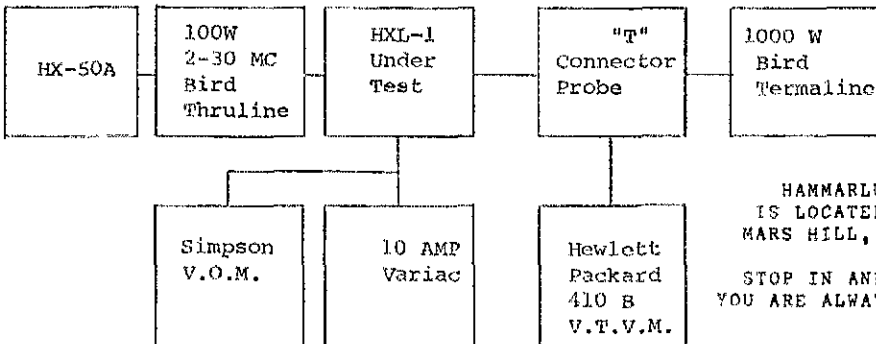
PREPARED BY:
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NOTE: ADJUST LINE VOLTAGE TO 110 VOLTS UNDER LOAD FOR POWER MEASUREMENTS.

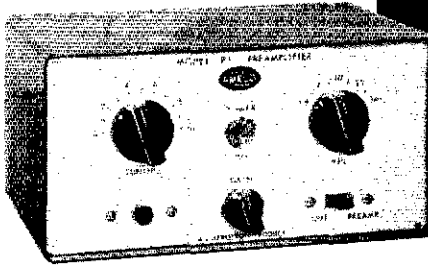
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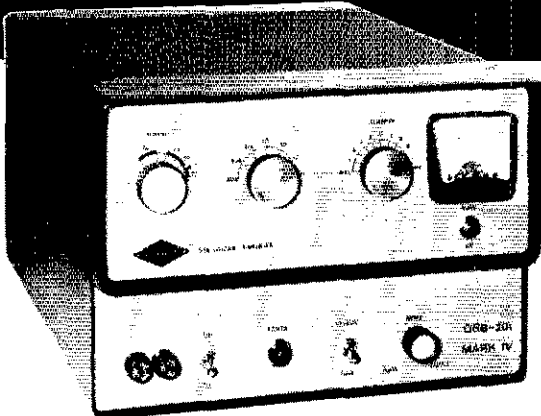
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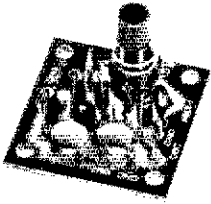
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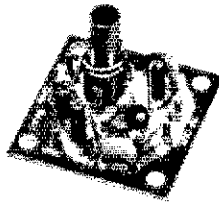
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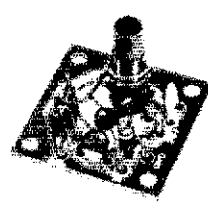
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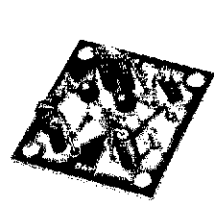
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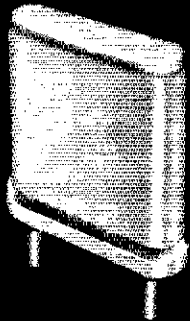
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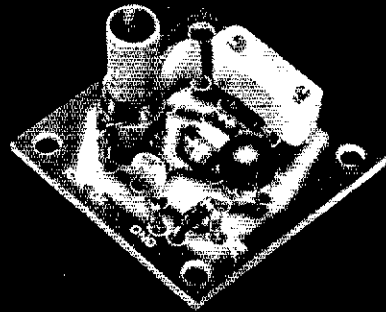
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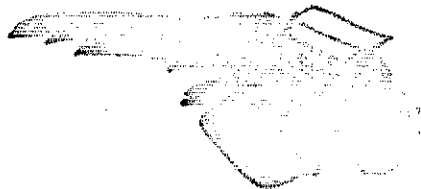
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"It Seems to Us..."

A. R. R. L. OPPOSES REPEATER RULES

A MAJOR SUBJECT for the agenda of the annual meeting of the ARRL Board of Directors last month was a decision on the FCC proposals covering vhf repeater operation. Much preliminary work had been accomplished, largely by the ARRL Advisory Committee (W0CXW, W2ODC, W4GCE, W5VPQ, W6GDO, W6MEP, W7FHZ, W9BUB, VE3ADO), which presented a full and complete report for the Board's consideration. This was based in part on input from individuals and repeater groups around the country, prompted by rapid dissemination of the FCC text through last-minute preparation for appearance in April *QST*, and through a number of other channels. In summary, the report indicated thorough dissatisfaction with FCC provisions and a strong feeling that the proposed rules were so restrictive that they might be the end of amateur repeater operation as it exists today.

During the informal sessions just prior to the meeting, it was agreed a special working group of directors would draft a statement of principles for appraisal and, hopefully, adoption by the Board. This was accomplished in a many-hours session of interested directors chairmanned by committee liaison director W6KW, with counsel W3PS and vhf editor W1HDQ as advisors. The total effort was so well directed that when the motion came before the Board in formal session, it received only a minimum of critical comment and was unanimously adopted.

The actual League filing will take considerable time to prepare, because of the many complexities of the rules; indeed, the League is requesting an extension of time for this purpose. Meanwhile, however, the basic principles expressed by the Board well state the ARRL position toward the FCC proposals:

1. That any rules adopted on amateur repeaters should provide for the maximum of flexibility and the minimum of restrictions and regulations.
2. That repeater linking and multiple hops should be permitted.

3. That coded access ("whistle-on") should not be mandatory but may be provided at the option of the repeater licensee.

4. That cross-band operation of repeaters should be permitted.

5. That subbands for repeater operation should not be specified by the Commission at this time except that, in the 144 MHz band, repeater operation should be conducted only above 146 MHz so as to permit the greatest flexibility for development of space communications in the world-wide exclusive amateur portion of that band.

6. That the licensee or another operator with an appropriate class of license designated by the licensee be capable of deactivating the repeater from a fixed, portable or mobile control point in case of malfunction or improper or unauthorized use of the repeater.

7. That the one kilowatt power limit applicable generally to the amateur radio service should be applicable also to repeaters.

8. That fixed, portable and mobile operation of repeaters should be permitted.

9. That automatic means to limit the length of a single transmission of a repeater, or a series of transmissions, should not be required but may be provided at the option of the licensee.

10. That identification of a repeater should be given at least every ten minutes (rather than three) of repeater operation, by automatic means and by cw, mcw or voice at the option of the licensee, with cw or mcw, if used, not to exceed a rate of twenty words per minute.

11. That the League concurs with the Commission's proposal regarding relaxation of logging requirements.

We believe the directors' actions make the League's position crystal-clear. Let there at least be an end to the loose talk about ARRL "disinterest" in repeater operation!

QST

A decision to file strong opposition to the restrictive FCC proposals covering VHF repeaters was a highlight of the annual meeting of the ARRL Board of Directors, held in Hartford, Conn., May 1-2. The League will request a minimum of rules, with maximum flexibility and privileges such as crossband operation, chain linking, coded access optional rather than mandatory, and elimination of restricted subbands. The ARRL VHF Repeater Advisory Committee, composed of active, dedicated repeater enthusiasts, was commended for its rapid and effective evaluation of the FCC proposals as a basis for the Board's action.

Several proposals were made concerning the size of radiotelephony subbands on the major amateur frequencies. After an extensive appraisal of the entire matter, the directors decided it was not in the best interests of U.S. amateurs -- indeed, of worldwide amateur radio -- to propose expansion of our phone bands.

The Board established a permanent structure of advisory committees, continued the present two on contests and vhf repeaters, and announced a new one on DX matters. W3GKP and W4HHK jointly received the ARRL Technical Merit Award for outstanding achievements in moonbounce communication. Family and blind membership dues were raised to \$2, to more nearly represent true costs. A National Convention was approved for Labor Day weekend of 1972, in Long Beach, Calif., and the Board took note of Colorado's wish to sponsor the national for 1976.

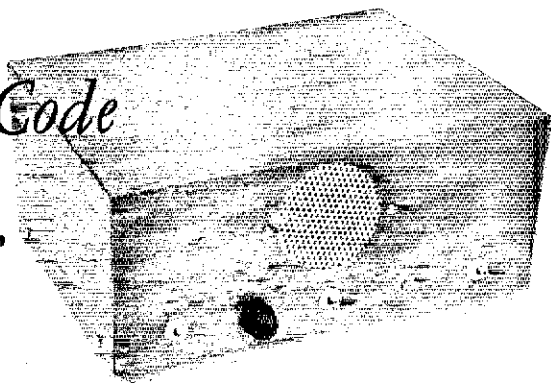
The League will underwrite a short training film, based on "Ham's Wide World," for audio-visual use in high schools, but directors referred the teen-age promotional booklet back to committee for additional study. Studies in depth were also ordered on several additional matters, such as reduced teen-age membership fees, W1AW daytime code practice and bulletin schedules, a League station on the west coast, payment for articles in QST, retired staff employee pensions, a series of articles on construction of hand-held emergency gear, and interference to solid state home entertainment devices. A list of manufacturers supplying free high pass TV filters will be assembled and published.

Subjects discussed but rejected were a move of W1AW frequencies, a propagation column in QST, and mandatory meetings of the Board twice yearly (second meetings are still possible on an optional basis). Directors ordered the sponsorship of a 160-meter contest, and changed to 175 miles the current 100-mile limit for affiliated club aggregate contest scores.

Charles G. Compton, W0BUO, was newly elected as First Vice President; incumbent W. M. Groves, W5NW, was given a standing ovation for his 35 years of dedicated service to ARRL and made an Honorary VP. Robert B. Thurston, W7PGY, was elected to the vacancy on the Executive Committee. Carl L. Smith, W0BWJ, is a new additional Vice President, and Gilbert L. Crossley, W3YA, was named a new Honorary Vice President. All other officers and Executive Committee members were re-elected. Complete minutes of the meeting will appear in July QST.

Quote-of-the-month: At the annual meeting, a show of hands was in process in voting on a motion, and the Chair admonished one director for not holding up his hand high enough to make sure it would be counted. "But," said the Board member, "My division doesn't really feel very strongly about the matter!"

A Digital Morse-Code Message Generator



A cw identifier or contest "2nd op"

BY JERRY HALL,* KI1PL

ELECTROMECHANICAL systems have often been used to key Morse-code characters for transmitter identification and for other short fixed-format cw messages. But as most users of code-wheel systems and similar methods soon learn, frequent mechanical adjustments are usually required. Not so with a solid-state system having no moving parts!

Various amateur publications in the recent past have described solid-state cw identifiers in one form or another. But none of those designs seemed to offer quite the features we desired for general-purpose use. Particularly, we wanted perfectly proportioned Morse code, a variable code speed, capability for a relatively long cw message, and the ability to change the message content easily. The instrument was also to be simple and economical to build, ruling out complicated and costly memory-switching schemes.

After several types of operation were analyzed in detail, including the use of different arrangements of shift registers for self-completing code elements, the approach shown in the block diagram of Fig. 1 was chosen as the one offering the most flexibility for the fewest dollars and fewest parts. The device can be built for about \$55 including all components, cabinet, power supply and etched circuit boards. It is useful wherever a Morse-code message is to be repeated often — for identification of repeater or RTTY transmissions, or as a semi-automated cw "tail ender." The cw enthusiast can even go a step

The code generator constructed as a station accessory. The two-piece aluminum cabinet has been given a wood-finish appearance with a process similar to "antiquing." From left to right, the controls are power, code speed, monitor on/off, message initiate, and message stop selector. The monitor speaker is mounted behind the cutout and grill. The cabinet is fitted with rubber feet, hidden in this photo.

further and use the unit for net call-ups and contest formats (inserting the other fellow's call, of course).

The generator uses digital logic circuits, the basic operation of which has been described in a previous issue of *QST*,^{1,2} and need not be repeated here.

Circuit Operation

A two-transistor oscillator provides a continuous train of clock pulses to the input of a binary counter, Fig. 1. The time between successive clock pulses represents the duration of a dot or a space. We'll call this time interval a "bit." A dash occupies the time of three clock pulses, or is three bits long.

When a message is being generated, the binary counter "counts" or "adds up" the number of clock pulses occurring. At any given instant, we can determine exactly how many clock pulses have been generated since the message started, merely by inspecting the counter's output, in 1-2-4-8-16 fashion. A matrix of diodes arranged to form AND and OR gates is used to perform this "inspection" continuously. The matrix converts the various binary

¹Pos, "Digital Logic Devices," *QST*, July, 1968.

²Staples, "Integrated-Circuit Frequency Dividers," *QST*, July, 1968.

* Assistant Technical Editor, *QST*.

Visualize, if you will, a small box that can be connected to your rig. Push a button and the box automatically sends CQ plus your call, plus the standby K, in absolutely perfect code. Or it can even be set up to send a complete contest exchange or for a repeater identifier (automatically, of course). Cost of the unit? Less than 55 bucks. Construction is all circuit boards that may be bought ready-made.

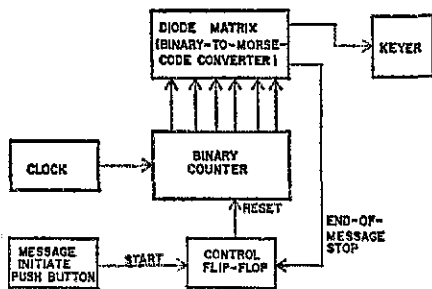


Fig. 1—Block diagram of the basic message generator. The self-completing message may be initiated manually with the push button or from an external timing source.

output states of the counter into dots, dashes, and spaces, each element occurring at the proper clock time for the message being generated. This output from the matrix operates the keyer.

The end of the message is also detected in the matrix, being determined by the total number of clock pulses required. When this number has been generated, a separate output flips or toggles a control flip-flop, its output resetting and holding the binary counter at zero. Keying stops. To again initiate the message, the state of the control flip-flop is changed by a push-button switch or by an external timing device or circuit. This action permits the binary counter to advance, thereby repeating the entire message cycle. The message is self-completing.

As one can understand from this brief description of operation, the diode matrix comprises the actual "memory" for a given Morse code message. Each message will have its own particular arrangement of matrix diodes. The number of diodes needed in the matrix depends partially on the length of the message, but primarily on the "rhythm" of the message, in terms of repeated bit patterns at intervals of 2, 4, 8, 16, and so on. For cw identification with most amateur calls, from 60 to 100 diodes will be required. (We bought ours at about two cents each.³) As a rough approximation, about one diode per bit of message length will be needed for most messages. But more about this later.

The maximum permissible length of a message is determined not by the diode matrix, but by the number of clock pulses which may be counted without ambiguity in the binary counter. Using four dual J-K flip-flop integrated circuits in the counter, a count as high as 255 may be registered. With the last bit being needed to form the stop signal, the maximum available message length is 254 bits. That's enough counting capability to send the message CQSS CQSS DE WA0QST K — with one bit to spare. Table I, listing the bit duration of each

³ Inexpensive germanium diodes are available from Poly Paks, P. O. Box 942, So. Lynnfield, MA 01940. Using the test described later in the text, usually about 60% or more of the diodes obtained are suitable for matrix use.

letter and number, is helpful for quickly determining the length of a message.

Circuit Description

Aside from the diode matrix, the generator circuit is the same for all messages, regardless of the message content or length. It is therefore convenient to build the basic circuit separately from the matrix, and to provide a plug-in arrangement for changing the matrix. Fig. 2 shows the complete schematic diagram of this basic part of the generator. Some sections may be omitted if they are not desired, without affecting the rest of the circuit, and the total cost can be pared accordingly.

The clock circuit is not original. Because this generator has clock-pulse requirements which are identical to those of W1WCG's ICKEY,⁴ we merely used his clock or time-base circuit with minor modification. The speed-control range is 10 to 50 wpm with the resistor network of R_1 , R_2 , and R_3 . The speed calibration of R_2 is not quite linear, being compressed somewhat at mid-range. The three resistors may be combined as one fixed value if code-speed changes are not needed.

The binary counter in cascade, the Q output of each toggling the next. Initially all Q outputs are low. When a message begins, the first clock pulse will set the Q output of U_{1A} high, the Q outputs of all other flip-flops remaining low; the second pulse will set the Q output of U_{1B} high, all other Q outputs being low; the third pulse will set only the U_{1A} output and leave U_{1B} high, and so on. Staples shows this sequence in graphic form for a 4-stage counter in his Fig. 6.⁵ That form of presentation

⁴ Van Cleef, "ICKEY — An Integrated-Circuit Electronic Keyer with Dot and Dash Memories," QST, November, 1968.

⁵ See footnote 2.

TABLE I
International Morse Code Character Duration,
Bits

A	8	N	8	1	20
B	12	O	14	2	18
C	14	P	14	3	16
D	10	Q	16	4	14
E	4	R	10	5	12
F	12	S	8	6	14
G	12	T	6	7	16
H	10	U	10	8	18
I	6	V	12	9	20
J	16	W	12	0	22
K	12	X	14	Slant Bar	16
L	12	Y	16	Word Space	4
M	10	Z	14	Last Character	-3

The values given include the proper spacing interval following a character. The bit duration of a complete message is, therefore, three bits less than the sum of the bits for its individual characters.

makes the operation of the counter easy to visualize.

For simple identification, our Q outputs are labeled to show their binary-coded-decimal values, 1-2-4-8, and so on. The status of the counter may be determined at any time, merely by observing the Q outputs of all flip-flops, and adding the BCD values for those which are high. These Q outputs and their complimentary NOR- Q (\bar{Q}) outputs are fed to the diode matrix through J_1 .

The matrix message signal is available at pin X of J_1 , going positive or high for the key-up condition and going low for the key-down condition. Q_3 functions as a buffer-amplifier, and also inverts the signal.

Q_4 and its associated components are used to obtain a cw-keying output. If you need only a keyed audio tone output, such as for a vhf repeater identifier, this stage may be omitted. R_9 limits the relay coil current to the proper value. R_{10} limits the contact surge current and prevents the relay contacts from sticking when keying a grid-blocked transmitter. Its value should be two ohms for each volt of grid-block bias. With J_2 and J_3 simply connected in parallel as shown, the generator can act as a "junction box" for a lead from the regular key to the transmitter. Just plug the key into one jack and a cable to the rig in the other. This places the contacts of K_1 in parallel with the output of the regular key so that either can be used without changing any cabling. U_8 and Q_5 and their associated components are an audio oscillator and amplifier, providing a side-tone signal for monitoring. If the side-tone signal from the speaker is not needed, Q_5 and related parts may be omitted. If just the keying relay output but no audio signal at all is needed, this oscillator may also be omitted from the generator.

U_{6A} is connected as an inverter, its filtered output keying the audio oscillator formed by

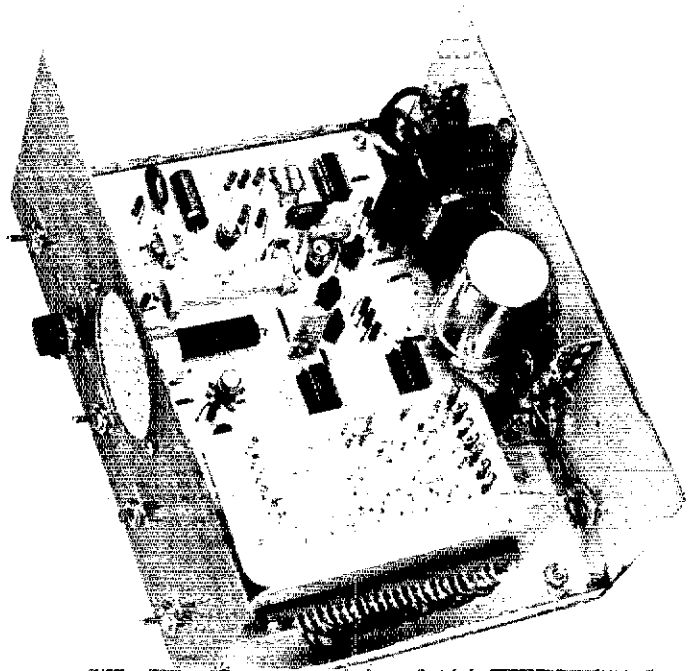
U_{6C} and U_{6D} connected as a multivibrator. Circuit constants were chosen to produce a tone of about 600 Hz, determined after conducting several "listening tests" on various individuals to be the optimum pitch for low-level use in identifying vhf fm repeater transmissions. ("Subaudio" tones in the vicinity of 100 to 250 Hz were found to be difficult to read beneath high-level voice modulation, should an individual be especially interested in knowing whose repeater he was hearing.) The note is very stable. The pitch may be slightly different from one IC to another, and will also depend upon the tolerance of the circuit components. Should you wish to make a change in the pitch, the value of R_{16} may be altered. A smaller value will yield a higher pitch, and vice versa.

The oscillator output is available directly at J_4 . However, this output is not suitable for driving a low-impedance load. Any connections to J_4 should be into an impedance of about 2000 ohms or greater, or distortion of the signal will result. The monitor amplifier may be used to drive low-impedance loads other than the speaker.

The type of Motorola J-K flip-flop used in the generator is considered to be in its "set" or "1" condition when the Q output is high, and "reset" or "cleared" or in the "0" state when the Q output is low. For the flip-flop to operate, its C_d input must be connected to the negative side of the power supply (ground) or to a low output of another logic circuit. Connecting the C_d input to the positive side of the supply or to the high output of another logic circuit will clear the flip-flop.

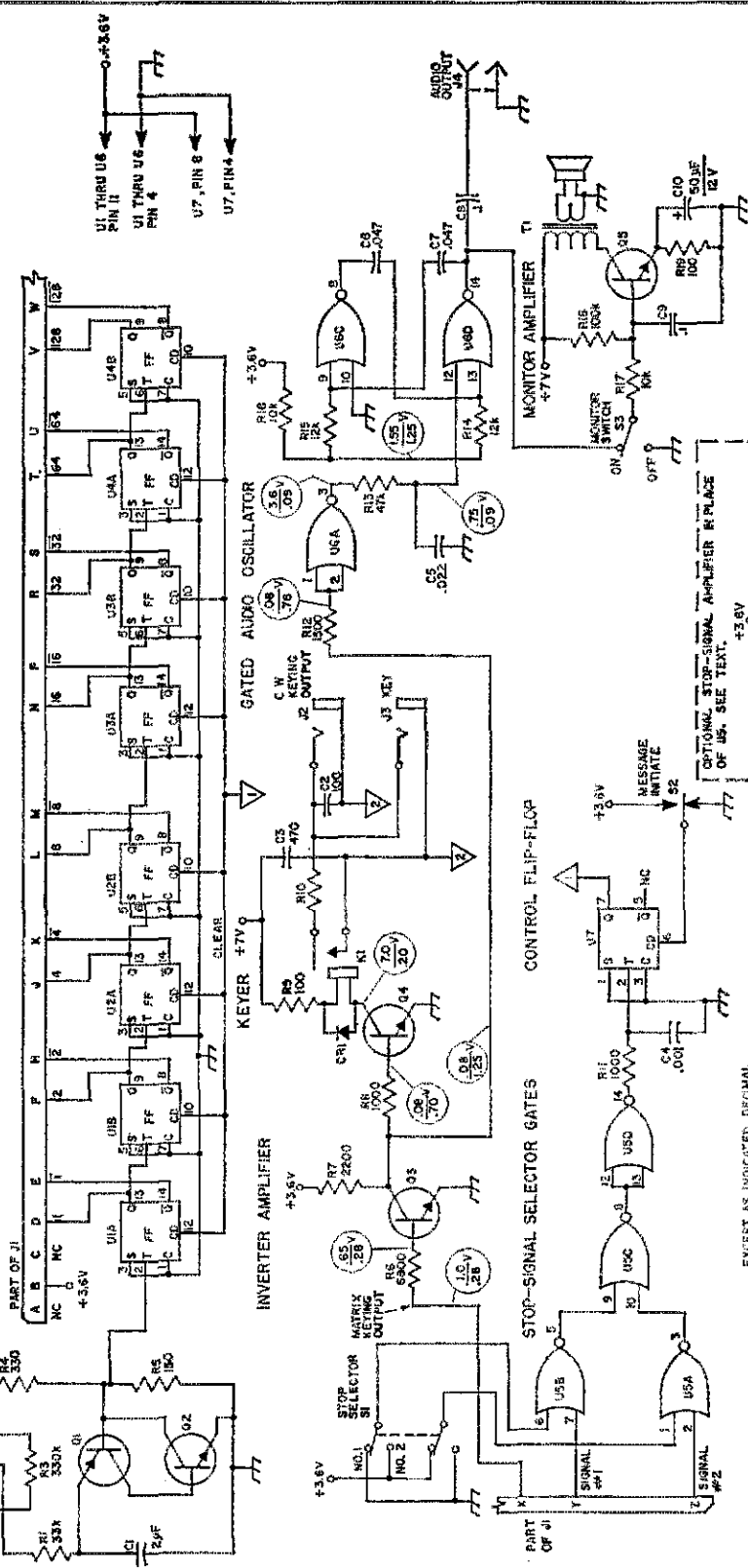
When no message is being sent, the control flip-flop, U_7 , is in its set condition, its Q output being high. This high output is applied to the C_d inputs of the counting flip-flops, clearing the entire counter to zero. The counter cannot

The inside of the code generator. A shortened matrix board is plugged into J_1 , which is mounted on a home-made aluminum bracket. The power supply components and cw keying jacks are mounted on the rear panel. The sockets used for the transistors and ICs are not a requirement; the board pattern is arranged for their direct mounting.



CLOCK

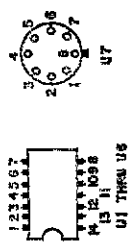
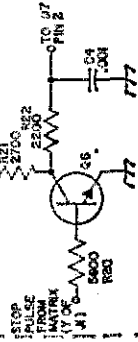
BINARY COUNTER



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICOFARADS (PF OR PUF); RESISTANCES ARE IN OHMS; K=1000.

GROUND ONLY AT STOP MESSAGE MATRICES. CANNOT DO NOT CONNECT DIRECTLY TO GROUND FOLLY OF ETCHED BOARD.

OPTIONAL STOP-SIGNAL AMPLIFIER REFERENCE OF U5, SEE TEXT.



PIN NUMBER OF IC'S

Fig. 2—Basic circuit of the message generator. All fixed resistors are 1/4- or 1/2-W, 10% tolerance. Components not listed in the parts list below are for text reference and circuit-board identification. The speaker may be miniature, rated at 100 mW. Connections to the diode matrix are made through J_1 . As a troubleshooting aid, dc operating voltages are enclosed in the amplifier, keyer, and oscillator sections. All voltages are positive measured with respect to chassis ground with a VTVM or 20,000-ohms-per-volt meter. Voltages may vary around the values given as the binary counter changes states. Values above the lines represent voltages for the key-up condition at the generator's output, while values below the lines are for the key-down condition.

C_1 —2 μ F, Mylar or metallized paper, 100 V.
 C_2 —100 pF, disk, 1000 V. Mount directly at J_2 .
 C_3 —470 pF, disk, 1000 V.
 C_4 —0.001 μ F, disk, 1000 V. Mount as close as possible to pin 2 of U_7 .
 C_5 — C_6 incl.—Mylar, paper, or polyester, 75 or 100 V.
 C_{10} —Electrolytic.
 CR_1 —Any small silicon diode.
 J_1 —Printed-circuit connector, 22 contacts, 2 unused (Amphenol 143-022-01 or equiv.).
 J_2, J_3 —Single-circuit phone jack.
 J_4 —Phone jack.

K_1 —Spst read relay (Magnecraft W102MX-1 or equiv.).
 Q_1 —Silicon npn rf or high-speed switching transistor (2N4126, Motorola HEP 52, or equiv.).
 Q_2 —Silicon npn rf or high-speed switching transistor (2N4123, Motorola HEP 50, or equiv.).
 Q_3 — Q_6 incl.—Silicon npn audio transistor. Q_3 must have $\beta = 50$ or greater (Motorola MPS 3394 or equiv.).
 R_2 —250,000 ohms, reverse or right-hand logarithmic taper (Mallory U45 or equiv.). Connect for zero resistance when fully clockwise.

R_{10} —See text.

S_1 —Dpdt toggle.

S_2 —Spdt, momentary push.

S_3 —Spdt toggle.

T_1 —Subminiature audio output, 0.1-W; primary 500 ohms, secondary 8 ohms (Calestro D1-712 or equiv.).

U_1 — U_4 incl.—Dual J-K flip-flop (Motorola MC790P, HEP 572, or equiv.).

U_5, U_6, U_7 —Quad 2-input gate (Motorola MC724P, HEP 570, or equiv.).

U_7 —J-K flip-flop (Motorola MC882G, HEP 583, or equiv.).

advance as long as its C_d inputs are held high, as this input overrides all others.

To initiate a message, S_2 is momentarily pushed, clearing the control flip-flop and causing its Q output to go low. The low state at the C_d inputs of the counting flip-flops now enables the counter to advance, ticking out the message. Once a message has been initiated, it would cycle through again and again if the state of the control flip-flop were never changed. A message-stop signal from the diode matrix is used to toggle U_7 , which then clears the counter and prevents the message from immediately repeating.

Often it might be convenient to change the stopping point of the message. This can be done by having two stop signals built into the matrix at different places, and switch-selecting one or the other. As an example, a matrix might be designed for automatic repeater operation with the full message DE WAILVI/1. For fixed operation, a stop signal following the LVI would be used, so the identification would merely be DE WAILVI. Should the repeater ever be set up as a portable station, perhaps in time of emergency, a flick of a switch would select a second stop signal following the /1 in place of the first, and the automatic identification to include the portable designator would result. Another idea for identification of RTTY transmissions is to use, for example, DE WIAW at the beginning of a transmission, and DE WIAW K at the end, selecting stop signals as appropriate, either before or after the K. A letter C stopped in the appropriate place becomes a K, offering a number of possibilities for simple CQ matrices with the amateur call included. Indeed, the first stop signal may occur anywhere throughout the "full" message—even after the first one-third of a dash (if the message were to continue), making instead a final dot.

U_5 and S_1 provide the capability of selecting one of two stop signals from the matrix. Each stop signal is fed to an input of separate NOR gates, U_{5A} and U_{5B} . The signal to be used is selected by "enabling" its associated NOR gate to operate, through grounding the gate's second input at S_1 . The NOR gate for the remaining stop signal is disabled by connecting its second input to +3.6 V through S_1 , thereby holding its output low no matter what the signal input does. U_{5C} and U_{5D} , with combined double inversion, form an OR gate, so that a stop signal from either U_{5A} or U_{5B} , whichever is enabled, will reach the toggle input of U_7 . This scheme of using selector gates avoids switching transients when flipping the selector switch. If the switch was connected directly to the toggle input of U_7 , these transients might initiate the message at an unwanted time. The input to U_7 is bypassed to prevent induced voltage transients from erroneously triggering the message.

If the selectable-stop feature is not desired, U_5 , R_{11} , and S_1 may be replaced by Q_6 and associated parts.

The Matrix

The matrix is nothing more than several diodes and resistors connected to form simple AND and OR gates. Fig. 3A is the schematic of an AND gate. In this circuit a diode will conduct if any of the three inputs is low (grounded). The output level will then be low, because the diode current drops the voltage V_{CC} across R . The output will be high only if A and B and C are high; no diodes can then conduct because no potential difference exists across them, and therefore no voltage drop exists across R .

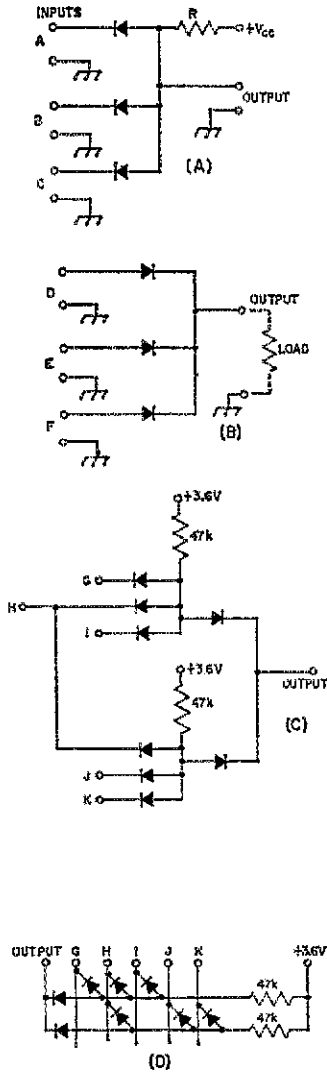


Fig. 3—AND and OR gates. Shown at A is an AND logic gate, while B represents an OR gate. The circuit of C is two three-input AND gates feeding a two-input OR gate. At D, this same circuit is redrawn to occupy less space.

Fig. 3B represents an OR gate. If any one of the three inputs, D or E or F, is high, the output voltage at the load will be high because a diode will conduct. Additional inputs to either the AND or the OR gate are available merely by adding more diodes to extend the circuits.

Fig. 3C depicts two three-input AND gates with their outputs combined in one OR gate. In this circuit, the common or ground-return connection is not shown, though it is understood to be used. The output will be high when G and H and I are high, or when H and J and K are high; at all other times it will be low.

The circuit of Fig. 3D is identical to that of 3C; it has merely been redrawn to occupy less space. By enlarging this circuit through the use of more diodes and resistors to form more and larger AND gates and more inputs to the OR gate, we have the type of matrix used in the message generator.

Of course in the previous paragraphs we've ignored the fact that in practice we do not have "perfect" semiconductor diodes—there will be some small voltage across a diode when it is conducting, and some small current when it is "nonconducting." However, with average-quality diodes, the generator circuit will tolerate these voltages and currents with no ill effects, even in a matrix using a large number of diodes. Germanium diodes should be used in the construction, because they exhibit only one-fourth the forward voltage drop that silicon diodes do; the "leakage" currents are about the same for either type in the voltage range at which they are used here.

Using various outputs from the binary counter as inputs to the matrix AND gates, we make use of the fact that the output from each AND gate will be high only when *all* of its inputs are high. For most messages consisting of DE followed by an amateur call, 10 to 14 AND gates will be needed, each having about 5 or 6 inputs. The connections are made so that an AND gate output goes high or positive for the message key-up condition. This scheme usually requires the least diodes. Consider the operation as requiring a positive output to "blank" a continuously keyed signal.

When the generator is in operation, the outputs from the various AND gates will be high at various times and for various intervals, as the binary counter changes the inputs to these gates. Each AND gate contributes its own small part to the overall blanking waveform, and the outputs of all AND gates are combined in one OR gate to form the keying output. The principle is shown in Fig. 4.

Fig. 5 presents the complete schematic of a message matrix. The message is CQ.

For one accustomed to keying the code in chronological sequence, it may seem strange that in a device such as this we cannot merely find a basic pattern of diode connections for each code character, and then just wire up these patterns for the sequence we want. If we have a DE WALLVI matrix designed, couldn't we just change a few diodes to change the last three

letters, and send DE WA1HOL instead? Unfortunately, this cannot be done with our relatively simple circuit, because each bit of the keyed message is rigidly controlled by the connections to the binary counter through the matrix. The counter information being fed into the matrix is in "parallel" format, being several independent signals occurring simultaneously. The matrix converts this information into a "serial" output, producing the Morse code in a time sequence. The AND-gate signal which blanks

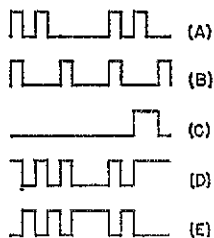


Fig. 4—The formation of a code character in the generator. The waveforms at A, B, and C represent outputs of three separate matrix AND gates, each waveform derived from binary counter inputs to the gates. Each AND gate output is high during some part of the character's key-down time. The waveform at D is the OR-gate output resulting from the three AND-gate signals. This is the keying or "blanking" output signal from the matrix. At E, the keying waveform is shown after inversion in Q_3 , and is now recognized as the letter F. This same letter, however, can, and often will, be formed by other combinations of AND-gate waveforms.

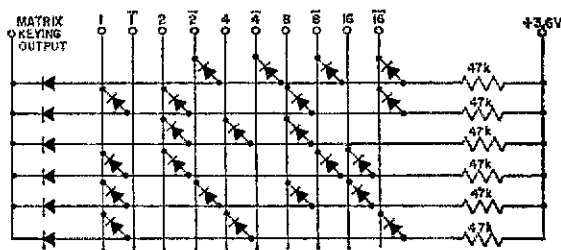
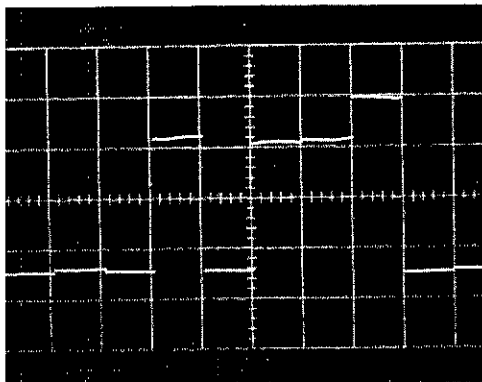
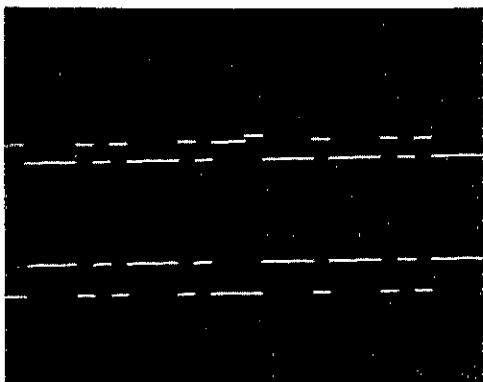


Fig. 5—A matrix for sending the message CQ. With no stop signal provided in this matrix, the message will repeat continuously.

the output between the dots of the I at the end of the DE WA1HVI message might be the only one to blank several other portions of the output throughout the message, so one simple diode change could disrupt our whole message. A completely new matrix must be used for any change in the message content, large or small. Just starting the same message one clock pulse later will also require a completely new matrix.

Determining how many and what diode connections are needed to produce any message you might desire is not a difficult process. A simple, methodical procedure requiring no guesswork or "hocus-pocus" is used. However, the space required to fully explain the process is just not available in these pages of *QST*. For those who wish to design their own matrices, a special "designers' package" of detailed information, including circuit-board etching templates, is



Waveforms recorded on a dual-trace oscilloscope for the CQ-message matrix of Fig. 5. The upper waveform in the photo at the left is the matrix keying output, and the lower waveform is the inverted version, appearing at the collector of Q_3 . The matrix output is positive during the key-up period. Conduction of more or less diodes, and switching among diodes in the matrix contribute to "steps" in the output levels. These steps are removed by the inverter-amplifier stage. Slight ripple on the power supply voltage accounts for the "wavy" appearance of the positive portion of the inverter output signal, but this has no effect on operation. Shown in the photo at the right is an expanded portion of the output signal of the CQ matrix. The formation of the output on a bit-by-bit basis is clearly indicated here by the steps in the two output levels. The 3-bit-duration positive level is the space between the C and the Q. Three AND gates contribute to its third bit, whereas only one gate contributes to each other positive bit of the entire message, causing the marked difference in amplitudes.

available from the ARRL. An 80- or 90-bit message matrix design can be completed in an hour or so.⁶

Power Supply

Power requirements for the generator are meager, being 7 volts at 450 mA, including Zener-diode regulating current to obtain 3.6 V. The current drawn from the 3.6-V portion of the supply is 210 mA.

The power supply schematic is shown in Fig. 6. We used a full-wave rectifier-bridge integrated circuit, but four discrete diodes could just as well have been used.

Construction of the Generator

Construction of the generator is quite straightforward, especially if an etched circuit board is used. Ready-made circuit boards are available.⁷ If you wish to prepare your own boards, templates are available from the ARRL.⁸ The basic generator can be built and completely tested without having a completed diode matrix.

The generator may, of course, be constructed by other methods than through the use of etched

⁶ A package of information is available which presents a Karnough map developed especially for use in designing message matrices for this generator. The map permits a graphical solution of the design problem to be reached. A working copy of the map, detailed instructions, sample problems, and circuit-board templates with parts layout are included. Send \$1.00 to ARRL, 225 Main St., Newington, CT 06111. Templates alone are 25 cents and an a.s.a.e.

⁷ Tinned glass-epoxy circuit boards are available from Stafford Electronics, Inc., 427 S. Benbow Rd., Greensboro, NC 27401. The main circuit board is drilled; the matrix board must be drilled by the user for the individual message.

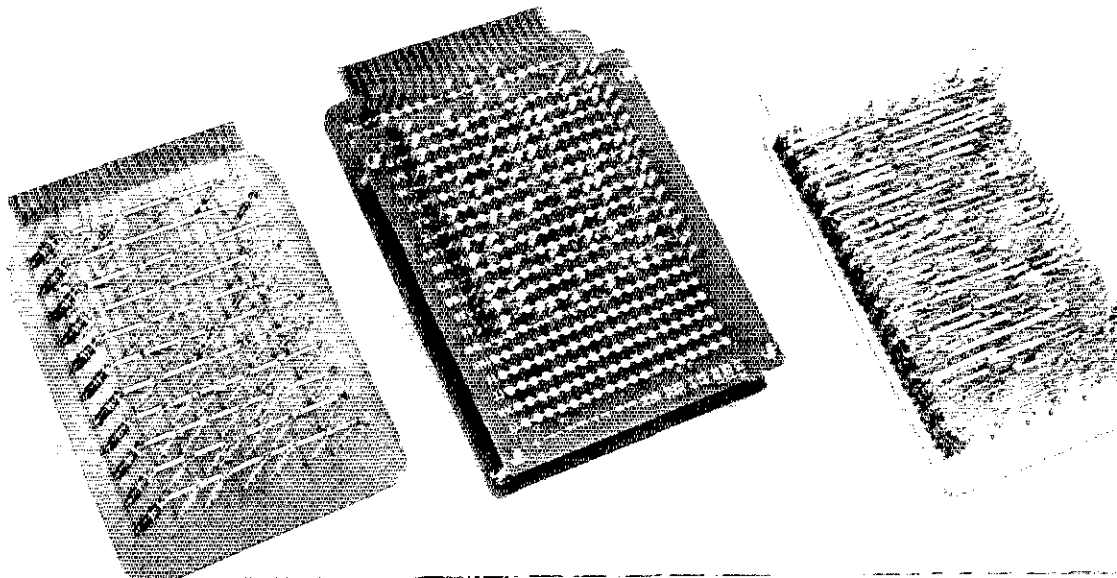
⁸ See footnote 6.

boards. The parts should be arranged so that the two transistors of the clock circuit are separated by two or more inches from the control flip-flop, U_7 , to avoid having clock pulses trip unwanted messages. Also, the precautions mentioned below about the keying relay should be suitable. Other than that, any parts layout is suitable.

The cabinet shown in the accompanying photographs was made in the ARRL lab, and measures $7 \times 9 \times \frac{1}{2}$ inches. Several utility cabinets of these approximate dimensions are available. The version photographed was made as a station accessory, but perfect operation occurred when the unit, less cover, was set inside the cabinet near the shield of the final PA tube of a 2-meter repeater running 50 watts of rf output. For use as an automatic repeater identifier, a different, packaging arrangement would probably be desired, but a completely enclosed box is preferred.

We debated for a good while about placing the keying relay directly on the circuit board, suspecting that the keying of high voltages might upset the counting sequence of the binary counter. With the precautions taken, such was not the case. The generator has been used to grid-block key a full two kilowatts (into a dummy load, of course) with no improper operation, and it operated flawlessly for the whole period while keying a 1-kW transmitter during the last cw Sweepstakes contest. To avoid possible problems, the keying leads from the relay should not be routed near the clock circuit or the counter ICs, nor should either of the relay contacts be connected directly to the ground foil of

Shown here are various construction techniques for assembling plug-in message matrices. The board at the right has a single-sided etching pattern, relying on bus-wire connections between diodes of each AND gate. This board, containing 250 diodes and 38 resistors, sends the Sweepstakes message CQSS DE W1FBY W1FBY SS K, which is 30 seconds in duration at 10 wpm. At the left and center are two-sided etched boards, containing copper-foil patterns on both the top and bottom of each. The assembly at the center uses a ready-made universal etching pattern which may be used to send any message. (See footnote 7.) This matrix sends CQ TEST DE W1ETU W1ETU TEST K (for the DX contest). To contain its 214 diodes and 33 resistors, the two-layer arrangement of near-identical boards as shown is convenient.



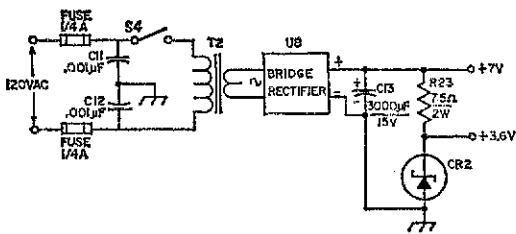


Fig. 6—Power supply for the message generator.

- C₁₁, C₁₂—Disk, 1000 V.
- C₁₃—Electrolytic.
- CR₂—Zener diode, 3.6-V, 1-W (1N4729, 1N3822, or Motorola HEP 102 or equiv.).
- R₂₃—7.5-ohm, 2-watt; made by paralleling two 15-ohm 1-watt 10% resistors.
- S₄—Spst toggle.
- T₂—Filament, 6.3-V, 1.2-A (Stancor P6134 or Triad F14X or equiv.).
- U₈—Full-wave rectifier bridge, 1-A 50-V (Motorola MDA 920-2, HEP 175, or equiv.). Four silicon diodes of the same rating may be used instead, if connected in the full-wave bridge configuration.

the board. Keyed currents through the ground foil may induce transients into the remaining circuitry. The leads from the relay contacts should be run as a twisted pair to the keying jack, or small-diameter coaxial cable may be used.

After the basic generator has been assembled, the current should be metered at two points to be sure that everything is proper. First connect a milliammeter between the anode of the Zener diode, CR₂, and ground. Then with all the ICs plugged into their sockets (if used), apply power and measure the Zener current. It should be in the neighborhood of 150 to 200 mA. If not, the value of R₂₃ may be changed to obtain the proper Zener current.

Next, meter the current through the coil of K₁, in the collector lead of Q₄. If this current is not within ten or fifteen percent of the proper amount for the relay being used, the value of R₉ may be changed for the correct current. The W102MX-1 relay is rated for a current of 40 mA, and with a 7- or 7.5-volt output from the power supply, 100 ohms should be the correct value for R₉.

Testing the Generator

The following tests will check every circuit in the generator. These tests should be performed with no matrix connected at J₁. The MC790P flip-flops are quite rugged as far as taking abuse from wrong external connections goes, but to play it safe you may wish to connect the jumpers for the following tests only while the power is removed.

This first test will check the clock and the first binary counter flip-flop, as well as the keying and monitor circuits. Connect a jumper lead between pins D and X of J₁. With the generator energized, a steady string of keyed dots should be emitted. If nothing happens, press the

MESSAGE INITIATE button to release the counter. The speed of the dots should be variable by moving the speed control.

Next, remove the jumper and connect it between pins W and X. Set the speed control at the maximum speed. Now you should have keyed dashes, about three seconds long and with a spacing of about three seconds. If all is okay here, the complete chain of flip-flops in the binary counter is working properly.

Now we'll test the message stop circuitry. Connect a jumper between pins E and X of J₁, and another jumper between pins L and Y. Place the STOP SELECTOR switch S₁ (if used) at position 1. (If you're not sure of the switch positions at this point, try both during the test, and select the one which gives the correct results.) With the generator energized, you should hear nothing other than perhaps a few dots just after turn-on. Now press the MESSAGE INITIATE button. You should get a perfect letter H, and nothing more. (You'll have to get your finger off the button quickly at high code speeds, or you'll get several Hs run together.) Each press of the button should give an H.

Now, if you've elected to use the selectable stop feature, move the jumper connection from pin Y to pin Z, and flip the stop-signal selector switch to its other position. Again depress the MESSAGE INITIATE button, and you should get another letter H. The selector-switch position providing proper operation here is position No. 2.

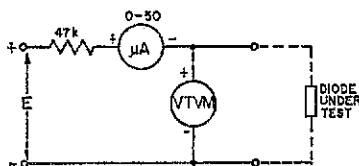


Fig. 7—Circuit for testing diodes. See text.

Construction of the Matrix

"Bargain" and "junk-box" diodes may certainly be used in construction of the matrix, if they meet the requirements of a test which can be performed simply. A VTVM and a microammeter, preferably 50 μ A full scale, are required. In addition, a variable voltage source up to about 3 volts is required. This may be nothing more than a pair of flashlight cells and a potentiometer. Connect the test circuit as shown in Fig. 7. The 47-k Ω resistor is included mainly for protection of the microammeter in case of accidental short, and its value is not critical. First connect the diode for forward conduction, adjust E for a current reading of 50 μ A, and read the voltage drop on the VTVM. Select only those diodes which read 0.2 volt or less. For most germanium diodes the reading will be between 0.1 and 0.15 volt. If the voltage reads between 0.4 and 0.6 volt, the diode is probably silicon, and should

(Continued on page 38)

Building a Simple Two-Band VFO

BY DOUG DeMAW, *WICER

SOLID-state VFOs have some decided advantages over their tube-type kinsmen, though, admittedly, there are a few features about transistorized VFOs that can bring tears to the eyes of the user. Fortunately, however, the bad features can be resolved without too much difficulty. Some of the problems that affect solid-state VFOs have already been discussed in *QST*¹ and the cures require but a few simple doses of preventative medicine. Of greater significance, perhaps, is the matter of peak output voltage from a transistorized VFO. Previously-published semiconductor VFOs, that have appeared in *QST*, perplexed the builder because of the low output voltages available — a level that is usually between 0.5 and 3 volts rms. Since most tube circuits that are excited by a VFO require considerably more voltage than this, some distraught readers have written in and asked for assistance in mating the transistorized VFOs to their existing station equipment. This article will show how the output level of solid-state VFOs can be increased by using impedance-matching techniques, and by the addition of amplifier stages. The VFO circuit shown here can be used for a variety of applications, and need not be confined to the frequency range of 3.5 to 7.2 MHz. The tuned circuit constants can be juggled to give coverage from 5 to 5.5 MHz, or the user may wish to increase the operating range from 7 to 8 MHz so that the VFO can be used to control the frequency of a 6- or 2-meter transmitter.

Circuit Data

In the circuit of Fig. 1 are two completely separate tuned circuits — one for 3.5 to 3.8 MHz, and one for 7 to 7.2 MHz. Since this VFO was

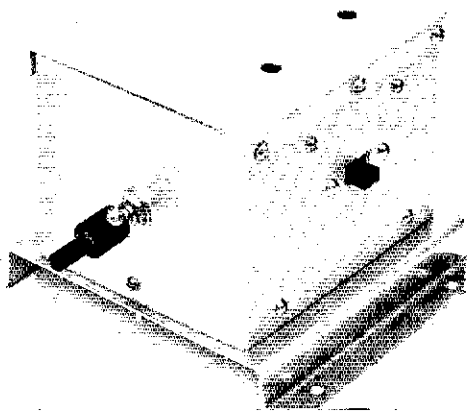
*Acting Technical Editor.

¹"Some Tips on Solid-State VFO Design," *QST*, May 1970.

Here is a follow up to the VFO design article that appeared in last month's QST. Some additional information is given on debugging, and a practical model of an 80- and 40-meter VFO is offered to those wishing to try their luck at solid-state VFO construction. The unit described here is easy to build, is inexpensive, and performs well.

designed primarily for 80- and 40-meter cw use, the tuning range was purposely restricted, thus providing reasonable bandwidth. A split-stator variable, C3, is employed so that there is no need to switch a single tuning capacitor from one tuned circuit to the other. Also, the arrangement shown places the tuning-capacitor sections in different parts of the circuit for the two bands. The 7-MHz tuned circuit uses C3A from the junction of the feedback capacitors (C1 and C2) to ground. This gives the desired amount of bandwidth for 40-meter operation, but, when hooking the 80-meter tuned circuit up the same way, only 100 kHz could be covered with C3B. So, for 3.5 to 3.8-MHz operation, C3B is connected from the high-impedance point on L2, to ground. The phone portion of 40 meters, and the 75-meter band can be covered by this VFO by merely readjusting the slugs of L1 and L2.

It will be noted that a rather high value of C is used in parallel with each of the inductors, L1 and L2. This measure was taken to enhance the frequency stability of the VFO. By using a high CL ratio, small changes in the junction capacitance of Q1 have a less pronounced effect on the tuned circuit than would be experienced when using smaller values of capacitance. Silver-mica capacitors are used in the interest of good stability. So that the oscillator will start readily, despite the high C to L ratio, Q1 was chosen to have high beta and f_T . However, the high gain and frequency ratings caused the stage to be unstable at vhf — approximately 150 MHz. As C3 was tuned, vhf oscillations could be seen on the output waveform, Fig. 2A. The vhf energy was tunable, and it was found that the lead from Q1's base-blocking capacitor, C6, to the arm of S1A, was long enough to act as a vhf inductance, which was being tuned by C3. The addition of a 3-ferrite-bead choke, RFC1, mounted right at the circuit-board terminal for C6, cured the problem. The output waveform



Outside view of the two-band VFO. The case is made of heavy-gauge aluminum to enhance the rigidity of the box. A band-change slide switch is mounted on the side of the unit. Calibration is done through the holes in the top cover.

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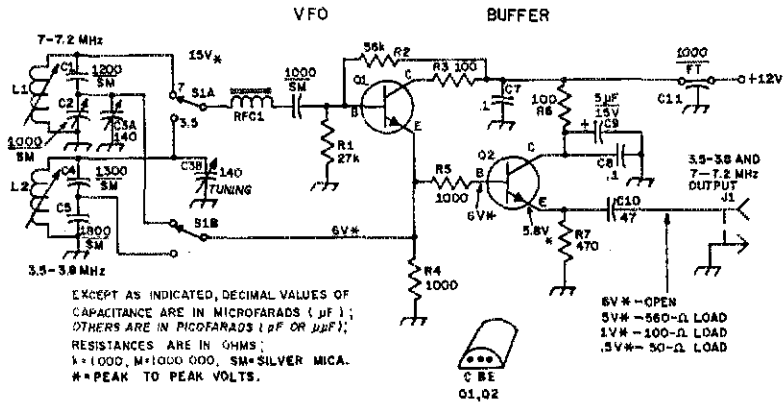


Fig. 1 — Schematic diagram of the two-band VFO. Fixed-value capacitors are disk ceramic unless otherwise noted. C9 is an electrolytic. Resistors are 1/2-watt composition. Numbered components not appearing in the parts list are so numbered for circuit-board identification purposes.

- C3 — DuDual-section miniature variable, 140-pF per section (Hammarlund HFD-140, or Millen 25140 RM).
- J1 — RCA phono jack, single-hole mount.
- L1 — 00.68 to 1.25- μ H slug-tuned inductor (J. W. Miller 42A106CBI, J. W. Miller Co., 19070 Reyes Ave., Compton, Calif. 90221).
- L2 — 2.2 to 4.1- μ H slug-tuned inductor (J. W. Miller 42A336CBI).
- Q1, Q2 — Motorola MPS6514. If substitute is used, it should have similar characteristics — VCEO

of 30, hFE 150 to 300, and f_T approximately 450 MHz. PD = 310 mW.

RFC1 — Three Amidon ferrite beads threaded on a 1/2-in. length of No. 22 wire. A 15-ohm, 1/2-watt resistor may serve as a substitute. (Amidon Assoc., 12033 Otsego St. N. Hollywood, Ca. 91607.)

S1 — Dpdt slide switch, (Oak 399278-278 or equivalent.)

from the VFO became that of Fig. 2B, after the addition of RFC1. Ideally, RFC1 would be mounted on the base lead of Q1, with the beads up against the transistor body. However, this is not always a practical method of mounting, so one should attempt to get the heads as close to the base connection as possible, thus minimizing the possibility of a vhf inductance being set up in that part of the circuit. To further discourage parasitic oscillations a collector resistor, R3, was included. It should be connected as close to the collector terminal of Q1 as possible, for the same reasons given when discussing RFC1.

Output from Q1 is taken across R4. Direct coupling is used between the low-impedance takeoff point of Q1 and the base of emitter-follower, Q2. Resistor R5 sets the forward bias of Q2 by picking some dc voltage off the emitter of Q1. Sufficient rf passes through R5 to drive Q2, and it can be seen that there is no measurable loss in peak voltage across R5. There are 6 volts, peak to peak, across the emitter resistor of Q1, and from base to ground at Q2, as measured with a Tektronix Model R453 oscilloscope.

The collector of Q2 is bypassed for high and low frequencies to assure stability. A 100-ohm collector resistor, R6, decouples the stages at rf. C11 is a feedthrough capacitor that mounts on the wall of the VFO enclosure, and is a further aid to overall circuit stability. It helps to keep unwanted rf from entering the VFO box along the 12-volt line.

Output is taken from the emitter of Q2 through a small-value capacitor, C10. The larger the

capacitance, the greater will be the available output voltage across a given load, but the smaller the capacitance value used, the better will be the VFO isolation from the succeeding circuit. One should use only the amount of capacitance that will provide adequate peak output voltage. Typical peak-to-peak voltages across some known loads are given on the schematic diagram. These readings were obtained with the 47-pF capacitor, C10, shown in Fig. 1. If larger values of capacitance are used at C10 there will be a greater chance for VFO "pulling" as the load across J1 changes. Such pulling can be observed when the stage to which the VFO is connected is tuned, or when the stages after the VFO are keyed, as in a cw transmitter. The result is a chirpy cw signal. It is always better to use light output coupling, and follow Q2 with another buffer stage, preferably one that is connected as a common-emitter amplifier. However, with the constants given here this VFO worked nicely when used ahead of a two-stage solid-state cw transmitter, which operated "straight through." The load that Q2 looked into was approximately 500 ohms, the base input impedance of the keyed Class-A amplifier stage. Resistor R5 is mounted close to the base terminal of Q2, and serves as a vhf parasitic suppressor for Q2.

Assembling the VFO

In the interest of mechanical stability this VFO has most of its components mounted on a circuit board. There is no reason why the builder cannot use point-to-point wiring if he does not wish to use

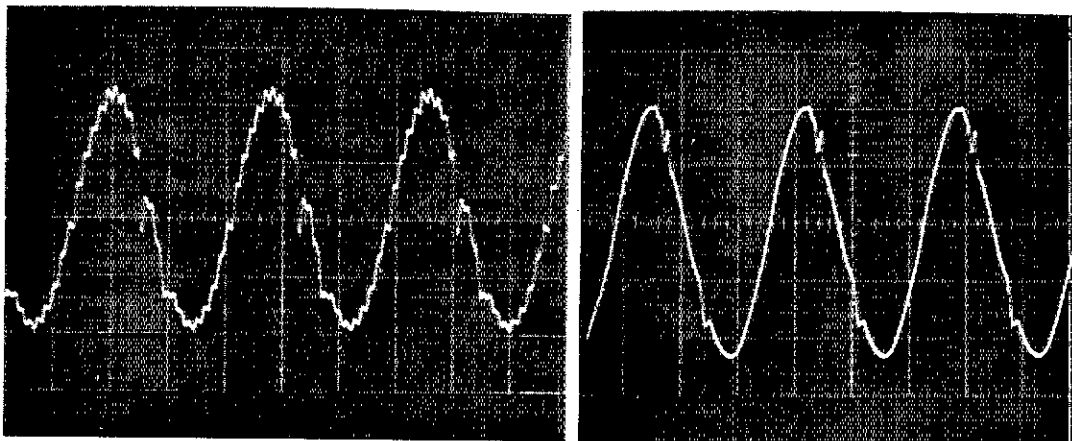


Fig. 2 — Oscillograms of the VFO output signal as viewed on a Tektronix Model R453. At A, tunable vhf oscillations are superimposed on the fundamental signal. At B, VFO output signal after RFC1 (Fig. 1) was added in the base lead of Q1. Some waveform impurity remains, but is removed after the signal is passed through the tuned circuit of Fig. 4B, or the tuned circuit of a succeeding stage in the transmitter.

a circuit board, but the method shown here is preferred by this writer for the reason given.

This unit is assembled in a larger box than is really needed, so those wishing to miniaturize the package can no doubt pack the circuit into a much smaller space. The larger format was chosen to simplify construction for those readers that might not have extensive experience in building compact gear. The circuit board² measures 3 1/4 X 4 inches. The homemade aluminum box uses 1/16-inch-thick stock to assure rigidity. The box is 3 inches high, 3 3/8 inches wide, and is 4 1/8 inches deep. A U-shaped top cover is attached by means of six sheet-metal screws. The bottom of the VFO is enclosed by the chassis upon which it is mounted. There are seven No. 6 spade bolts attached to the

²Ready-made circuit boards for this and other QST projects are available from Stafford Electronics, 427 S. Benbow Rd., Greensboro, N.C. 24701.

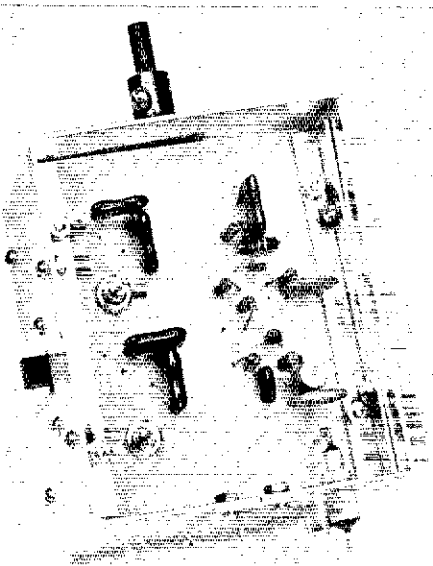
lower portion of the box walls. These are used to anchor the VFO to the main chassis of the composite equipment. If it is to be used as an outboard accessory a second U-shaped lid can be made for use as a bottom cover. If this is done, four adhesive-backed rubber feet can be added to the bottom cover. If used separately, a false panel should be bolted to the front of the box (on metal standoff posts) to facilitate mounting a vernier dial.

A scale layout for the VFO circuit board is given in Fig. 3. The main body of the aluminum box requires four 90-degree bends, and these can be made in a bench vise. The open ends of the stock are joined at the rear-center of the box, and are secured by means of a single strip of aluminum that is 1 inch wide by 3 inches long. The strip is bolted to the box with four 4-40 screws and nuts.

Tuning capacitor C3 attaches to the front wall of the box by means of its threaded shaft bushing. A small aluminum bracket secures the rear end of C3 to the back wall of the box. Both ends of the capacitor should be firmly attached to the box walls as outlined. This will further enhance the mechanical stability of the VFO.

Band switch S1 is mounted on the side wall of the box so that the leads between it and the circuit board will be as short as possible. S1 is a two-pole double-throw slide switch. The builder may wish to mount a miniature rotary switch on an L bracket, inside the box, and bring its shaft out through the

The circuit board is attached to the side walls of the VFO case by means of homemade aluminum L brackets. The board is recessed one inch into the enclosure. The dual-section tuning capacitor is attached to the front and rear walls of the box. A feedthrough capacitor is mounted on the rear wall for bringing the 12-volt line into the VFO. A phono jack is used to bring the VFO signal out of the box.



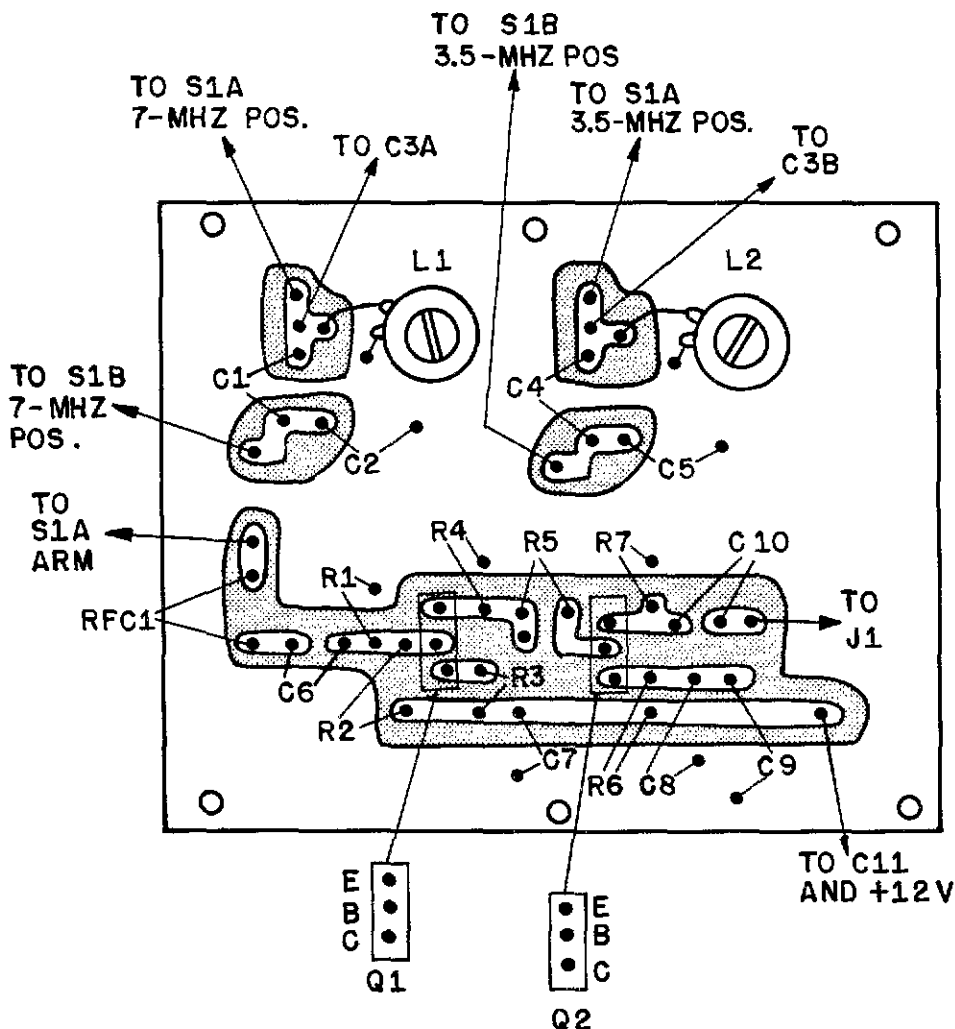


Fig. 3 - Scale template for the VFO circuit board. A foil-side view is given here.

front wall of the box to provide front-panel accessibility. Or, some type of mechanical linkage could be contrived to permit operating the slide switch from the front panel of the equipment. Improvements over the method shown here will be limited only by the ingenuity of the builder. The circuit board is attached to the side walls of the box, one inch down from the top of the enclosure, by means of two homemade L brackets.

Performance

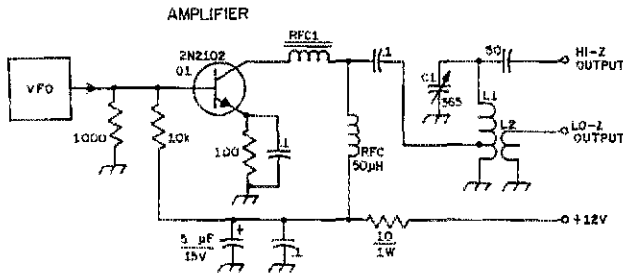
The waveform of Fig. 2B was obtained with the VFO looking into a 50-ohm termination. It shows good linearity, but is not completely clean. Some harmonic energy is present, but its level is low enough to not present any problems. The tuned circuit of the succeeding stage normally restores the waveform to a pure sine wave. Since there is no tuned circuit in buffer stage Q2, one can expect

some harmonic energy to be present in that part of the circuit.³

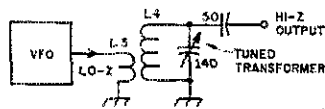
Typical peak-to-peak voltages are given for various parts of the circuit. This will serve as an aid to anyone wishing to compare the performance of his model to that of the *QST* version. A diode probe and a VTVM can be used if a peak-reading instrument is not available. The diode probe will provide rms readings, which can be converted to peak readings for comparison's sake.

The VFO was checked for drift at 7 MHz. It was connected to a regulated 12-volt supply. During the first hour, drift amounted to approximately 80 Hz, but the frequency change was not all in the same direction. The wandering may have resulted from changes in ambient

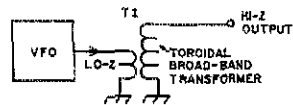
³Bipolar transistors generate considerable harmonic energy by virtue of the nonlinear change in junction capacitance, plus the more familiar envelope-distortion harmonic-generation process.



(A)



(B)



(C)

Fig. 4 - Schematic illustrations of possible VFO circuit additions. Resistance is in ohms. $K=1000$. Capacitance is in pF. At A, amplifier circuit that can be used to boost the power output of the VFO. L1C1 can be made to tune both 80 and 40 meters without the need for a band switch. The tap on L1 is chosen for the proper impedance match between Q1 and the load. RFC1 consists of three Amidon ferrite beads. The circuit at B can be used to provide an impedance step up when the VFO feeds the grid of a tube, or the gate of an FET. The transformer is tuned to the VFO operating frequency. At C, a broadband toroidal transformer can be used to raise the output impedance of the VFO. The turns ratio is chosen for the desired step-up ratio. The transformer secondary must present a high impedance to the circuit it connects to.

temperature, since the room in which the tests were performed is subject to temperature variations. The bottom cover was not on the box when the tests were made. During the second hour of testing, the frequency was relatively steady, but some wandering was noted over a range of approximately 25 Hz. The greater part of the frequency drift occurs during the first 30 seconds of operation, no doubt owing to junction heating of Q1 and Q2. All in all, the drift specifications are quite satisfactory for most amateur applications.

The VFO showed very little loss in output when the operating voltage was lowered to 9. Some builders may want to use Zener-diode regulation. If so, a 1-watt, 9.1-volt Zener can be added between the 12-volt line and ground. A 220-ohm series resistor should be placed between the Zener and the 12-volt source if this is done. With an operating voltage of 12, the total drain of the VFO is 20 mA.

Mechanical stability is excellent. The box was dropped from a height of 6 inches and no frequency shift or warble could be observed while monitoring the output signal on a receiver whose BFO was turned on. The shaft of C3, the main tuning capacitor, was securely anchored in place when this test was made.

Final Comments

It should be remembered that if this VFO is to be used in combination with a tube-type transmitter, some means for stepping up the VFO's output impedance (to that of the tube's grid circuit) should be employed. If the driven stage operates Class C, then an intermediate amplifier

should be used to provide some driving power. Such a circuit is given in Fig. 4.

If the VFO is designed to look into a high impedance, but if the circuit does not consume appreciable power, then a simple step-up transformer can be used between J1 and the load. It can be a tuned circuit, or a broadband toroidal transformer. This method is useful when the VFO is used to excite a mixer stage, or to drive a Class-A or AB1 amplifier - a situation that is typical when dealing with receivers or ssb transmitters. In such instances driving power is not required, and only excitation voltage is needed.

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How to Handle Hi-Fi Interference

A Cautious Approach To A Sticky Problem

BY LEWIS G. MCCOY,* W1ICP

There is no single solution to the problem of interference to audio equipment. However, some of the techniques described in this article may be the answer to your problem.

IT is very apparent from our mail that while TVI has become less and less a problem, amateur interference to hi fi, tape recorders, electronic organs and such types of entertainment equipment has been getting worse. It is also apparent that most of the problems are on the increase because of the gradual changeover to the use of solid-state circuits in these devices. While it is possible to have interference problems with vacuum-tube units, solid-state equipment is much more susceptible to interference from nearby rf fields. The simple fact of the matter is that solid-state units are more inclined to overload than tube devices.

Let's make one important point clear before going into greater detail; there is *nothing* a ham can do at his own station to eliminate the majority of these types of interference. True, he can go off the air, but that is not the answer to the problem. We are continually getting queries asking how a ham can debug or fix his station so it won't interfere with such devices. Possibly the only type of interference that could be the ham's fault might be a harmonic that would interfere in the fm spectrum, 88 to 108 MHz; however, we are assuming the ham station has no parasitic or harmonic emission.

What's The Reason?

The question asked by any amateur who doesn't understand the problem, would be why his transmitter signal could cause interference to a device that has no frequency relationship to his signal. For example, a record player isn't even a radio receiver, it is simply an audio amplifier that amplifies audio signals. Nevertheless, such a device can be easily interfered with by a nearby ham radio station, through no fault of the amateur. When such pieces of equipment are operated in the presence of a strong rf field, the energy can be coupled or fed into the device, causing interference. The rf is rectified in the units and ultimately appears as audio, in one form or another, at the speakers.

An unmodulated, unkeyed, radio signal can cause a hum in hi-fi equipment, or a reduction or increase in the audio level which may go unnoticed by the user. When the carrier is keyed, as in cw operation, the audio level will change in time with the keying rate. If the carrier is amplitude modulated, the amateur's voice can be heard in the audio equipment. In ssb operation, the interference will take on the character of gibberish and would

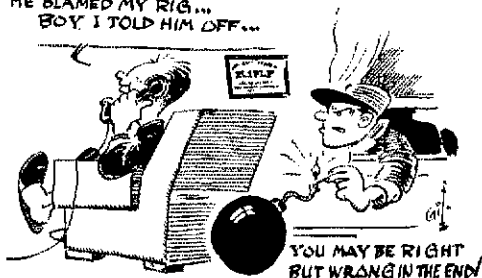
be unreadable to the audio listener. Also, fm would be unreadable. If the hi fi listener didn't know there was a ham nearby he normally would be unable to identify the source of the interference. However, we have to get along with our neighbors and sooner or later the source of the interference will be identified — meaning *you*, the ham.

The Public Relation Problem

Before getting into details for curing such interference, let's discuss an even more important phase of the problem — public relations. Having gone through all the troubles with TVI, amateurs should be well aware of the problem of dealing with an uneducated public. Most of the successful approaches that were used with TVI and public relations problems can be used effectively with audio equipment interference.

For one thing, never start off by telling a hi-fi owner that you know your gear is OK and that his equipment is at fault. *You* may know that is the truth, but just for a moment, put yourself in the other guy's place. You've just paid "umpteenth" dollars for a real classy 8-channel, multiple-speaker, high-fidelity installation and some one comes along and makes the speakers jump off the wall with interference. How would you feel? Not very good, and that's for sure. Your first step would be to call the dealer where you bought the unit and ask what was wrong. The dealer would send a repairman out, who, after checking the unit, would probably say it was the ham's fault and that there was nothing wrong with the hi-fi unit. (Unfortunately, while

YEH JOE, I GOT THIS NEIGHBOR
WITH HI-FI INTERFERENCE AND
HE BLAMED MY RIG...
BOY, I TOLD HIM OFF...



*Novice Editor.

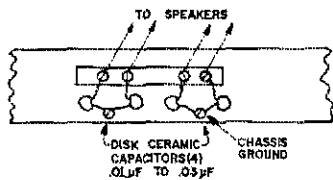


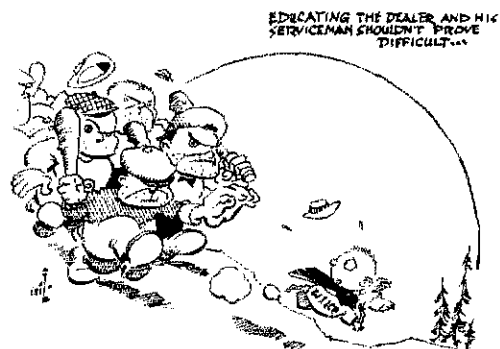
Fig. 1 — The disk capacitors should be mounted directly between the speaker terminals and chassis ground, keeping the leads as short as possible.

the serviceman may know how to repair such gear they seem to be completely inept when it comes to the simple steps of eliminating rf interference).

Your problem is now one of educating an irate hi-fi owner who has been told that his equipment is OK while your rig is at fault — and when you know for a fact that the opposite is true! We could hardly fault a ham for feeling a little irked about such a situation but believe us, *nothing* but trouble will result if you can't handle the situation with tact and diplomacy. As they say, this is the time to "keep your cool".

A good approach is to tell the hi-fi owner that you will be happy to talk to the dealer and serviceman to see what can be done about the interference. Once you get to the serviceman, you can point out the simple steps needed to clean up the interference. We can assume that the serviceman has some knowledge of electronics and can understand lead filtering and bypassing. This approach to the problem will work in many instances. However, you'll occasionally run into a dealer who isn't cooperative. In such cases, the only answer is to write directly to the manufacturer and point out the problems, including the lack of cooperation on the part of the dealer.

As an example, a ham from Milwaukee had a neighbor who purchased an organ, of well-known make. When operating on 20 meters, the W9 had audio interference in the organ (which was about a block away). The dealer informed the ham that nothing could be done at the organ to cure the trouble and even implied the cause was at the transmitter. The amateur wrote directly to the organ manufacturer, even offering to install the necessary corrective measures himself. The manufacturer answered very quickly and assured the ham that the organ was at fault and enclosed the required information for correcting the problem.



Additionally, the manufacturer straightened out the dealer about the causes and cures.

We have heard of many such examples, so it does pay to write the manufacturer about a particular problem. Most important — enough so to keep repeating ourselves — the answer in handling all complaints is to use tact. Probably the utmost in tact was displayed by a ham who was blamed for interference that was actually caused by three CB stations. The ham stepped in and cured the interference and in the meantime made a ham out of one of the CBers and the hi-fi owner! That's not only tact — that's salesmanship.

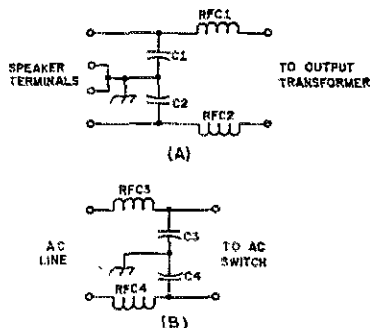


Fig. 2 — At A, the method for additional speaker filtering, and at B, filtering the ac-line input. In both cases, these installations should be made directly inside the amplifier chassis, keeping the leads as short as possible.

C1, C2 — .01- to .03- μ F disk ceramic.

C3, C4 — .01 disk ceramic, ac type.

RFC1 through RFC4 — 24 turns No. 18 enamel-covered wire, close-spaced and wound on a 1/4-inch diameter form (such as a pencil).

The Cures

Step number one is to try and determine how the interference is getting into the hi-fi unit. If the volume control has no effect on the level of interference or very slight effect, the audio rectification of the amateur signal is taking place past the volume control, or on the output end of the amplifier. This is by far the most common type. It usually means that the amateur signal is being picked up on the speaker leads, or possibly on the ac line, and is then being fed back into the amplifier.

In our experience, and we are not talking about radio or TV, most of the rf gets into the audio system via the speaker leads or the ac line, mostly the speaker leads. You may find that on testing, the interference will only show up on one or two bands, or all of them. In hi-fi installations speakers are sometimes set up quite some distance from the amplifier. If the speaker leads just happen to be the same length as one of your transmitting antennas, you've got troubles. The speaker lead will act as a resonant antenna and pick up the rf. One easy cure to try is to bypass the speaker terminals at the amplifier chassis. Use .01- to .03- μ F disk capacitors from the speaker terminals directly to chassis ground, see Fig. 1. You can try .01 μ F and see if

that does the job. We found in some amplifiers that .03 μ F were required to eliminate the rf. Be sure to install bypasses on *all* the speaker terminals. In some instances, it may appear that one of each of the individual speaker terminals are grounded to the chassis. However, some amplifiers have the speaker leads above ground on the low side, for feedback purposes. If you have a circuit diagram of the amplifier you can check, but in the absence of a diagram, bypass all the terminals. If you can get into the amplifier, you can use the system shown in Fig. 2A, a method recommended by the Electro-Voice Corp.

In this system, two rf chokes are installed in series with the speaker leads from the output transformers, or amplifier output, to the speakers. These chokes are simple to make and help keep rf out of the amplifier. In particularly stubborn cases, shielded wire can be used for the speaker leads, grounding the shields at the amplifier chassis, and still using the bypasses on the terminals. Speaking of grounding, all chassis used in the hi-fi installation should be bonded together and connected to a good earth ground (such as a water pipe) if at all possible. In our experience, we have found that grounding sometimes eliminates the interference. On the other hand, don't be discouraged if grounding doesn't appear to help. Even with the bypassing and filtering grounding may make the difference.

Fig. 2B shows the method for filtering the ac line at the input of the amplifier chassis. The choke dimensions are the same as those given in Fig. 2A. Be sure that the bypasses are rated for ac because the dc types have been known to short out.

Fig. 3 shows the method for lead filtering the input circuits of an amplifier, such as the record-player input. Keep all leads as short as possible to reduce the possibility of rf pickup.

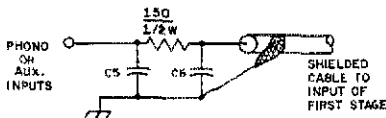
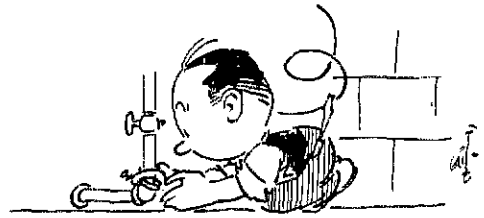


Fig. 3 - Method for filtering phono or auxiliary input leads. The filter circuit should be mounted directly inside the chassis at the terminal. Use short leads wherever possible.
C5, C6 - 150-pF mica capacitors.

Antenna Pickup

If the hi-fi setup includes an fm installation, and many of them do, there is the possibility of rf getting into the audio equipment by way of the fm antenna. Chances for this method of entry are very good and precautions should be taken here to prevent the rf from getting to the equipment. A TV-type high-pass filter can prove effective in some cases.

For the benefit of the Novices, a high-pass filter is simply an electrical circuit, usually enclosed in a small shielded metal container, that will attenuate all radio frequencies below the filter's designed cut-off frequency. High-pass filters are usually



BONDING ALL CHASSIS TOGETHER AND CONNECTING THEM TO A GOOD EARTH GROUND MAY HELP.

designed with a cut-off frequency of about 40 Mhz. The filter will pass any radio signal higher than its designed cut-off frequency, but will attenuate any frequencies below the cut-off frequency. The filter can be installed directly at the chassis near the fm antenna terminals. Directions that come with these filters are for television sets but the same installation techniques can be followed for the fm sets.

Conclusions

We don't suggest that the amateur needs to install these preventive devices on a neighbor's hi-fi installation. The problem in doing such installations yourself is that the hi-fi owner would be inclined to blame you if something went wrong. However, as pointed out earlier, *knowing* how to do the job will enable you to deal with the hi-fi dealer or his serviceman.

In particularly stubborn cases, it is a good idea to write to the manufacturer of the equipment and see what recommendations he may have. And, above all, use diplomacy and tact in dealing with any interference case, whether it is your fault or not.

Strays



The Cedar Valley Amateur Radio Club cooperated with the Multiple Talent Drop-In Center (a teenage recreational activity) to demonstrate amateur radio. WA0IFH is shown at the controls of the demonstration station.

Assemble your own microphone — well, why not? This article reviews the basics of microphones, contains information on adapting military surplus noise-cancelling microphones for amateur use, and shows how to construct carbon and magnetic hand-held mikes from inexpensive telephone elements.

The Portable/Mobile Microphone

BY DOUGLAS A. BLAKESLEE,* W1K1K

THE subject of microphones for mobile use really hasn't come in for much consideration by hams — in fact, microphones for all amateur applications haven't received much attention in recent years. Yet, all phone transmission starts with a mike, and the quality and intelligibility of that transmission can only be as good as the microphone used. Microphones intended for portable and mobile use deserve extra care in selection as they must work in very severe environments. Although this article is primarily about hand-held microphones and handsets, the material covered applies equally well to all microphones. The ham considering a mike purchase will find the information helpful in making a choice from among the many types available.

Microphones have a number of basic characteristics, and it is these factors that must be considered when fitting a mike to a particular application. They are: distortion, frequency response, impedance, output level, mechanical design, and directional or noise-cancelling ability. These factors are considered one at a time in this article, although microphone design is a set of compromises and trade-offs among these basic parameters.

DISTORTION — Non-linear response of the microphone to sound waves. Distortion is not usually a problem in mikes of modern design, except the carbon types.

FREQUENCY RESPONSE — Bandwidth over which the microphone responds to sound waves. In ham phone transmissions only the portion of the speech band from about 300 to 3500 Hz needs

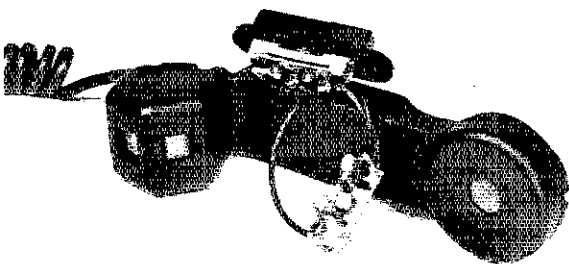
* Assistant Technical Editor, QST

to be transmitted for good intelligibility. Microphones usually have bandwidths greater than 300 to 3500 Hz, so the speech amplifiers in transmitters are often designed to limit the audio bandwidth to the minimum necessary (ssh filter-type exciters often rely on the filter to limit transmitted bandwidth).

A microphone should have a response that is as uniform as possible over the desired speech range, but this is the most difficult microphone characteristic to achieve. The inexpensive types often have peaks and valleys in their response as much as 20 dB above and below the nominal output level. This peaky response will increase the peak-to-average ratio of the speech waveform, which reduces the average level of audio power transmitted.

IMPEDANCE — A microphone is a voltage generator which has an optimum load impedance. Mikes are available in two broad categories of impedance, high and low. The high-Z mikes are used within a short distance of the transmitter, as the connecting cable cannot be made very long without compensation or matching transformers. Shielding of this cable is necessary to prevent hum and noise pickup. Low-Z microphones are sold in three popular impedances, 50, 150, and 600 ohms. The 50-ohm types are used by the commercial communications services, while the 150- and 600-ohm mikes are usually found in broadcast, telephone, and public address applications. The amateur's choice of mike impedance is usually dictated by the requirements of his transmitter, unless a transformer is used.

OUTPUT LEVEL — Related to impedance, output level varies widely with different types of microphones. There are several systems of specifying microphone output level in use, so direct comparison of various manufacturers' specifications can lead to erroneous conclusions. Also, the test level, reference level and load impedances used



The H-138 handset with switch and preamplifier assembly partially removed.

QST for

in the specification of high-Z and low-Z mikes are different, so the two cannot be directly compared.¹

MECHANICAL—In choosing a microphone for heavy-duty applications, mechanical considerations are important. Some microphones are inherently delicate and some are quite rugged. Most have problems if exposed to dust, moisture, or excessive temperature, so the housing should provide protection from the elements. Mobile microphones are made up in either a handset or hand-held case, and the choice between the two is a matter of preference for amateurs.

NOISE CANCELLATION—The ability to cancel or reject noise while not attenuating the desired voice signal. This subject is covered in more detail below.

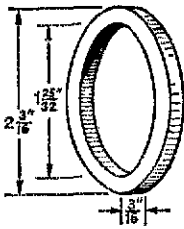


Fig. 1—Adapter ring for the T1 carbon mike when it is to be used in place of the F1.

Carbon Microphones

The carbon microphone is used universally by the telephone industry, and until quite recently was quite popular with the military. Carbon elements are low impedance (usually between 30 and 80 ohms), and very high output—0.2 volt or more, depending on the dc voltage across the element. They differ from the other popular types in that the transmitter (or some other source) must provide an operating voltage for the element. Practically, the voltage requirement limits the use of the element to transmitters designed for carbons. In amateur service, a good deal of the converted fm gear in use on vhf requires carbon microphones, and some of the older amateur equipment, notably the Gonset Communicator series, had the provision to use carbon elements. One reason that the carbon mike has remained popular with hams is the large numbers available surplus for a few cents each.

The carbon mike has two principal disadvantages, a high level of distortion compared to other types, and a problem when the element is exposed to moisture for long periods. Moisture in the

element will pack the carbon granules together, reducing the output and increasing distortion. In some cases the element stops working altogether. The mike can sometimes be restored by heating it for several hours in the oven or with a sun lamp, and then tapping it lightly to loosen the granules.

The older F1-type carbon transmitters used in surplus handsets and hand-held mikes can be replaced with the modern T1 element (the type used in the Bell 500 phone).² To make this change, fabricate a plastic adapter ring similar to Fig. 1, glue the T1 element in the ring, and put it in the mike case, replacing the F1. The T1s have a little less output than the F1, but otherwise are superior and will give years of trouble-free service.

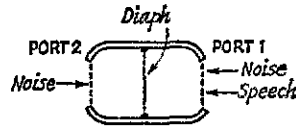


Fig. 2—Simplified center chamber of a noise-cancelling microphone.

High-Z Mikes

The crystal, ceramic and dynamic microphones are the high-Z types used by amateurs. Because of its fragile nature and its dislike of temperature or humidity, the crystal mike is only used in home stations, and rightly so. The ceramic types have become very popular with manufacturers who supply mikes with their amateur and CB transceivers. The reason is, of course, that the ceramics are being mass produced and sell for low prices in quantity. They are high impedance, which goes with the standard high-impedance input of today's transceivers. The output of a modern ceramic is generally enough to adequately drive most of the popular rigs. But, a ceramic is a low-output device, and operation can be marginal with a transmitter that is lacking gain in the audio stages. An interesting characteristic of the ceramic microphone is that if it is terminated in a lower-than-optimum resistance (100k Ω to 250k Ω) the low-frequency output is attenuated—a simple way to eliminate the unwanted frequencies below 300 Hz. This frequency characteristic is also true of microphones made with Rochelle salts, another piezoelectric material.

Many of the inexpensive ceramic units show the effects of mass production—excessive peaks in their frequency response. Manufacturers rate

¹ The popular rating for high-Z microphones is the output voltage, expressed in dB below one volt, measured across an open circuit with a 1 dyne/cm² test signal at 1000 Hz applied to the microphone. Low-Z mikes use a different system with the rating in output power, expressed in dB below 1 milliwatt, measured across a 600-ohm load and using a test tone of 10 dynes/cm² at 1000 Hz. Several other test procedures are in use currently, so direct comparison of manufacturer's specifications will only be valid if the same measurement standards have been used.

² The best source of Bell (Western Electric) elements is a telephone repairman—a big smile and a good story helps, when you see the Bell truck in your neighborhood. The military services use similar elements; their TA-117 carbon microphone and TA-255 receiver are copies of the elements in the Bell 500 handset, and these units can be found surplus. New elements can be purchased from any Graybar outlet; Graybar distributes elements manufactured by ITT's Telecommunications Division. Another source is Yankee Telecom Labs, Meriden, Conn. Prices for new T1s are about \$1.50 and \$2.75 for a U1.

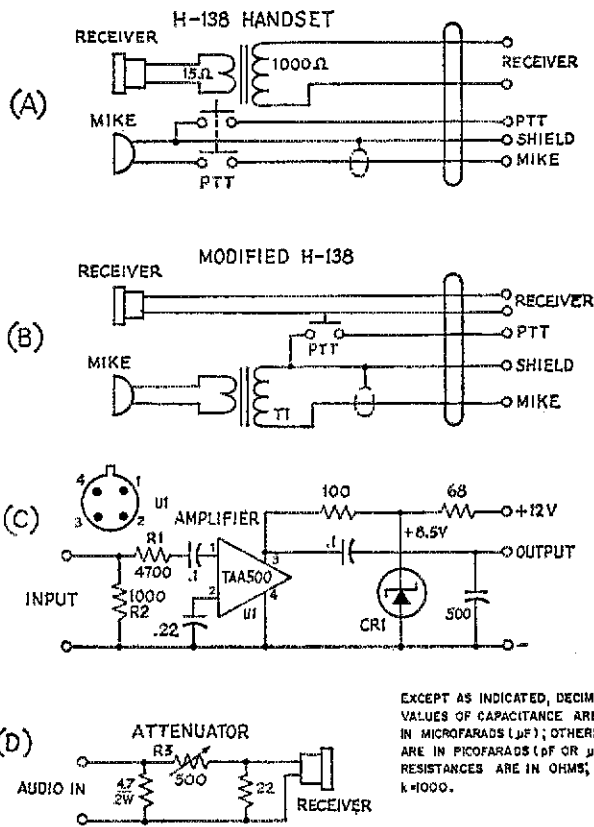


Fig. 3—(A) The original H-138/H-207 handset schematic. (B) H-138 modified for amateur use. Transformer T_1 has a 250-ohm primary, 250-kilohm secondary (subminiature type) for high-Z output (UTC SSO-1), or a 600-ohm primary, 60-ohm secondary unit (UTC SSO-11) if low-Z output is desired. (C) Handle-mounted preamplifier for the H-138 using an Amperex TAA-500 integrated circuit, U_1 . Resistors are composition types, and capacitors are paper or ceramic. Diode CRI is an 8.5-volt, 1-watt Zener. R_1 and R_2 are labeled for text reference. (D) Input attenuator to reduce the level to the receiver element. R_1 is a linear composition control (IRC R501B).

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (PF OR $\mu P F$); RESISTANCES ARE IN OHMS; k=1000.

the nominal frequency response for these mikes, but never mention the limits of deviation from the nominal output level. It is generally true that the cost of materials for all types of microphones is very low unless put in a very fancy housing. The yield, testing, rework, and retesting that a manufacturer goes through to insure a microphone meets a specified frequency response within specified limits is what adds up to the price of a "good" microphone.

Dynamic mikes are the most popular type for radio service. Dynamic elements are low impedance, and matching transformers are built in if high-impedance output is desired. Dynamics range all the way up in price until they rival the cost of a communications receiver. The super-expensive types are generally intended for recording and broadcast work. The dynamic element can be made noise cancelling or directional. The mounting of the diaphragm is such that sound can easily be applied to both the front and the rear of the diaphragm to produce a desired pattern or effect. Because of its excellent speech quality and reliability, the military services have been changing over to this type of mike for use on field radio sets.

Noise Cancellation

Amateurs usually don't have a broadcast-studio environment from which to operate. More often, the washing machine is going, the children are yelling, and the fan in the kW is rumbling

away. Peaks of noise trip the VOX and make use of a compressor impossible. The intrepid ham who operates mobile or portable faces even greater levels of noise. When hams have multi-transmitter setups, such as Civil Defense centers and on Field Day. . . . You know, you've heard these operations on the air. There are enough problems in getting a good signal-to-noise ratio at a distant receiver without starting with more noise than signal at the microphone. The noise-cancelling mike can be used to advantage in many amateur applications.

The battlefield isn't a quiet place either, so the military research and development centers have spent a lot of time and money on noise cancellation in microphones. During World War II the carbon mike was the standard in field equipment. Many of the carbons of that day had to really be shouted at to get much output, anyway, so they only picked up the heavy noise. Experimentation went on with throat mikes, boom mikes, lip mikes, and other types to get the best signal-to-noise ratio. Many of these efforts paid the price of poor sensitivity and high distortion for the ability to attenuate background noise. Designs have improved considerably in recent years, and the military has been using some fine units which are now beginning to show up as surplus.

The principle of noise cancellation (perhaps more properly called noise attenuation, as it is impossible to get rid of all noise) is quite simple.

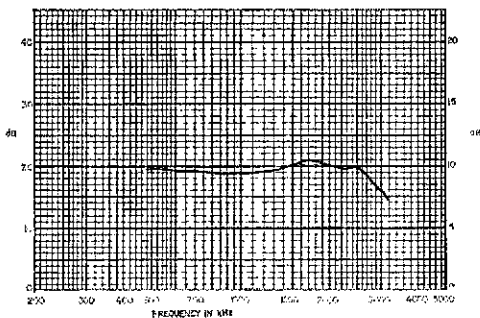


Fig. 4—Response of a typical UI receiver element. The horizontal scale is frequency in Hertz and the vertical, amplitude in dB.

Referring to Fig. 2, the noise originating at some distant point enters the mike through two ports and is applied to both sides of the diaphragm. If the sound pressure is equal on both sides, the diaphragm will not move and the mike has no output. Speech is allowed to enter through only one port; the diaphragm moves in response to this sound pressure and output is produced. The shape of the diaphragm, the material it is made from, and the mounting are all important design considerations. A problem area is the tendency of the diaphragm to "lock up" under heavy noise pressure, distorting the desired speech signal. Considerable progress has been made in this area, and a good design will take very heavy noise without producing appreciable speech distortion.

The mike element itself must be physically small and light, as someone is going to hold it, which means that the two sampling ports cannot be spaced very far apart. If the voice is allowed to enter both ports, it too will be attenuated. So, noise-cancelling mikes are inherently close-talk devices. They must be held within $\frac{1}{2}$ inch of the lips for best results.

The measurement of a mike's ability to attenuate noise is not standard, and most commercial units are sold simply with the label "noise-cancelling", with no information on how well the mike actually cancels background noise. A good unit should attenuate noise by at least 20 dB across the speech band.

Hams have traditionally not spent much money on microphones, even though good noise-cancelling commercial units have been on the market for awhile. The surplus hounds have found two fine military models that are beginning to show up on the market, the M-80 hand-held mike and the H-138/H-207 handset. (The 138 and the 207 are the identical handset except for the length of the coil cord.) The M-80 is a current

model, and the H-138 recently was obsoleted and replaced by the H-189 and the H-294 handsets.

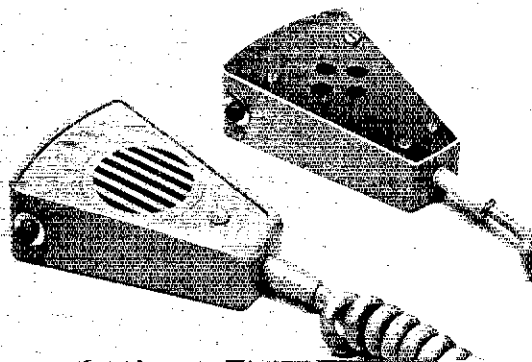
We obtained an H-138 and modified it for use with ham equipment.³ The microphone element used in this handset has an impedance of 1000 ohms, and the receiver element, 15 ohms. The receiver is connected through a transformer which steps up the input impedance to 1000 ohms. This transformer is mounted under the push-to-talk switch. All of the handset interconnections are made with screw terminals, so it is easy to rearrange things. The coil cord has 5 conductors, one of which is shielded. The shielded lead should be used for the microphone connection. All connection parts are located under the push-to-talk (PTT) switch. The PTT switch has two normally-open single-pole contacts that are sequenced so that one closes before the other. In the original handset, the transmitter keying contact was closed before the second contact connected the microphone.

Modifying the handset consists of changing a few connections around and adding a transformer (Fig. 3B) to raise or lower the microphone impedance to the value required by the transmitter you are going to use. The receiver transformer is removed and discarded to make room for the subminiature mike transformer. If the earphone is to be used, remember it takes only a few milliwatts of audio to operate. If it is used in place of a speaker, an attenuator such as shown in Fig. 3D should be included to reduce the input voltage to an acceptable level.

If the handset is to be used with a transmitter that is located some distance away, as happens when using an fm rig in the trunk of a car, the H-138's low-Z output is so low that noise pick-up may be a problem. For this situation the small preamp shown in Fig. 3C can be used in place of the transformer. This amplifier uses an Amperex TAA-500 integrated circuit and is designed to operate on 12 volts dc. The TAA-500 requires very little input signal (0.002 volt) for full output, so an input attenuator, R_1 and R_2 , was required to reduce the output of the H-138's mike to an acceptable level. Zener CR_1 protects the integrated circuit from the voltage fluctuations often found in mobile installations. The output of this preamp is sufficient to drive transmitters designed

³ Most surplus stores have handsets and elements available. Two sources are the Tallen Co., 300 7th Street, Brooklyn 15, New York, and Fair Radio Sales, Lima, Ohio.

Two homebrew microphones, the carbon unit on the left, and a rear view of the magnetic mike to the right. The four holes in the rear plate of the magnetic model allow noise to enter the rear of the element to cancel noise being picked up through the front opening.



for carbon mikes. As the output is high, make sure you are not overdriving the transmitter's first audio amplifier.

Roll Your Own

In looking at noise-cancelling mikes, we discovered a Marine Corps unit that used the standard Bell Telephone U1 receiver element as a noise-cancelling mike. The U1 is a magnetic-type element with excellent frequency response characteristics, as can be seen in Fig. 4. It has a rear-port opening to the diaphragm for noise cancellation. The element doesn't have the noise-cancelling properties of some of the fancy military mikes, but then it only costs three dollars.

The magnetic receiver element has been widely used in amateur headsets. Some of the early models had high response peaks in the middle of the audio range. Old timers used this defect to advantage, as an audio note would have a distinctive sound in the peak region. Many OTs used their special set of "selective cans" to pick out a desired signal in the "rotten QRM." Today you have to have a tone filter or Selectoject to produce the same effect, as modern elements like the U1 have very flat response curves.

Different from its cousin the dynamic, the magnetic element uses a metallic diaphragm which is biased by fixed magnets called pole pieces. The drive coil or coils are arranged to add and subtract from the magnetic field when an ac signal is applied, moving the diaphragm and producing sound. Used as a microphone, the process is reversed.

With a good but inexpensive element in hand, rolling your own microphone is a simple assembly job. The hardest thing to obtain was a housing that would fit the U1. A sturdy plastic case was found, which the manufacturer has agreed to sell to amateurs.⁴ The T1 carbon element men-

⁴ The plastic microphone cases cost \$1.75 postpaid from Mr. Mark Gaylord, Action Systems Company, 34 Cambridge Street, Meriden, Connecticut 06450.

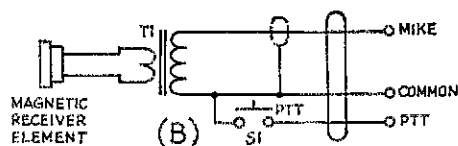
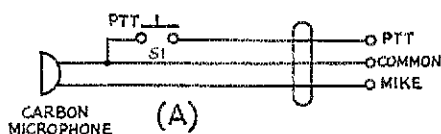


Fig. 5—Wiring of the (A) carbon and (B) magnetic mikes. S1 is a push-button switch (Switchcraft 903 or 913). If high impedance is desired on the magnetic model, transformer T1, a 250-ohm primary, 250-kilohm secondary submarine type (UTC S50-1) is included; otherwise it may be omitted, as explained in the text.

tioned earlier also will fit in this housing. Coil cords are available in radio stores, by mail order, or at most music stores where they are sold as extension cords for electric guitars.⁵ A three-conductor cord is required for a mike with PTT switch; otherwise, a two-conductor will do.

The internal wiring is shown in Fig. 5B. The impedance of the U1 element is about 200 ohms, so it may be used directly for low-impedance applications, or transformer T1 can be added for a high-Z output. If the transformer is located in the mike housing, it is necessary to have a shielded lead in the coil cord to prevent excessive hum pickup. Most of the coil cords designed for the guitars have such a shielded lead. A word of caution about the coil cords—don't cut off the terminals supplied on the cord, and don't buy a cord without terminals. The conductors in these cords are made with a tinsel wire that is about impossible to clean and solder. The special terminals made for the purpose are the only practical method of connection. You can always cut down the terminal and solder it, if a solder connection is desired.

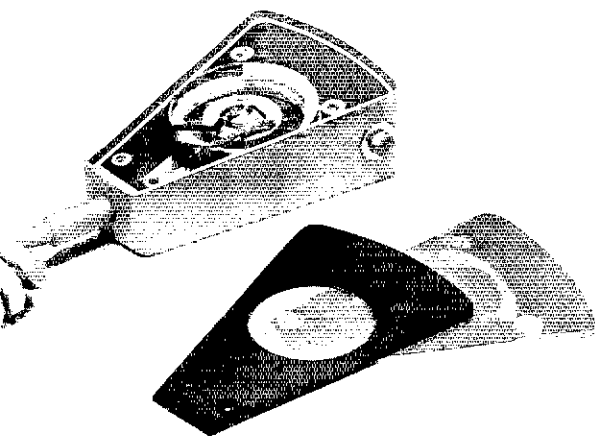
Two holes are drilled in the plastic housing for the coil cord and PTT switch. The PTT switch may be mounted on either the left- or right-hand side of the mike case. Put it on the side you find is most convenient. Large drill bits go through plastic very quickly, so use a slow-speed drill and take it easy when drilling. The nub on the front of the case is left by the injection mold when the part is made; it can be cut off for appearance's sake.

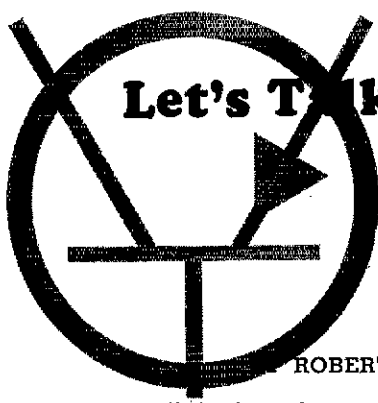
A back plate for the housing was fashioned from sheet aluminum. Four $\frac{3}{8}$ -inch holes are

(Continued on page 60)

⁵ Roth Allied Radio and Newark Electronics, Chicago, Ill., list shielded and unshielded coil cords in their industrial catalogs.

Fig. 6—Rear view of the carbon microphone. The back plate and rubber insulator are in the foreground. The rubber piece is cemented to the aluminum plate before final assembly.





Let's Talk Transistors

Part 8—Odds and Ends

ROBERT E. STOFFELS*

IN Part 7 we learned a little about the actual biasing of a transistor. We found that, although there is certainly more than one way of providing this bias, most methods have one disadvantage or another, and some are downright unsatisfactory.

The best of the various methods is probably what is known as "single-battery biasing stabilization," which simply requires the insertion of a resistor in the emitter lead, and the placing of the base lead somewhere on a voltage divider.

By drawing a fair amount of current in this voltage divider, the beta, or current amplification factor, of the transistor became almost negligible. This made it possible to use transistors without a tight beta spread, thus materially decreasing the cost of the transistor.

We derived the equations used in determining the resistor values in the emitter lead, and in the voltage divider, and thus were able to obtain the biasing network of the transistor with little effort. Conversely, we found that if a transistor used in a particular known circuit were to have these equations applied then the equations would tell us what current was normally flowing in the emitter-collector junction, and what voltage appeared between the emitter and collector.

This month we shall discuss several subjects that are less complex, and are not actually basic in nature, but are nevertheless extremely important.

Power Dissipation

The first of these subjects is power dissipation. As we know, power dissipation results in the generation of heat, and since it is heat that destroys transistors, we are urgently concerned with it.

The formula for determining power dissipation in a transistor is I^2R ; in most cases this is equivalent to E^2/R , or $I \times E$. For our purpose let us use the formula $I \times E$.

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A closer look at power dissipation, leakage current, and current amplification.

In one of our earlier chapters we plotted, in the form of a load line, the current in the emitter-collector junction versus the voltage across this junction. We found that at one end of this line (called cutoff) the current was zero, and the voltage was equal to the supply voltage. At the other end of this line (called saturation) the current was maximum (equal to the supply voltage divided by the external resistors in the circuit) and the voltage was zero.

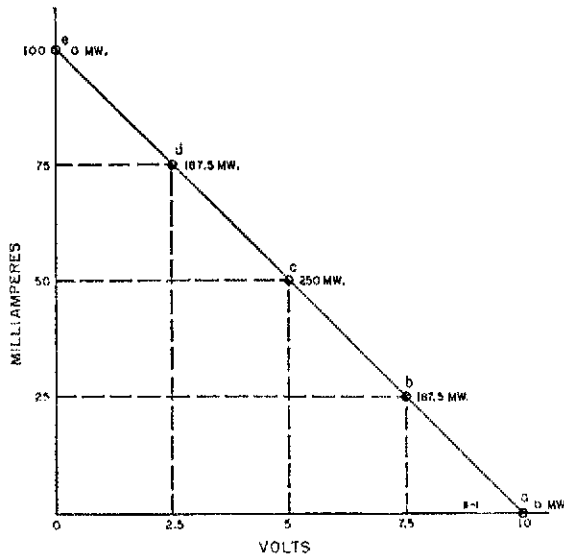


Fig. 8-1—Load line, showing power dissipation.

Therefore, by using the formula $P = I \times E$, it is immediately obvious that at both of these points the power dissipation is equal to zero watts, since in the one case the current is zero and in the other case the voltage is zero.

Points *a* and *e* respectively, of Fig. 8-1 show these two points, and we can therefore label these points "0 milliwatts." Point *b* on this curve is arbitrarily chosen where *E* is equal to 7.5 volts, and where, therefore, *I* is equal to 25 ma. In this case the power dissipation is; $P = I \times E = 25 \text{ mA} \times 7.5 \text{ V} = 187.5 \text{ mW}$. This point has been so labeled.

Point *c*, which is midway up the load line (as mentioned in earlier chapters, this is normally

where we "operate") has a voltage of five volts across the emitter-collector junction, and a current of 50 mA in the junction. Therefore, the power dissipation in the transistor at this point is equal to 5×50 , or 250 mW. This point has also been labeled.

Point *d* is located where the voltage is equal to 2.5 volts, and the current is equal to 75 mA. At this point the power dissipation is equal to 2.5×75 , or 187.5 mW. Notice that this is exactly the same power dissipation as we noted at point *b*.

When we examine the number of milliwatts generated at these various points, it becomes apparent that the point of maximum power dissipation is at the center of the load line, and the points of minimum power dissipation are at the two extremes.

If we were to examine a larger number of points on this load line, and in the surrounding regions, we would find that points of equal power dissipation could be joined, and that the resulting curves would be as shown in Fig. 8-2 (these are regular hyperbolas, and are formed by the equation $k = xy$). Thus the farther up and out our load line extends, the more power is going to be dissipated in the transistor.

Isn't it a shame that we normally operate at precisely that point on the load line where power dissipation is a maximum! Not only do we have to supply the power, but we have to ventilate cabinets to get rid of the resultant heat. Furthermore, it becomes necessary to purchase transistors which have greater power-handling capabilities, and naturally this costs money.

Class B operation (normally called "push-pull") does not utilize transistors biased at this maximum power point, but rather has its transistors biased at cutoff, where steady-state power

dissipation is zero milliwatts. We shall learn more about such operation in Part 9.

In like manner, most switching circuits scrupulously avoid this area of large power dissipation. Rather they leave the transistors biased into saturation (one end of the load line) or into cutoff (the other end of the load line), both of which points result in zero power dissipation. When a transistor is switched from one of these two conditions to the other, the trick is to do it fast — very fast! This permits use of a transistor which is capable of handling only 25 or 50 milliwatts in a circuit where the load line is as shown.

We might mention briefly some of the various means used for operating transistors at relatively high levels of power dissipation.

A most obvious method of preventing transistors from overheating is to air-condition, or at least to ventilate, the enclosing cabinet. For this reason printed-wiring cards are usually mounted on edge, so that convection currents will cause air to flow past each transistor, thus providing a certain amount of cooling. Also, upper operating temperature limits are usually specified; failure to observe these limits will often cause complete failure of the transistor.

A second method is to provide a "heat sink" for the transistor. This is either a small piece of metal clamped to the transistor, or a larger piece of metal to which the transistor is clamped. In either case the heat generated in the transistor is transferred by conduction (the best way to transmit heat) to the heat sink, thus keeping the temperature of the transistor as low as possible.

In cases where a large amount of heat will be generated (power output stages, for instance) larger transistors capable of dissipating up to 40 or 60 watts are used. These transistors are built in a larger case, and are always used with a large heat sink.

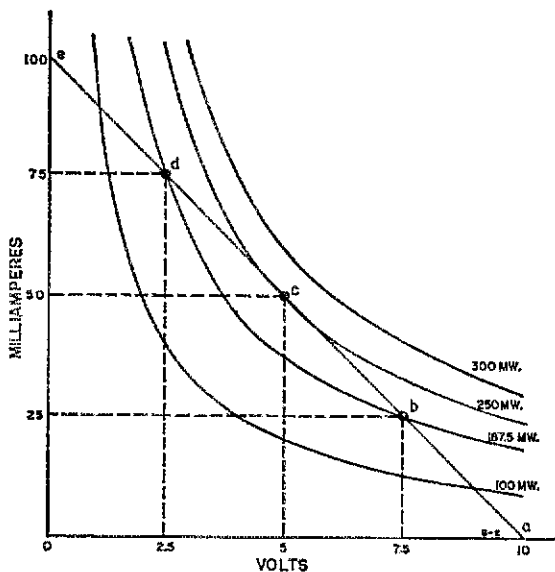


Fig. 8-2—Constant power dissipation curves.

Leakage Current

A second subject we should discuss, and one which probably causes designers more trouble than any other, is what is known as leakage current.

In Fig. 8-3 we have shown a very simple transistor circuit. Note that the base lead is actually grounded — a scheme which will certainly keep the transistor from turning on.

Recall also that the emitter-base junction of the transistor is actually a diode, biased so that current will flow from emitter to base (in the pnp transistor); and that the base-collector junction is essentially a diode, biased so that current *cannot* flow from the base to the collector. Thus, in this circuit, there should be no current flowing at all.

Unfortunately, this is not the case. It is true that no current will flow from emitter to base, or vice versa, but because there is a potential difference between the base lead and the collector supply battery, current *will* flow between these two points. Because this current is leaking across the base-collector junction, it is usually known as

leakage current (designated I_{co}). This current in a germanium transistor is normally on the order of 10 microamps at room temperature; this is small, but it cannot be ignored. To make matters worse, the characteristics of the transistor are such that the current just about doubles for every ten-degree rise in temperature (measured on the centigrade scale). Thus a leakage current of 10 microamps at room temperature (20 degrees C) will multiply to 80 microamps at 50 degrees C (122 degrees F) and to 1.6 mA at 60 degrees C (140 degrees F).

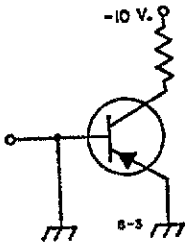


Fig. 8-3—Simple transistor circuit with base lead grounded.

Now this is all well and good until we try to use a circuit such as is shown in Fig. 8-4. In this case a resistance ground is connected to the base lead, and under normal temperature conditions this keeps the transistor cut off rather well. However, at higher temperatures, the current flowing from this resistance ground, through the base-collector junction, through the collector resistor, to negative battery, increases appreciably. The voltage drop across the base resistor increases, and in a very short time the potential at the base of the transistor is quite a bit negative. The transistor sees this negative potential at the base, and thinks it is supposed to turn on. It does, and the trouble starts!

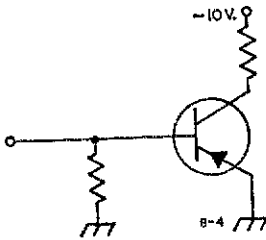


Fig. 8-4—Resistance ground connected to base lead.

A similar condition exists in the circuit of Fig. 8-5. In this case the base lead is left open, and although one would think that no trouble could possibly result, the circuit is extremely "shaky." Looking at the situation in the following manner often helps: a small amount of current flows from the emitter, through the emitter-base junction, to the base. Because there is practically no voltage drop across this junction, the base is nearly at ground potential. This re-

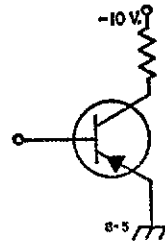


Fig. 8-5—Same circuit, but with base lead left open.

sults in a voltage difference between the base and the collector-supply battery, and as a result "leakage" current starts to flow. Because these few microamps are flowing from the emitter to the base (as the first leg of their journey) and thus are flowing out of the base junction, we apply the usual rules of a transistor, and multiply this base current by beta to determine what the resultant emitter-to-collector current will be. It will obviously be considerably greater (at least 20 times greater), and as a result additional current will flow from the emitter to the collector directly.

In other words, the leakage current, which flows from the base to the collector, is being drawn out of the base from the emitter. This amounts to normal base current, and the amplifying ability of the transistor causes appreciable additional current to flow from emitter to collector. This sometimes results in the transistor going into complete saturation — without even connecting the base!

One means of satisfactorily solving the problem is shown in Fig. 8-6. In this case the resistor on the base lead is not connected to ground potential, but rather to a positive potential. Operation in this circuit is satisfactory as long as the voltage drop across the base-connected resistor is low enough to keep the base at a positive potential, (this will of course, keep the transistor cut off). This voltage drop can be kept low by using a high positive potential, by using a small base-connected resistor, by using a transistor with a low inherent leakage current, or by keeping the temperature from rising too drastically.

Because of the exponential rise in this leakage current with temperature, the maximum operating temperature of a circuit can be determined

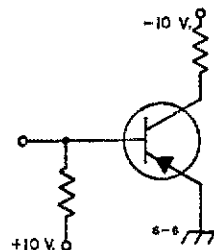


Fig. 8-6—Resistor in base lead connected to positive potential.

to a reasonable degree of accuracy. If the temperature exceeds this maximum permissible value by so much as a degree or so, leakage currents rise, voltage drops across these base-connected resistors rise, the base of the transistor goes negative, and the transistor turns on. Nothing more can be done!

One solution to this leakage problem is to use silicon transistors. The leakage current of a silicon transistor is very much smaller than that of a germanium transistor. Whereas the leakage current for a germanium transistor might be 10 microamps at 20 degrees C (68 degrees F) it would be 0.1 microamp for a like silicon transistor. Obviously, therefore, it is possible to operate a circuit employing silicon transistors at considerably higher temperatures than are possible with germanium transistors.

Please note that the above problems exist primarily when a transistor is to be held in cutoff. When a transistor is operating Class A there is little problem, since the biasing network automatically takes care of the situation.

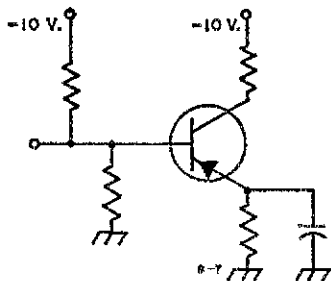


Fig. 8-7—Capacitor connected across the emitter resistor

Alpha

We have, throughout these chapters, used the term "beta," and defined it as the ratio of collector current to base current. We have said that the beta of a transistor varies from about 20 to as high as 200 or 300. These are numbers we can comprehend, and as a result the term is universally used, and is extremely descriptive.

There is another term, however, which was used even before "beta" was defined, and is still used in some quarters. This is the term "alpha." It is defined, roughly, as the ratio of collector current to emitter current.

Now it is pretty obvious that this number is not nearly so easy to comprehend. Suppose, for instance, that a particular transistor has a beta of 100. If the base current is 1 mA then the collector current must be 100 mA, and the emitter current must be 101 mA. As a result the "alpha" of the transistor is 100/101, or 0.99009, a number which is virtually impossible to find on the slide rule! If the beta of the transistor had been as low as 20, the alpha would have been 20/21, or 0.9523. Notice that even in this case the result is greater than 0.9; so, as a result, there is little

means of comprehending what the number really represents.

Occasionally, however, the amplification factor of a transistor is represented by its "alpha," so it is worth while to know the means of converting between alpha and beta, and vice versa. These conversions are as follows:

(α is for alpha, β is for Beta)

$$\beta = h_{fe} = \frac{I_c}{I_b} = \frac{\alpha}{1 - \alpha}$$

$$\alpha = h_{fb} = \frac{I_c}{I_e} = \frac{\beta}{\beta + 1}$$

Notice that we have inserted in these formulas two additional symbols, namely h_{fe} and h_{fb} . These are expressions of the two factors in terms of "hybrid" parameters, and although the entire hybrid system is too complex to investigate here, it is important to realize that specification sheets often use the hybrid system exclusively. The user should therefore recognize that this is simply another way of expressing the amplification factor of the transistor.

Bypass Capacitor

In Part 7 we learned how to bias a transistor to obtain stable operation. One of the components added for this purpose was a resistor in the emitter lead.

It was pointed out that this resistor impairs, to some extent, the operation of our circuit, since some of the output voltage which we have been working so hard to obtain now appears across the resistor. Or, to put it another way, the amplified ac voltage appearing at the collector of a transistor that is operating with a resistor in the emitter lead will be somewhat less than that appearing across a transistor operating without a resistor in the emitter lead. I am not suggesting that we should eliminate this resistor; we cannot, since we are relying upon it for stable operation.

There is, however, a means whereby we can regain some of this lost ac voltage, and that is to use what is known as an "emitter bypass capacitor." This is shown in Fig. 8-7.

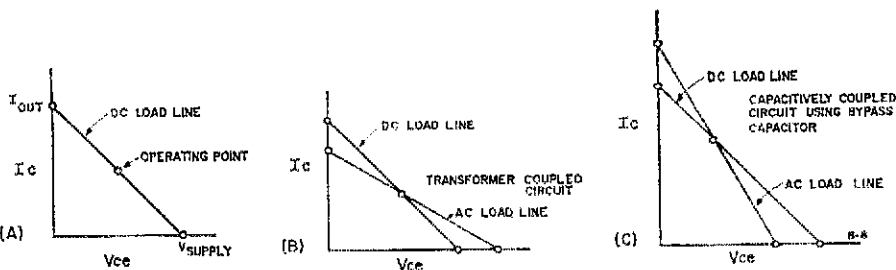
As can be seen, we simply connect a capacitor across the emitter resistor. Because the ac resistance of a capacitor is virtually infinite, this does not affect the load line, or any of our calculations. But because the ac resistance, or impedance, of a capacitor can be made as low as we wish (by making the capacitance as large as we wish) we are able to bypass the ac signal-voltage across this emitter resistor.

A rule of thumb states that this capacitor should be made large enough so that its impedance, at the lowest anticipated signal frequency, will be no more than 1/10 of the emitter resistance. And since the impedance (Z) of a capacitor is:

$$Z = \frac{1}{2\pi fC}$$

choice of this capacitor is not particularly difficult.

Fig. 8-8



AC Load Line

Our discussions during the past months have dealt very heavily with the biasing of a transistor, and the dc load line which shows just where and how the transistor is operating. We have not discussed — indeed, we have scrupulously avoided — the existence of an ac load line as opposed to a dc load line. Such a line does exist, however, and in order to understand how a transistor operates in a circuit (as opposed to just how it is biased in a circuit) it is necessary to spend some time on it.

As you will recall, the two extremes of the dc load line were determined by (a) the supply voltage, and (b) this supply voltage divided by all external resistors in the emitter-collector circuit (or saturation current). Thus we ignored any effects due to capacitors, transformers, or inductors; we were simply considering dc phenomena. And this is as it should be, in considering the biasing techniques of an ac audio amplifier in a steady state, or no-signal condition. And under these conditions only the dc resistance of the circuit is important.

But once the circuit is in operation the situation changes; for now we are interested in the ac impedance of any transformers in the circuit, and the effect of any bypass capacitors we have added. (Please note that if we are talking about a capacitor-coupled circuit, and have not added bypass capacitors to this circuit, the dc load line is quite valid for consideration of the circuit under actual operating conditions — it is only when inductors and capacitors have been added that we must reevaluate our load line.)

Let's look at three figures to show what the results of these components might be. In Fig. 8-8A we have simply shown the dc load line, and have indicated the operating point. Note that the slope, or "tilt," of this line is indicative of the resistance in the circuit. Had the resistance been higher the saturation current would have been lower, and the load line "flatter." If the resistance were lower, the amount of saturation current would be higher, and the load line would have a greater tilt. (If we had turned the paper 90 degrees we would have had a truer representation of this slope, since we would have had the voltage on the vertical axis, and the current on the horizontal axis; in this case the slope would have been represented by $V_{ce} \div I_c$ which is, of course, the resistance. Thus the greater the resistance, the greater the slope.)

As a final exercise with this line, let's assume that the supply voltage had been raised by sev-

eral volts, and determine what this would have done to the load line. Because of this higher supply voltage the load line would cross the X-axis at a new, higher, value. This higher voltage would, in turn, result in a higher saturation current. The end result, of course, would be a load line with exactly the same slope, but simply displaced so as to fall in line with the new supply voltage.

In Fig. 8-8B we show what would happen if we were utilizing transformer coupling. The dc load line would still be valid, and would still be used to locate the operating point. But in this case the ac impedance of the circuit (under operating conditions) would be considerably larger than the dc resistance. Consequently the slope of the ac load line would be very much flatter, as shown in the figure. It would, of course, pass through the operating point on the dc load line. It is important to note that this ac load line is not symmetrical, as was the dc load line. That is, there is considerably more operating room on the lower right side of the load-line operating point (i.e., closer to cutoff) than there is at the upper left side of the operating point (i.e. closer to saturation). Thus, if we drive the transistor harder and harder, saturation is reached long before cutoff is reached. This might, incidentally, be a completely valid reason for changing the biasing of the transistor, and hence the dc operating point. By doing so we would be able to locate the operating point at approximately the midpoint of the ac load line.

Fig. 8-8C shows very much the same thing, except in this case we are assuming a capacitively coupled circuit (and thus no large ac impedance in the collector circuit), and a bypass capacitor in the emitter circuit (thus resulting in a lowered ac impedance). Consequently the slope of the line reflects an ac impedance less than the dc resistance of the circuit, rather than a larger ac impedance.

As was the case in Fig. 8-8B, the ac load line passes through the dc operating point. Notice that in this case the expanse of line toward the saturation side of the operating point is larger than that toward the cut-off side of the operating point. Once again it is perfectly legitimate to adjust the operating point (with the biasing resistors) to permit equal excursions in either direction on the ac load line.

One word of caution is in order here. Note that in Fig. 8-8C a heavily driven circuit will result in a collector current considerably higher than the saturation current shown on the dc load line. This, in turn, could cause severe over-

driving of the transistor, resulting in complete destruction.

It is not at all unreasonable to find a circuit in which we are using both transformer coupling, and a bypass capacitor in the emitter circuit. It is quite possible, in fact, to adjust the circuit parameters so that the reduced ac impedance attributed to the bypass capacitor is exactly equal to the increased ac impedance due to the transformer in the collector circuit. In such a case the ac load line is exactly the same as the dc load line.

Questions:

1. If we are operating at a point on a load line where the voltage across the transistor is 5 volts, and the current in the transistor is 100 mA, how much heat is being generated in the transistor?
2. How does a power transistor beat the problem of high power dissipation?
3. Is it permissible for a transistor capable of handling 50 mW to go through a region of approximately 200 mW, on its way from saturation to cut-off?
4. How fast does leakage current, or I_{co} , rise as the temperature rises?
5. Is leakage current effectively controlled by biasing a transistor off with a positive voltage, rather than with a ground voltage?
6. Is the leakage current of a silicon transistor about the same as that for the germanium transistor?
7. What are the symbols for alpha and beta, and what are their representations in the hybrid model?
8. What should be the impedance of a "bypass" capacitor?

Answers:

1. The heat generated is proportioned to the product of the voltage across and the current in the transistor; namely 5 times 100 (equals 500 mW, or $\frac{1}{2}$ watt).
2. First, the transistor is quite large, and thus has a large volume. Secondly, the transistor is made so that it may conveniently be clamped to a "heat sink."
3. Yes, but it is something like finding yourself in the women's-wear section of a department store; the discomfort of the situation is directly proportional to the time you are there!
4. I_{co} approximately doubles for each 10-degree rise in temperature.
5. Yes, indeed! This is probably the best way of doing it, and explains why a number of power supplies are needed in electronic systems.
6. No, it is very much smaller. Consequently, transistor circuits can be operated at higher temperatures, and artificial cooling equipment can often be omitted.
7. The symbol for alpha is α , and its hybrid parameter symbol is h_{fb} . The symbol for beta is β , and its symbol is h_{fe} .
8. Its impedance should be less than 1/10 the resistance of the emitter resistor at the lowest expected frequency. QST

A Digital Message Generator

(Continued from page 18)

not be used in the matrix. Next reverse the diode and adjust E for a reading of 2 volts on the VTVM. Read the reverse leakage current on the microammeter. Select only diodes which read less than about 3 μ A — the lower the better. If a large number of diodes is to be used in the matrix, 150 or more, you should be a bit more stringent on the reverse leakage test, rejecting those diodes that read greater than 2 μ A.

The above test approximates very closely the operating voltages and currents of the circuit in which the diode is used. We've never found a diode which wouldn't work in a matrix after being selected by this test.

Ready-made etched boards or template patterns for building the matrix have the connections to the counter identified in the etching pattern as 1, 1, 2, 2, and so on (of course you must wire the socket to correspond). The general idea for construction of these boards can be seen in one of the photographs. No. 18 bus wire can be used to interconnect the tops of the diodes on single-sided board patterns; spaghetti insulation will prevent shorts between adjacent gates.

By using care to connect and to orient the diodes properly, the completed message matrix should work the first time. If faulty operation occurs, it can probably be traced to a single AND gate. This is easiest done by slowing the message down considerably and determining approximately what counter states are producing the wrong outputs, by listening to the message. Then from the matrix design information, see which gates contribute to bits around those counter states. A VTVM or 20,000-ohms-per-volt meter connected to the output of the AND gate will flick positive during the times the gate is decoding. While listening to the message and watching the meter, a bad gate can be isolated by noting improper "flicking" action, either at the wrong time or not at some desired time. If the gate is wired correctly, the erratic message symptoms may point to a particular diode. One end of the diode should be unsoldered for critical testing. Of the several matrices we constructed, only one failed to work properly the first time; that was because of a reversed diode which was soon found by using the "meter flicking" test described above.

Operation

There is little to be said about the operation of the generator, other than to depress the MESSAGE INITIATE button each time it is desired to send the message. Often when the generator is first energized, the message, or some portion at the end, will be sent. Usually the same thing will be sent each time power is applied. This is because the stages of the counter will "come up" at some random count, and the message will proceed from that bit. If a transmitter is being keyed, you should disable the keying while applying power to the generator, to avoid sending an unwanted portion of a message. QST

A 10-6 Mobile Whip

BY CHARLES A. RANKIN,* WA2HMM

IN the days before our licensing structure set up an arbitrary split between them, the 10- and 6-meter bands made a popular and interesting combination, both for home-station and mobile use. Because it "opens" first for most ionospheric propagation, "10" gives the 6-meter man warning of impending DX, and being able to work both bands conveniently extends the usefulness of a mobile setup tremendously. Designing equipment for both bands is relatively easy, or you can use separate rigs handily in these days of compact solid-state gear—but if you don't solve the mobile antenna problem neatly you may run into family problems in trying to work both bands in the car.

The solution lies in the now-familiar trap approach. A parallel-tuned circuit presents a very high impedance to rf energy at its resonant frequency, but off resonance its series resistance is very low. Thus we can break up a 10-meter whip into two sections, with a tuned circuit in the center, and approximate the performance of a resonant whip for either band.

Details of the trap assembly required are shown in Fig. 1. This is only one way of doing the job; dimensions are not important unless you're interested in duplicating the original. The insulating rod on which the trap is mounted can be any diameter, provided you experiment with coil turns and spacing, or use a variable capacitor in place of the mica 10-pf one shown. The bottom section of the whip is 49 inches long, including the 5-inch spring mount. The upper portion is 46 inches. These lengths could vary slightly, as final adjustment of the trap will take care of some minor differences in materials and the position of the whip on the car.

Adjustment

Before the whip is assembled, the tuned circuit should be adjusted to resonance at the approximate operating frequency used in the 6-meter band. This should be done with a grid-dip meter, with the coil well away from metal surfaces. The turns can be fixed, and a variable capacitor used, or, as was done in this case, the turn spacing can be adjusted to resonance with a 10-pf fixed-value capacitor across the coil.

Now, the whip should be assembled and mounted on the car in the position in which it is to be used. Be careful in tightening the four 6-32 screws, to prevent stripping the threads in the insulation. It may be well to drill a slight depression in the whip elements, at the point where the screws will bear against them, to make the contact more readily maintained without excessive pressure.

The antenna is fed with 50-ohm coax, but this should not be connected until after a further resonance adjustment is made. Use the "dipper" as

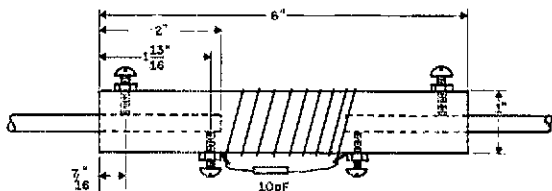


Fig. 1 — Principal details of the trap used in the 10-6 whip. The coil form can be any good insulating material. Weather protection can be provided with a plastic bottle fitted over the coil, once adjustments have been completed. If whip sections of larger diameter than the 7/32-inch original are used, it may be advisable to use a larger-diameter form. Turns information can be modified, so long as resonance at the 50-MHz operating frequency can be obtained.

before. Now connect the coaxial line, and run an SWR check on both bands. If necessary, adjust the length of the top section to get best operation on 10 meters. The writer uses the whip mainly on 28.73 and 50.46 MHz, but it works well over a considerable frequency spread either side. The SWR is under 1.5 to 1 on both bands, a value that is inconsequential in a mobile installation.

Evaluation

The effectiveness of this dual-band setup was checked against single whips, with the aid of WB2FXO. Greg manned the other station, making transmitting tests and taking S-meter readings, while the whips were changed on the mobile. Results with the dual whip were found to be comparable to those with a stainless-steel whip adjusted for either band alone.

The system was also checked to see if the trap was really working as it should, by touching the top section when the antenna was being used on 50 MHz. There was no detuning effect, transmitting or receiving, observed on 50 MHz when this was done. Contact with the lower section made a marked difference in the transmitted or received signal. The whip has been in use with WA2HMM/mobile for several months, and it has given good results on both bands.

DET-1

**SWITCH
TO SAFETY!**



* No. 8 Corral Lane, East Northport, NY 11731.

VHF Mobile Whips



Sturdy telescoping whip that can be adjusted for either 2- or 6-meter operation. Ten sections slide down inside an 8-inch cylinder. An insulating mount for a conventional coaxial fitting is shown.

BY E. P. TILTON,* WH1DQ

THOUGH this writer remains convinced that all vhf mobile work, by amateurs, at least, should be done with horizontal polarization, we must face the fact that vertical polarization is coming back in vhf circles. "Circles" is appropriate here, as we started with vertical for all vhf work in the 1930s, changing to horizontal when its advantages became apparent. We will not rehash the arguments about polarization here; the principal advantages of each are dealt with thoroughly and factually in *The Radio Amateur's VHF Manual*, Chapter 8. What we are concerned with at the moment is that, if we must use vertical polarization, how to get the best results with it.

There are advantages in the use of whips. Not the least is that the general public has become accustomed to whips on cars. A halo or turnstile is more of a conversation piece, and you have to be patient with silly questions when you have either on your car. This leads many vhf operators to hide their identity by using the car broadcast whip for 6- or 2-meter mobile work.

Several aspects of broadcast whips make them less than ideal for vhf use. They're almost invariably in the worst possible place on the car, for one thing; on the cowl, too near the windshield corner post to work well. And the coax used to feed them is very poor for our purposes. It has

* VHF Editor.

a fine-wire center conductor inside a plastic tube, making its impedance so high that a bad mismatch in the vhf range is almost inevitable. If you must use a broadcast whip, get rid of this stuff and substitute RG-58/U or something similar.

The writer has done this on occasion, running the coax to a switch, so that the antenna can be used for broadcast reception as well as 2- and 6-meter mobile. Keep the coax to the broadcast receiver as short as you can, or the reception on that band will suffer.

In ordering a new car I always specify no radio. This saves about a hundred bucks, and leaves me free to do as I wish with antennas. Few of us will want to go all the way in assuring whip effectiveness by drilling a hole in the center of the car top, but there are lots of other ways to solve the antenna mounting problem without resorting to the conventional cowl mount that is almost standard in radio-equipped new cars. It is a simple matter to make some sort of coax-fitting mounting bracket to fasten under the edge of the rear deck opening. The CB people have solved this for us, and several adaptations are found in stores catering to the CB trade. An advantage of the coax fitting approach is that the whip proper can be removed quickly, for substitution of other antennas, or for identity-hiding purposes, if the latter is important.

Types of Whips

The advent of the a-m/fm portable radio has made available a whole new family of whips, of sizes and construction well-suited to vhf mobile and portable work. They take a little adapting to use with coax fittings, but the result is usually worth the trouble. There is a beautiful 54½-inch job having 10 tight-fitting telescoping sections that collapse into a half-inch cylinder, about 8 inches long. (Radio Shack, \$1.99.) It is rugged enough for mobile use, and its sections will stay at any overall length you set it for. One of these is shown mounted on a coaxial fitting in our first photograph, run down to a length of about 10 inches.

Using this with a PL-259 fitting took some doing, but the result is neat and strong. A piece of ¾-inch Teflon rod one inch long was turned down to 11/16 diameter, for ¾ inch at one end. Don't let "turning" scare you; if you don't have access to a lathe, this operation can be done with a file fairly easily. Do it and the drilling and tapping to follow before cutting to the desired one-inch length. Drill and tap for 6-32 a screw, which will extend through the coaxial fitting into the whip end.

File the last half inch of a 1¾-inch 6-32 screw down so that it will make a tight fit in the pin of the PL-259 fitting. Thread the screw into the Teflon rod and insert this assembly into the fitting. It will extend out of the top about ½ inch for the Teflon and another ¼ inch for the screw. (The head of the screw is cut off before this is done, if you don't have a source of 6-32 threaded brass rod.)

The whip we have was tapped originally for 4-40, so we drilled the base hole out and retapped it for 6-32. All the strength we can muster at this point in the whip will be needed for durability in mobile service. Screw the whip onto the threaded inner conductor, and solder the tip as thoroughly as possible. Let the solder flow down inside the joint, if it will.

This whip will stay set at 19 inches for 2-meter operation, or can be extended to its full length of 54½ inches, for 6-meter use. The coax jack (SO-239) for it is permanently mounted on a flat area just in back of the rear window of an old Corvair Convertible that we use for banging around. A round baffle plate of aluminum, about 4 inches in diameter, was added to the car surface to stiffen the mount. If yours is a shiny new car you may not have the heart to do this, and some sort of adaptation for the rear deck opening may look better to you or your family. In any event, this is a pretty good spot on a car for a mobile whip, in our considerable experience with such matters.

If you're concerned only with 2 meters, an infinite choice of whip adaptations is available. The piano wire type is almost invisible, and is very light. A 19-inch piece of rod or tubing, ¼-inch diameter or less, can be mounted in a coax fitting in any of several easy ways. Insulation quality is not too important at the whip base. The impedance is low, and insulation losses are nil. Use any insulating material that is strong and will not absorb moisture.

A convenient way to provide quarter-wave operation on both 6 and 2 is to mount a 19-inch length of ¼-inch tubing in a PT-259 coaxial fitting, and plug in a 37-inch whip into the top end of it when you want to go on 6. There are

many small whips that will serve this purpose, and the tubing can be drilled out to about a 1-inch depth to take the whip end.

A ¾-Wave Vertical for 2

For 2 meters only, a X-wave whip gives a worthwhile improvement in coverage, and is easily made. The one shown here follows a design by VE7ABK, in principle.¹ A tuned circuit at the base of the whip resonates the system to the operating frequency, and the coax inner conductor is tapped up one turn on the coil. The length of the whip is not critical, as tuning the circuit will take care of several inches of whip-length variation, with only a minor change in radiation pattern and impedance to be matched.

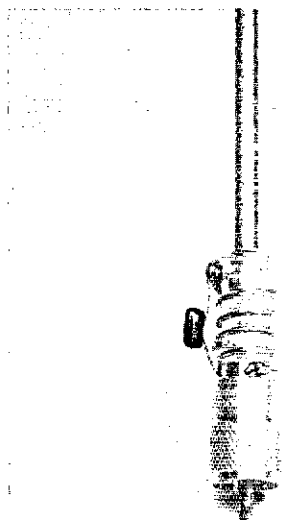
The coil is wound on ½-inch poly or Teflon rod 2 inches long, turned down to 11/16-inch diameter for the first ¾ inch of its length, and ¾-inch diameter for the second ¾ inch. This leaves a 1¼-inch shoulder extending above the fitting, for the coil support. Drill the center of the rod its entire length about ¼-inch diameter. Drill two No. 35 holes perpendicular to this, one about ¼ inch from the top and the other one inch from the top.

Drill out the top end of the insulator ¼-inch diameter, to a depth of ½ inch. A 10-inch piece of ¼-inch aluminum tubing is inserted in this hole, and drilled to match the No. 35 hole in the insulating material. Tap the No. 35 hole for 6-32. A ½-inch 6-32 screw runs through the side of the tubing to press against the inner wall on the other side, to assure good electrical contact for the top end of the coil.

A length of No. 22 wire is used for making the tap on the coil. Bend the end upward at 45 degrees, about ¼ inch, so that the point will come up into the lower No. 35 hole when the wire is threaded into the tip of the coaxial fitting and up into the drilled insulator. It can be bent around the coil wire and soldered. The coil is No. 14 tinned, 4 turns wound on the insulating rod, with turns spaced about ⅜ inch, center to center, and another complete turn around the top of the coaxial fitting, soldered in place. Wrap the top end around the 6-32 screw inserted in the top horizontal hole in the insulator, and solder.

The capacitor shown in the photograph was initially a small 15-pF trimmer, soldered across the coil. Obviously this is not a permanent arrangement, it having been put on to determine the optimum value experimentally. This was found to be about 10 pF, for a total antenna length of 45 inches, for use in the upper half of the 2-meter band. Adjustment of the whip length will take care of other frequencies in the band, with one value of fixed capacitor. Adjustment can be made for minimum reflected power in the coaxial line, or for highest reading on a field-strength indicator. Whip length or coil turn spacing can be adjusted, after the fixed capacitor is installed, as shown in the photograph.

QST



Lower portion of a five-eighths-wavelength vertical antenna for 2-meter mobile. The capacitor in the tuned circuit at the whip base is a fixed type installed after the optimum value is found by use of a small variable.

¹ "Improved Vertical Antenna for 2-Meter Mobile," Vern Epp, VE7ABK, October, 1965, QST, p. 32.



A Simple JFET and MOSFET Tester

WHEN working with transistors it's always nice to know whether or not the semiconductor is good. While there are plenty of available devices to test bipolar transistors, there are no simple checkers for FETs. The unit shown in the photograph is designed to determine if a particular transistor is in proper working order. Although the checker won't test the gain of a transistor, nor indicate *positively* that a transistor is defective, it is quite useful as a "go-no-go" indicator for shorts or opens.

Circuit Details

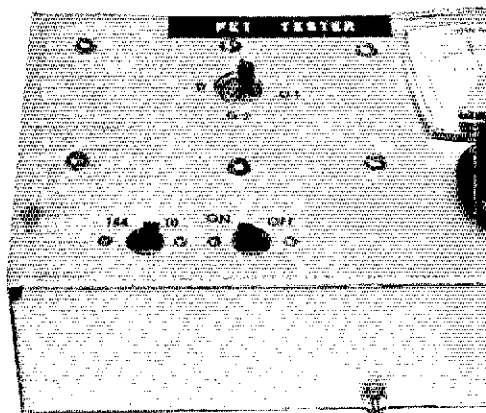
The circuit shown in Fig. 1 consists of a common-gate rf oscillator stage with provision for selecting two oscillator frequencies. A 50-microampere meter, M1, is used to indicate the rectified rf voltage from CR1. S1 permits changing the oscillator frequency by selecting either L1 for 144 MHz, or L2 for 10 MHz. A 9-volt battery supplies the operating voltage.

Construction

A 2 x 3-inch etched-circuit board is used for mounting most of the components. Fig. 2, a full size template, shows the proper placement of the various components on the board. A 2 x 4 x 6-inch aluminum chassis serves as a cabinet for the checker; however, any suitable container may be used.

Using the Checker

It should be mentioned that the checker may be used to determine only if the transistor in question will function as an oscillator. If the circuit won't oscillate, it doesn't necessarily mean that the FET is defective. But, if it does oscillate, it's a good indication the device is at least in working order.



Here is the FET tester in use. The unit being tested is an MPF 103 and the meter reading indicates the transistor is oscillating at 10 MHz.

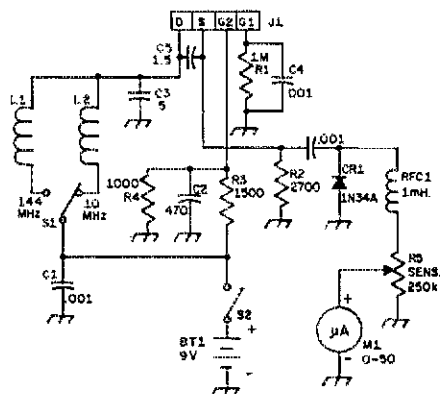
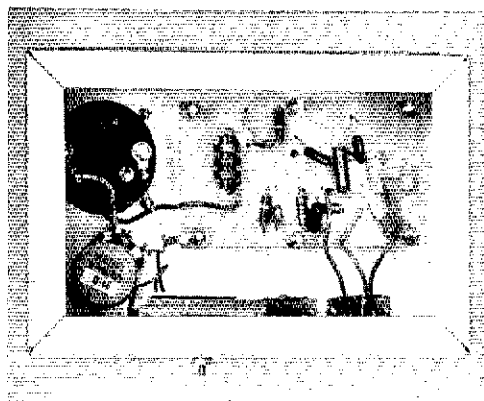


Fig. 1 - Circuit diagram of the transistor checker. All .001-uF capacitors are disk ceramic. Other capacitors are dipped silver micas. All resistors are 1/2 watt. Parts designations not listed below are so labeled for parts placement in Fig. 2.

- J1 - Transistor socket.
- L1 - 3 turns, 1/2-inch dia., 16 turns per inch, No. 20 (B&W Miniductor 3003).
- L2 - 8.2-uH rf choke (Millen 34300-8.2).
- M1 - 0 to 50-uA meter.
- R5 - 250,000-ohm control, linear taper.



Bottom view of the transistor checker. The circuit board is mounted on 1/2-inch spacers. The 9-volt battery can be seen at the bottom left.

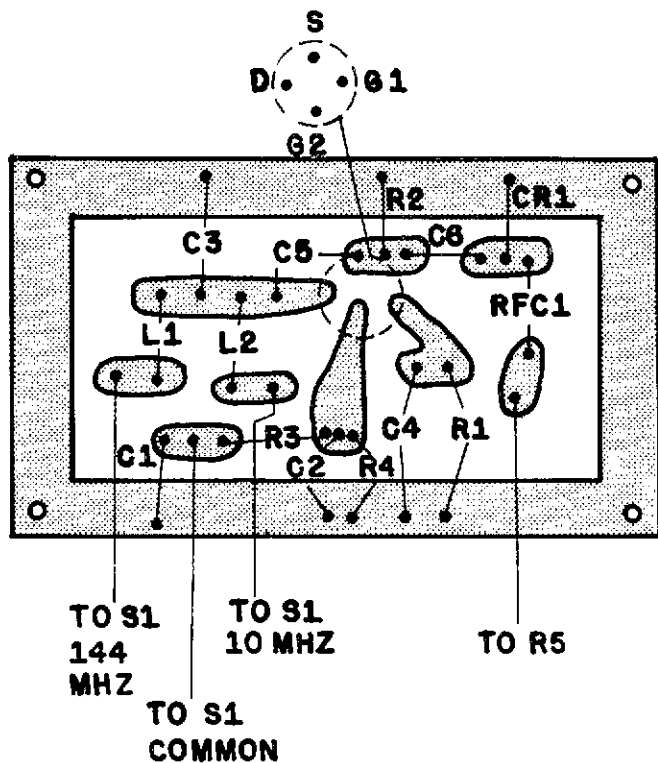


Fig. 2 — Full-size template for the etched-circuit board. A ready-made board is available from Stafford Electronics, Inc., 427 S. Benbow Rd., Greensboro, NC 27401.

Checking a transistor is simple. Plug the FET into the transistor socket, turn S2 on, and adjust R5 for a reading on M1. If the transistor permits oscillation an indication will appear on M1, the amount of the indication being determined by the positioning of R5. If the needle on M1 stays on zero, there is a possibility of a bad transistor. The FET can be checked at either 10 MHz or 144 MHz, depending on the position of S1. Because it is an easy matter to destroy MOSFETs certain precautions should be observed. Static electricity can cause a puncture of the fragile dielectric gate material. It is a good idea to wind some thin, bare wire around the leads of a MOSFET before pulling it from its shorting collar or socket. The wire should be removed only after placing the MOSFET in the checker. When returning the transistor to the original circuit, the same procedure should be used.

Operation

Several types of transistors can be readily checked. Among the ones we checked were HEP-801s, HEP-802s, and some of the MPF102 through MPF107 series. When checking P-channel types, the battery polarity must be reversed. If it is expected that many P-channel types will be checked, it might be convenient to add a polarity-reversing switch to your checker. — *W1ICP*



Feedback

In the article, "A Receiver Matcher and Pre-amplifier," April 1970 *QST*, the coils L1L2 are listed as being made from a single length of coil stock. The stock is no longer available in three-inch lengths so two sections of coil stock are required to make the two coils. The coils should be positioned about 1/8-inch apart in order to obtain the desired coupling.

The author of "The 2-Meter QRP Mountain Topper," Dick Preiss, W7HCV, (May 1970 *QST*) resides at 7670 S.W. 141st Ave., Beaverton, Oregon 97005. One address number was mistakenly dropped in our footnote.

The KMC transistors, K5200 and K5500, used in the 1296-MHz preamplifier described by WA2VTR in *QST* for December, 1968, and in the 1970 *Handbook*, are no longer obtainable from the source given in these references. They can be obtained on a similar basis from Bill Ashby, K2TKN, Box 332, Pluckemin, N.J. 07978.

The Post Office Department promises faster mail service with Zip codes. Use Zip codes.

Technical Correspondence

INDUCTANCE AND CAPACITANCE MEASUREMENT

Technical Editor, *QST*:

Reference is made to the Technical Correspondence letter by WSPY in November 1969 *QST* on measuring inductance.¹ The general approach is correct. However, failing to take into account the resistance of the choke being measured can, in some instances, result in considerable error. The circuit used for measuring inductance is shown in Fig. 1.² The complete formula, taking the resistance of the choke into account, is as follows:

$$L = 0.00265R \sqrt{\left(\frac{V}{E}\right)^2 - \left(1 + \frac{R_L}{R}\right)^2}$$

The value of a capacitor can also be measured using this idea. Replace the choke of Fig. 1 with the capacitor. The original equation for reactance is used since the series resistance of a capacitor is extremely small and can be neglected at 60 Hz.

$$X_C = R \sqrt{\left(\frac{V}{E}\right)^2 - 1}$$

(This equation is of the same general form developed by Palmer.) The reactance of a capacitor is:

$$X_C = \frac{10^6}{2\pi fC}$$

where f is in Hz and C is in μF . From this equation, C is:

$$C = \frac{10^6}{2\pi fX_C}$$

If f is taken as 60 Hz,

$$C = \frac{2650}{X_C}$$

The formula for determining capacitance then becomes:

$$C = \frac{2650}{R \sqrt{\left(\frac{V}{E}\right)^2 - 1}}$$

One word of caution: electrolytic capacitors cannot be measured by this method, since they are nearly a short circuit on reversed polarity. — Edwin L. Clark W2NA, Box 181, Waretown, NJ 08758.

¹"Measuring Unknown Inductances," Technical Correspondence, *QST*, November, 1969, p. 45.

²A device for measuring inductance and capacitance by using the principle outlined here is presented in an earlier issue of *QST*. See Gimmicks and Gadgets, "C and L Measuring Gimmick," by Noble, *QST* February, 1968, p. 28. — Editor.

ANTENNA HEIGHT VERSUS PERFORMANCE

Technical Editor, *QST*:

The article in the March 1970 issue of *QST* is an interesting and well-written summary of K6YNB's antenna-height-experiment contacts with other amateurs.³ And even more interesting, his findings can be correlated quite well with theoretical information which is available in *The ARRL Antenna Book*.

We all know that the height of a horizontal antenna above the earth determines its radiation angle or wave angle — the angle above the horizon at which most of the rf energy is concentrated. *The ARRL Antenna Book* contains a series of a dozen drawings showing the effect of antenna heights on vertical radiation patterns.⁴ For an antenna which is $1/4\lambda$ high, most of the energy is sent straight up. As the antenna is raised to greater heights, the transmitted energy is divided into lobes, with the wave angle for the first lobe always decreasing with increased height. An antenna that is 1λ high, which would correspond approximately to a 20-meter beam on a 65-foot tower, has two lobes, at 13 and 48 degrees. Between these lobes, nulls in the vertical pattern appear at 0, 28, and 90 degrees. These nulls would be complete if the antenna was located above a perfectly-conducting ground, but over a real earth, some small amount of energy will be emitted at these angles. Fig. 3 shows the geometry involved when radio waves propagate through the F_2 layer of the ionosphere. Under average ionospheric conditions, a signal between the lowest and highest usable frequencies, transmitted tangent to the earth's surface (zero-degree wave angle), will be refracted and returned to the earth at a distance of about 2500 miles (4000 km). Ordinarily, 2500 miles is the maximum distance that can be covered by a one-hop signal (earth to ionosphere to earth). If the signal leaves the earth at some higher angle, it becomes apparent from Fig. 3 that the one-hop distance which is covered will be less than 2500 miles. A graph in *The ARRL Antenna Book* shows these distances for all wave angles between 1 and 90 degrees.⁵ A 1λ -high antenna will favor skip distances of 300 and 1250 miles. (For DX communications, the shorter high-wave-angle path can usually be ignored.) Pattern nulls correspond to 0, 680, and 2500 miles distance.

As a good approximation, it can be assumed that the ionosphere is evenly distributed along the path of the signal, and that multihop distances are integral multiples of single-hop distances. For a 1λ -high antenna having a wave angle of 13 degrees, a 2500-mile distance would be covered best in two hops. For an antenna $1/2\lambda$ high, four hops would be required to cover this same distance, the

³Overbeck, "High Versus Low Antennas," *QST* March, 1970.

⁴Chapter 2, "Antenna Fundamentals," Figs. 2-26 through 2-37, *The A.R.R.L. Antenna Book*.

⁵Chapter 1, "Wave Propagation," Fig. 1-10, *The A.R.R.L. Antenna Book*.

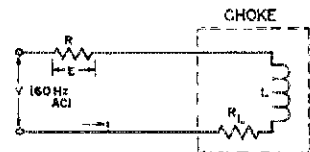


Fig. 1

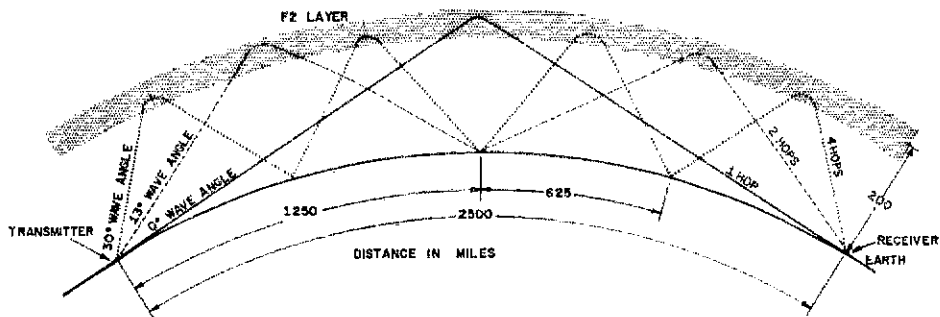
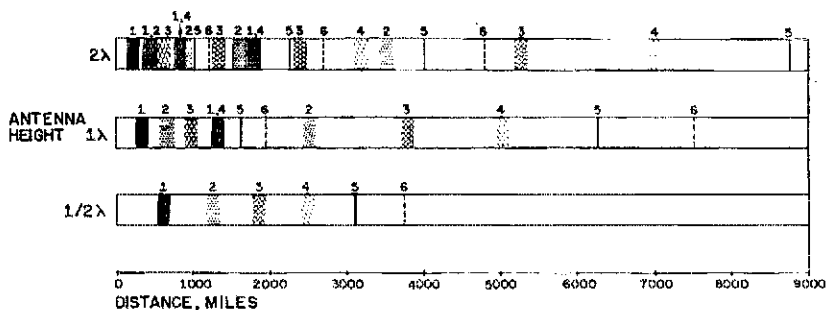


Fig. 3 — Single-hop and multihop ionospheric propagation paths for 0-, 13-, and 30-degree radio-wave angles.

Fig. 4 — Signal strength versus distance for antennas at various heights, F-layer propagation. The figures above the shaded areas represent the number of F2 hops covering the associated distance.



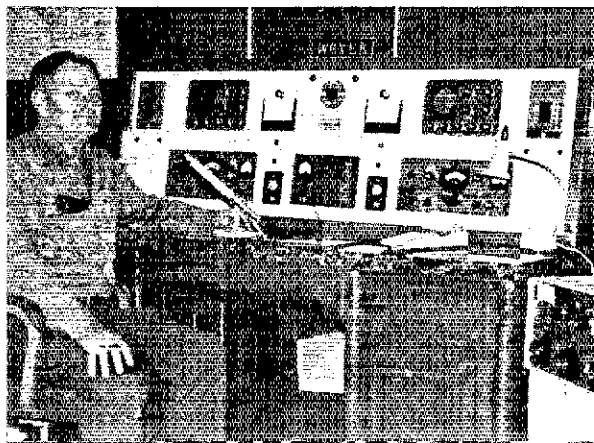
minimum wave angle for this antenna being 30 degrees.

A rule of thumb has been developed from the results of detailed studies of ionospheric propagation: Each additional hop of a signal attenuates that signal by an average of 10 dB. So it is easy to understand that the signal from a 1λ -high antenna will be about 20 dB stronger than that from a $\frac{1}{2}\lambda$ -high antenna at a receiving location 2500 miles distant, all other things being equal. Fig. 4 gives a comparison of signal strengths for transmitting antennas at different heights,

based on the information referenced above. The signal strengths are displayed according to the number of hops involved, but in reality the indicated "nulls" between hop points will not display a complete absence of signal. The chart does display graphically how the many lobes of the 2λ -high antenna tend to "fill in" the short-distance gaps that are indicated for the lower antennas, making this antenna a better performer for both nearby and DX contacts. — Jerry Hall, K1PLP, 181 Brimfield Rd., Wethersfield, CT 06109.

Strays

This is the W8YEK operating position. That 78 year old ex-roll-top desk houses Gene's new homebrew console. He recently made 5BWAS Nr. 5, the first 8th call area station to so qualify.



Slow-Scan TV Viewing Adapter for Oscilloscopes

BY BILL BRILES,* W7ABW AND ROBERT GERVENACK,** W7FEN

THE authorization of slow-scan TV for our lower frequency bands has opened up a whole new adventure for radio amateurs. Slow-scan TV has made it possible to see the fellow on the other end, whether he is across the country or around the world. Slow-scan TV has thus far been limited to the amateur builder since no commercial slow-scan equipment is available.

The fundamentals and standards for amateur slow-scan are covered by Copthorne Macdonald, WA2FLJ, in *QST*.^{1,2} The reader should refer to these articles for basic information.

The slow-scan TV adapter for oscilloscopes shown in the photographs was developed by the authors so that the ham with an oscilloscope could view slow-scan TV with a minimum of investment and effort. The authors have used the adapter on several oscilloscopes, including the Tektronix 514, Dumont 304, Heathkit IO-18, Heathkit IO-10, and a Navy surplus scope, OS-8B.

Oscilloscope Requirements

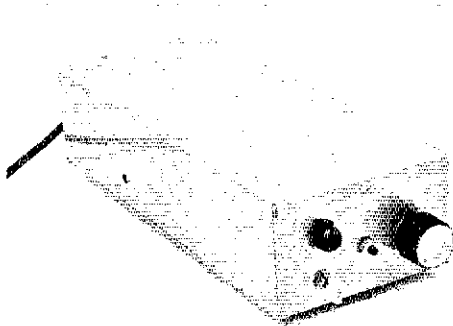
The oscilloscope's horizontal scan must be able to synchronize from an external trigger at 15 Hz. The scope should have a dc vertical input that will accept 10 volts. If the scope does not have a dc input, the vertical deflection amplifier may be able to be driven directly. The circuit shown in Fig. 3 was used with the Heath IO-18. This arrangement should be adaptable to other scopes not having a dc input, but R_1 and R_2 would have to be scaled to provide proper centering.

Most oscilloscopes have cathode-ray tubes with a P1 phosphor. The P1 phosphor is of short persistence, which is not suitable for slow-scan TV. Therefore, the P1 tube should be replaced with a P7-phosphor tube which has the long persistence required. The last two characters of the CRT type usually indicate the phosphor,

*2009 W. Coolbrook Ave., Phoenix, Arizona 85023.

**Route 1, Box 350, Monroe, Washington 98272.

¹Macdonald, "S.C.F.M. — An Improved System for Slow-Scan Image Transmission," *QST*, in two parts, January and February, 1961.



and most types are available in several different phosphors. The Heath IO-18 uses a 5UP1 which was replaced with a 5UP7 at a cost of less than \$15.00.³ If a direct substitute cannot be found, it may be possible to find a surplus CRT of another type which will function. The Dumont 304 used a 5ABP1 CRT, which was replaced with a 5CP7A. This CRT was obtained on the surplus market for less than \$5.00.⁴ If the purchase of a new oscilloscope is anticipated, a P7-phosphor cathode-ray tube should be requested.

Adapter Circuit Design

A block diagram of the slow-scan TV converter is shown in Fig. 1 and the schematic diagram in Fig. 2. The slow-scan signal from the audio output of a communications receiver, tape recorder, or other source is fed into the input of an integrated-circuit operational amplifier having a gain of 300. Therefore, a 0.1-volt ac peak-to-peak signal causes the amplifier to limit at the supply voltages, and the limited output will be approximately 28 volts ac peak-to-peak. The limited signal is then fed to a series video discriminator. The output of the video discriminator is fed to Q_1 , a video amplifier with a 6.3-volt ac

³Macdonald, "A Compact Slow-Scan TV Monitor," *QST*, March, 1964.

⁴Available from Barry Electronics, 512 Broadway, New York, N. Y. 10012.

⁵Catalog 8C2799P7, Fair Radio Sales, P.O. Box 1105, Lima, Ohio 45802.

When the FCC authorized slow-scan television transmission, many amateurs began experimenting with this mode. This article describes a simple adapter to convert popular oscilloscopes to slow-scan monitors. The dc vertical amplifier and slow-speed sweep circuits shown will be of interest to amateurs owning older oscilloscopes who want to improve their scope's performance by adding these features.

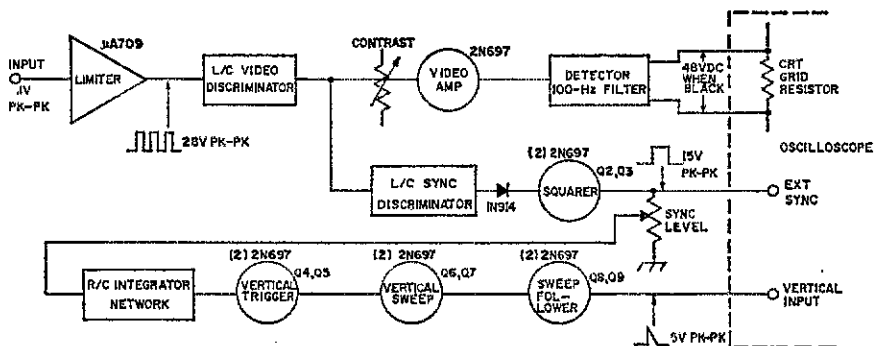


Fig. 1—Block diagram of the adapter which converts slow-scan TV signals for viewing on standard oscilloscopes.

filament transformer as a collector load. The transformer is used to provide voltage step-up. A transformer with 3000-volt insulation from ground is used, as the CRT grid circuit has a 1400-volt potential which must be insulated from ground. The video is then full-wave rectified and fed to a 1000-Hz filter. The output video dc is then connected across the scope CRT's series grid resistor to modulate the CRT intensity.

The output of the video discriminator is also fed to a 1200-Hz sync discriminator. This circuit passes only the 1200-Hz sync pulses. The 1200-Hz sync pulses are then rectified, filtered and fed to a two-stage amplifier, Q_2 and Q_3 . The output of this squarer provides 15-volt sync pulses.

A 5-volt sawtooth voltage is required for vertical sweep on the oscilloscope. This voltage should have a very fast rise time and a linear decay. A sync separator circuit is used to separate the 30-ms vertical pulses from the 5-ms horizontal pulses. The vertical pulses are fed into the vertical trigger, a one-shot multivibrator. Provision is made for manually triggering the vertical sweep with a front-panel pushbutton, S_1 , in case a vertical sync pulse is missed. The multivibrator triggers a transistor switch, Q_6 , that instantaneously charges C_2 every time a vertical sync pulse is received. This capacitor is discharged at a linear rate through Q_7 . The base of Q_7 is biased by two diodes at 1.2 volts. Thus, the current through Q_7 's 0.47-megohm emitter resistor is held at a constant current, giving a linear voltage discharge across C_2 . This sawtooth voltage is sampled by a Darlington transistor follower, Q_8 and Q_9 , whose output will sweep from 10 to 5 volts dc when receiving slow-scan TV. The value of 5 volts was chosen so that when a signal is not present, the dot on the scope CRT will be off the screen.

Construction

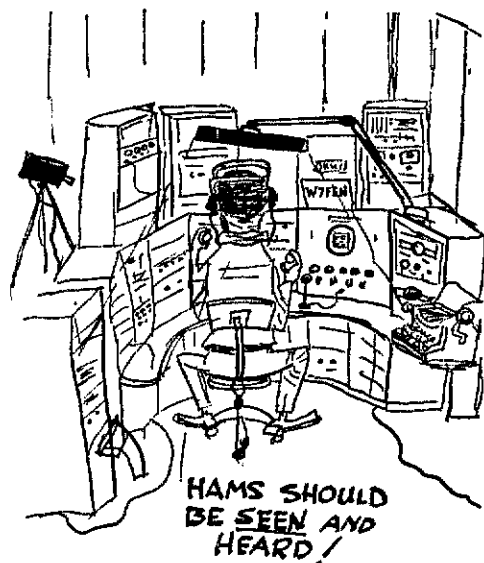
Two different units are shown in the photographs, indicating different construction approaches a builder can use. The parts are mounted on a fiber Vectorbord.

The layout is relatively noncritical with the exception of the 6-volt ac filament transformer which will have high voltage on the secondary,

so necessary precautions must be taken. It should be mounted away from the power transformer to minimize hum pickup. High-voltage wire is used to bring the CRT grid connection into the unit. Sockets were used for the integrated amplifier and transistors; however, the components can be soldered directly into the circuit. The vertical-scan output lead should be shielded. Several types of transistors may be used; the circuit was designed for devices with a minimum beta of 50. A variety of integrated operational amplifiers may be used; however, the 709 was chosen because of its low cost (less than \$3.00) and its availability.

Scope Modification

The potential between the CRT's control grid and the cathode varies the intensity. The control grid usually has an isolation resistor in series with the negative voltage lead. Video from the converter is connected across this resistor to vary the intensity of the CRT. This resistor should be at least 100K. If it is not this large in the existing scope circuit, it should be



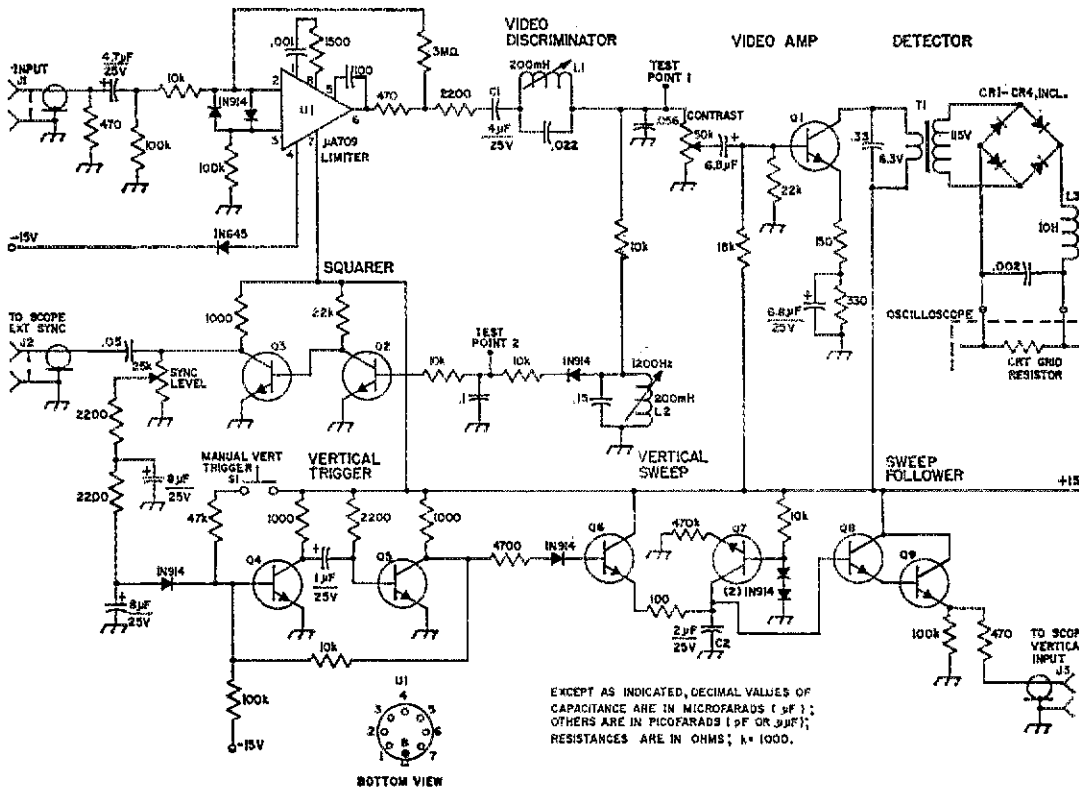
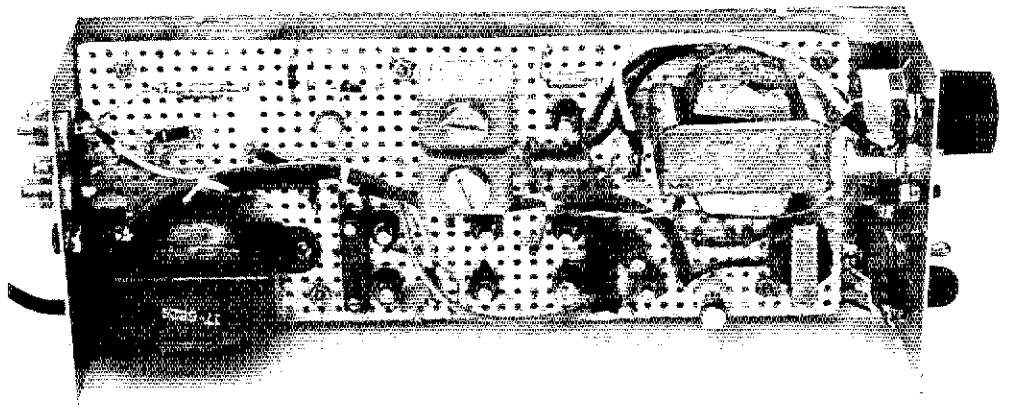


Fig. 2—Schematic diagram of the slow-scan adapter. Capacitors with polarity indicated are electrolytic, others are ceramic or paper, except as indicated. Variable resistors are composition controls, linear taper. Resistors are 1/2-watt.

C₁—4-µF, 25-volt, nonpolarized tantalum.
 C₂—2-µF, 25-volt, Mylar.
 J₁—J₃ incl.—Phono jack.
 L₁, L₂—Variable inductor, approx. 200 mH (Miller 6330, UTC HVC-6, or Stancor WC-14).

L₃—10-H, low-current choke, 3000-volt insulation from ground (B-A 18A959).
 Q₁—Q₉ incl.—2N718, 2N697, 2N2222, or 2N3641-3.
 T₁—6.3-volt, low current, 3000-volt insulation.
 U₁—Operational amplifier (Fairchild µA709, Texas Instruments SN6715 or Motorola SC4070G).



Interior view of W7ABW's adapter. The transformer near the rear is in the power-supply circuit. The phono jacks on the rear deck are for connections to the oscilloscope and receiver—one is a spare. Two banana jacks are used for the CRT connections. The large transformer near the front panel is in the video detector circuit.



Slow-scan TV pictures photographed from the screen of a Dumont 304 oscilloscope. The scope had been modified as described in the article, using W7ABW's SSTV adaptor. On the right is a picture transmitted by ZL1DW and tape recorded by K4YPX, Memphis, Tennessee; the photo to the left was transmitted by K4YPX and received by W7ABW in Phoenix.

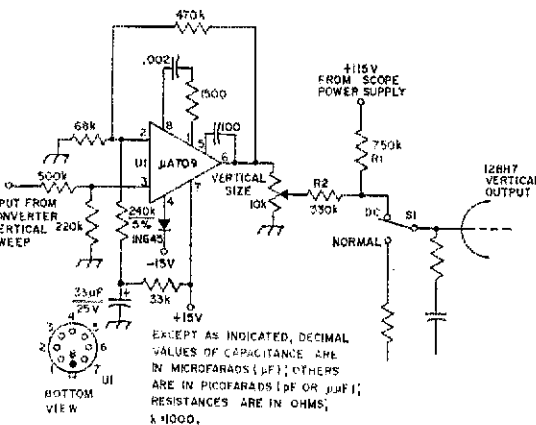
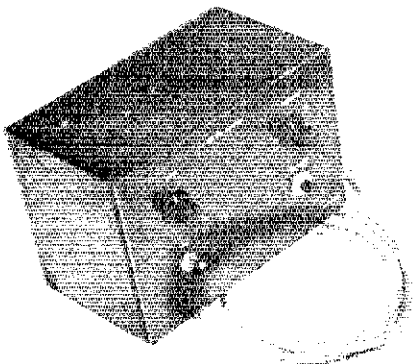


Fig. 3—Amplifier circuit to provide a dc vertical input for the IO-18. A similar conversion can be used with other ac-only oscilloscopes. Unmarked components are parts in the Heath's original circuit. Capacitors are ceramic, and resistors are 1/2-watt. The switch, S₁, may be any convenient type. The operational amplifier, U₁, is a Fairchild μA709. R₁ and R₂ should be adjusted in value to give proper centering, if necessary.



changed to 100K. This will have no effect on the scope's operation, since this control grid draws no current. There is usually ample room on most scopes to install two additional insulated jacks on the terminal board that has the direct deflection-plate connections.

Adjustment

- 1) Connect the scope's vertical input to test point 1.
- 2) Connect a 2350-Hz signal to the input and adjust the video discriminator coil L₁ for minimum indication on the scope. This is usually with the slug fully inserted.
- 3) Connect the scope to test point 2. Change the input to 1200 Hz and peak the sync discriminator coil L₂ for maximum indication on the scope.
- 4) Make the connections from the adapter to the oscilloscope's external sync, vertical input, and the CRT grid.
- 5) Connect the adapter's input to the receiver or tape recorder.
- 6) Set the contrast control at midposition and the sync control to maximum.
- 7) Adjust the scope's sweep to 15 Hz for trigger lock.
- 8) Adjust the size of the raster with the scope horizontal and vertical size controls until a square raster is obtained.
- 9) Adjust the adapter contrast and the scope intensity controls until a clear picture is obtained. If the picture is negative, the connections to the CRT grid should be reversed.
- 10) When a picture is obtained, the sync control should be adjusted to a point just before sync is lost. This will eliminate false triggering when copying weak signals and, if a vertical sync pulse is missed, the manual trigger can be used.

Another version of the converter built by W7FEN. Both sync and contrast controls are mounted on the front panel.

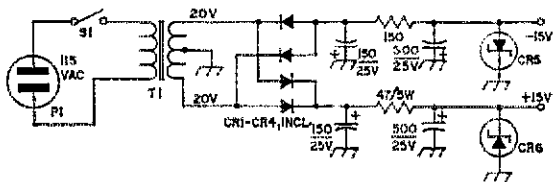


Fig. 4—Power supply for the adapter. Capacitors are electrolytic. Resistors are 1/2-watt unless otherwise specified. CR₁—CR₄—Silicon type, 200 V PIV or more, (Motorola 1N4002, 1N4004, or 1N4007). CR₅, CR₆—15-volt, 1-watt Zener (Centralab R4128-4, Uniradio U2715). P₁—Fused line plug. S₁—Toggle. T₁—40-volt c.t., 100 mA (Triad F90X).

The finished adapter can be finally tested in several ways:

- 1) Tune to one of the SSTV frequencies listed below and look for a station transmitting SSTV. Tune the signal as you normally would for ssb. It is a good idea to tape-record a few pictures off the air — they then can be played back as often as necessary while adjusting the adapter.
- 2) Send a blank recording tape (with return postage) to any amateur who is equipped with an SSTV flying-spot scanner or camera. All amateurs in this field are happy to make a tape to get a newcomer going.
- 3) Listen to the SSTV frequencies. You may find a nearby amateur is on the air with SSTV. You can take your adapter to his shack to try it directly on a picture generator.

There are several nets currently active where SSTV pictures are regularly being transmitted:

14.230 MHz	Saturdays	1900Z
3.845 MHz	Every day, West Coast, Alaska and Hawaii	2100 Pacific Local time
6.970 MHz	Saturday and Sunday (Navy MARS)	2100Z

The slow-scan calling and working frequencies are 14.230 and 3.845 MHz, so activity can usually

W7FEN's version from the rear. The power-supply components are mounted on the cabinet wall, and the converter circuitry on Vectorbord.

be heard around these frequencies. The author has now made some 25 two-way SSTV contacts, in 16 different states and three countries. Italy and Ecuador have recently come on the air, but haven't been worked yet at W7FEN.

Conclusion

The slow-scan TV adapter has given good pictures on the scopes tried. A hood should be provided around the CRT face for direct viewing. Scopes with CRT tubes that have an accelerator will provide a brighter scan. The Heath 10-18 scope uses a CRT without the accelerator, and the brightness was noticeably less than others tried. Our thanks to Bob, WA7MOV, and Bill, W7DQZ, for their help in testing the adapter, and also, Malcolm, ZL1DW, and Jim, K4YPX, for on-the-air tests.

QST

The Portable Mobile Microphone

(Continued from page 52)

drilled in the plate to allow noise to enter the rear of the mike element. A circle of thin mylar was cut and glued to cover the opening on the mike case and rear plate, forming a moisture guard. This step is not absolutely necessary, as the U1 has moisture protection, and mylar is difficult to obtain in a small quantity. Thin rubber sheet is cut to fit the back plate, with a large hole in the center so not to obstruct the rear port holes. This piece, which can be seen in Fig. 6, is glued directly to the rear plate. It seals the microphone cavity and prevents the terminal connections from shorting out on the back plate. The U1 element itself is glued in place with contact cement. The back plate is attached to the housing with four No. 6 sheet-metal screws. The finished mike can be given a shine by rubbing the plastic with a soft cloth.

A carbon version, Fig. 5A, was also constructed when we found the T1 element fit in this housing as well as the U1 did. The same parts and assembly procedure are used, except the rear port holes are left out of the back plate, as the carbon version is not noise cancelling. A shielded coil cord is not necessary on the carbon version. The total cost of either model will be under \$5.

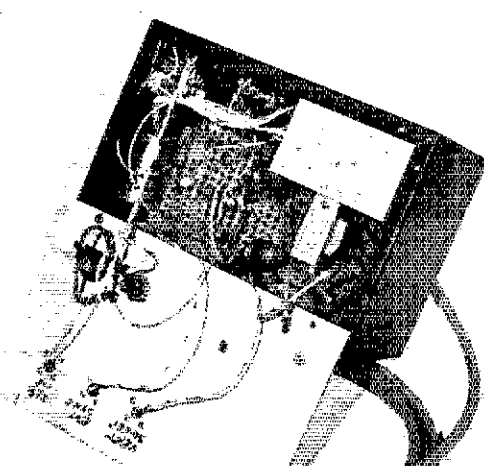
Using these microphones can be a lot of fun, too. The H-138 has an unconventional appearance, which causes stares whenever it is used in public. Telling the fellow on the other end that you are using a homebrew, hand-held, noise-cancelling mike . . . well, try that one for yourself.

QST

SWITCH TO SAFETY!



QST for



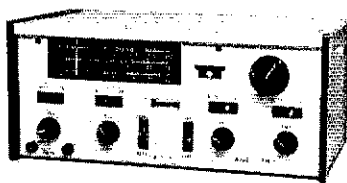


Recent Equipment



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

Ten Tec PM-2



HERE IS a piece of solid-state equipment that is practical and inexpensive as well as novel. The basic transceiver package provides for operation on 80 and 40 meters, VFO or crystal control. The transmitter section of the PM-2 also covers 15 meters, but the receiver portion of the equipment cannot function on 21 MHz without an accessory converter (which is available from Ten Tec). Other models of this equipment are available, permitting operation on 20 meters, in addition to one other band.¹

The transmitter PA operates at approximately 2-watts dc input, and delivers between 1.5 and 1.75 watts rf output to a 50-or 75-ohm load. No provision is made for operating the transmitter into loads of other impedances, but a Transmatch would enable the operator to use an antenna whose impedance was other than the range specified by the manufacturer.

Modular construction is used in the PM-2. The transmitter is a separate assembly, as is the VFO, the product-detector (receiver front end), and the IC audio board. One may wish to purchase the basic kit of modules and assemble his own transceiver, or he can obtain the PM-2 assembled in its cabinet.

An operating voltage of plus 12 is required for the PM-2, and maximum current taken (during transmit) is approximately 200 mA. The manufacturer recommends that the equipment be operated from a good stiff battery pack, rather than from an ac-operated dc supply. An ac supply can introduce

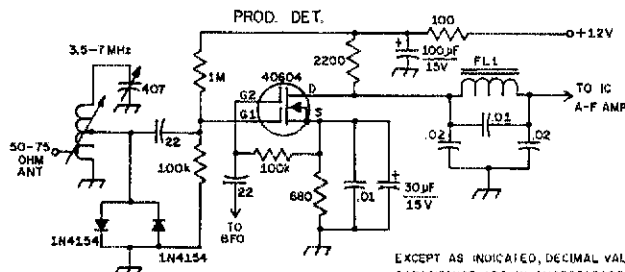
hum on the received signal, and may result in hum on the transmitted signal when the VFO is being used. Experiences while using regulated ac supply tend to bear this theory out.

The Receiver

The prospective buyer should not be misled by the apparent simplicity of the PM-2 receiver section. This is one of the "hottest" receivers of simple design that one can find. The direct-conversion technique is used here, meaning that the first stage of this unit consists of a tunable product detector whose BFO operates at the incoming signal frequency.² Fig. 1 shows the product-detector circuit. An RCA dual-gate MOSFET provides good cross-modulation and overload immunity, and assures good conversion gain and low noise figure. Two silicon diodes are cross-connected across the tap on the input tuned circuit to prevent damage to the 40604 MOSFET should excessive rf energy appear on the receiver antenna lead. BFO injection is supplied to gate 2, which is forward biased by the voltage developed across the source resistor of the detector. Forward bias is also applied to signal-gate 1, no doubt to increase the transconductance of the MOSFET. Gate 1 is tapped down on the tuned circuit, probably to aid the *Q* of the input tank. Selectivity for the receiver is established after the detector, by means of FL1, a potted inductor and three

¹ Other models of this equipment are available. The PM-2 and PM-1 are electrically identical, but the PM-1 is supplied without the cabinet. The PM-3 covers the 40- and 20-meter bands, but is otherwise the same as the PM-2. The PM-3A is identical to the PM-3 except that it features break-in keying.

² Another name for this receiving technique is "synchronodyne". For additional information see April and May 1969 QST.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F); OTHERS ARE IN PICOFARADS (PF OR μ PF); RESISTANCES ARE IN OHMS; $k = 1000, M = 1000000$.

Fig. 1 — Circuit of the Ten Tec product detector and audio filter. A dual-gate MOSFET is used in this circuit. It is followed by a 2-kHz audio filter, FL1.

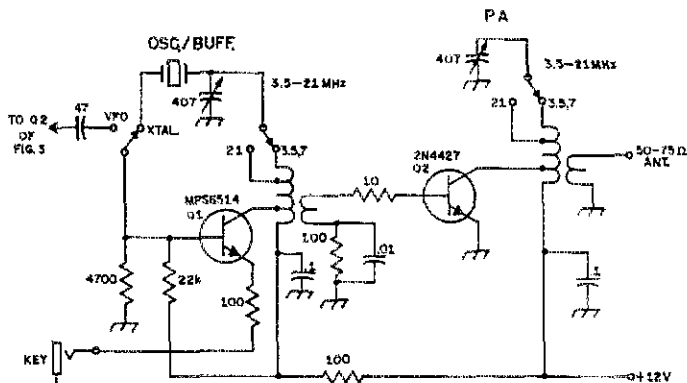


Fig.2 - Circuit of the basic transmitter. Provision is made for crystal or VFO operation. The collector tanks of Q1 and Q2 use tapped toroidal inductors to permit operation on three bands, 3.5, 7, and 21 MHz. A fixed-impedance output link permits the use of antennas whose impedances are between 50 and 75 ohms.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (μ F); OTHERS ARE IN PICOFARADS (pF OR μ pF); RESISTANCES ARE IN OHMS, $\times 1000, M=1,000,000$

associated resonating capacitors. Phone selectivity is used, and the filter provides a bandwidth of 2 kHz. Though this is ideal for ssb reception, it leaves a great deal to be desired when operating cw. However, since the audio channel has gain to spare, an outboard 900-Hz cw filter, active or passive, can be added for code reception.

The filter is followed by a high-gain IC amplifier. It uses an RCA CA3035V1; this circuit operates with a gain of 100 dB. Provision is made for headphone output only, but it was discovered that a 1000-ohm to 4-ohm output transformer provided sufficient volume for loudspeaker operation on all but the weakest of signals. The transformer was added as an outboard accessory. Under normal conditions, while using a pair of 2000-ohm headphones, the signals were so loud that the audio-gain control was nearly at zero setting for comfortable listening.

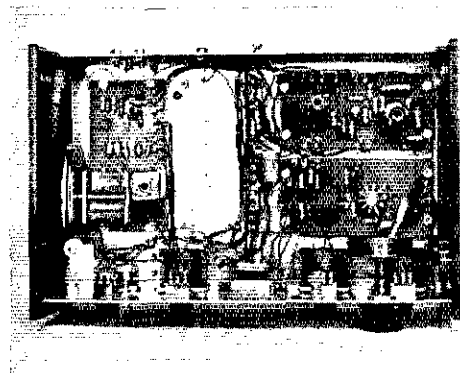
Single-signal reception is not possible with this type of receiver, but all one has to do to reject an interfering cw signal is to tune to the opposite side of zero beat. The receiver can handle either upper- or lower-sideband signals if the operator tunes to

the proper side of zero beat when tuning in the ssb signal. A-m signals can be received by tuning to exact zero beat, but the quality of a-m signals that are copied on a direct-conversion receiver is less than ideal.

Since the dynamic range of FETs is excellent, as compared to bipolar transistors and ICs, strong local broadcast and ham signals have little effect on this receiver. The writer lives but two blocks from an a-m station which operates in the high end of the broadcast band. No evidence of a-m detection or overload could be noted. This was not true, however, when testing other tube and transistorized receivers at the same location.

Transmitter Circuit

Fig. 2 shows the circuit of the two-stage transmitter. Bipolar transistors are used for both stages, and toroidal inductors are employed in the tuned circuits to achieve high Q and compactness. A switch provides for crystal or VFO operation. The VFO functions as a BFO during receive. It operates at the signal frequency, but much to the writer's amazement it proved to be relatively



Interior view of the Ten Tec PM-2. The VFO/BFO tuning capacitor is seen at the left-center of the photo, the remainder of the tuning capacitors are located along the bottom edge of the front panel. The VFO circuit board is at the far left. An open space is adjacent to the VFO module. The 15-meter receiving converter can be installed in that area. The product-detector board is visible at the upper right of the photo, and the two-stage transmitter module is directly below it. The audio-amplifier board is mounted on its edge at the center of the base plate, directly behind the panel meter. The input and output jacks, and the power receptacle, are located on the rear lip of the cabinet.

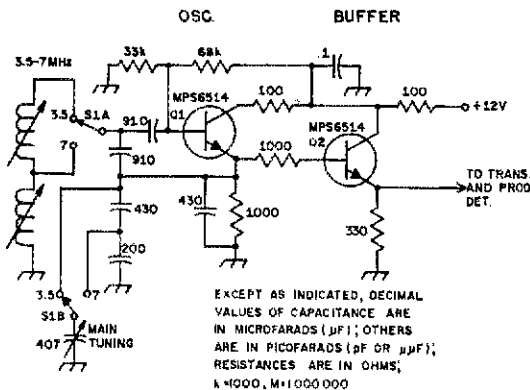


Fig.3 — Schematic diagram of the VFO portion of the transceiver. Transistors Q1 and Q2 are high-beta, high- f_T types. The tank circuit uses a high value of parallel capacitance as an aid to stability. Main-tuning capacitor C1 is tapped down on the feedback network to provide handsbread. During receive, the VFO functions as the BFO for the product detector of Fig. 1. Q2 operates as an untuned emitter-follower buffer. S1 is the band switch.

chirp-free.³ Here, again, a good stiff battery supply is important to good operation. A voltage that shifts as the load changes will cause a chirpy cw signal. Q1 is a high-beta transistor whose f_T rating is in the uhf spectrum. This type of device makes an excellent oscillator or amplifier, provided spurious oscillations can be suppressed. No evidence of instability was noted when testing the rig. The collector of Q1 is tapped down on its tuned circuit to provide an impedance match. A 407-pF broadcast variable tunes the toroidal inductor to resonance at 3.5, 7, and 21 MHz. A band switch selects the appropriate taps on the coil for the band of operation. Keying is done in the emitter return of Q1. Though no shaping is incorporated, the cw note is relatively clean and free of clicks. It would be an easy matter to add some shaping to the keying, and the operator may wish to do so.⁴

The PA stage, Q2, Fig. 2, uses a 2N4427 which operates essentially Class C. Its tank circuit is arranged in a like manner to that of Q1. Output is taken from a fixed link which is designed to look into a 50- or 75-ohm termination. A panel meter reads relative collector current of the PA. The oscillator is tuned for maximum meter reading. The PA is tuned for a dip in meter reading. The PA appears to be stable, because the dip in collector current coincides with maximum rf output. There are no protective measures to prevent damage to Q2 should the transmitter be keyed at a time when there is no load, or when a severe mismatch occurs.

The VFO

As outlined earlier, the VFO operates as a BFO during receive and is shown schematically in Fig. 3. Both transistors are high-beta, high- f_T types. By selecting a high-beta device for Q1 it is possible to use large amounts of C in the tuned circuit and still enable Q1 to sustain oscillation. The capacitance used is very high for 7-MHz operation, hence contributing to good stability. There is no evidence of oscillator "pulling" when the transmitter is keyed, or when the input of the detector is tuned

³ Ordinarily it is quite difficult to obtain a chirp-free cw note when a VFO operates at the transmitter's output frequency. The difficulty is particularly troublesome when using transistorized equipment because of the poor isolation between the transistor's input and output ports.

⁴ Information on shaped keying is given in the ARRL *Radio Amateur's Handbook*, 47th Edition.

to resonance during receive. The VFO tuning capacitor is tapped down on the feedback network to provide suitable handsbread. For operation on 80 meters an additional slug-tuned inductor is added to the circuit, but the shunt capacitance remains unchanged. Therefore, the vfo is not quite as "stiff" on 3.5 MHz.

Output from Q1 is taken across a 1000-ohm emitter resistor. Forward bias for Q2 is set by a second 1000-ohm resistor which connects to the base of Q2. This resistor also helps to isolate the VFO from its buffer, Q2. The buffer operates as an emitter-follower, and its output is taken across a 330-ohm resistor. No Zener diode is used to regulate the oscillator voltage. The manufacturer assumes that the equipment will be operated from a battery supply with ample current capacity to assure a steady operating voltage as the transmitter is keyed.

Operation

The transmitter has very low harmonic output, which is not always true of solid-state transmitters. All harmonics are down at least 25 dB from the fundamental, an acceptable figure when operating at QRP level. There was no evidence of TVI when the equipment was operated into an antenna which was only 10 feet from the writer's TV antenna.

Numerous contacts were made on 80 and 40 meters. The greatest distance covered was 1000 miles, and the signal report was RST 569. Many reports of RST 599 were received at distances up to 500 miles. Two series-connected 6-volt lantern batteries were used to power the transceiver, and after several hours of operation the batteries did not show any signs of depletion.

Final Comments

The manufacturer has a number of accessories which can be used with the PM-2. Among these units are a 15-meter receiving converter, a side-tone monitor, an antenna tuner, and an SWR indicator. A solid-state electronic keyer is available to those

Ten Tec PM-2 Transceiver

Height: 4 1/2 inches.
 Width: 10 3/8 inches.
 Depth: 6 5/8 inches.
 Weight: 2 lb.
 Price Class: \$55
 Power Requirements: 12 volts dc at 200 mA.
 Manufacturer: Ten Tec, Inc. Sevierville, TN 37862

wishing to really go "high hat" during QRP excursion.

When using the transmitter for 15-meter operation, Q1 of Fig. 2 operates as a tripler to drive Q2 straight-through on 21 MHz. The efficiency of the transmitter is not quite as good on 15 meters as it is on the two lower bands. The measured output was approximately 1 watt on 21 MHz.

There is sufficient frequency offset when going from receive to transmit to permit compatibility of operation with stations that use transceivers. The Ten Tec receiver should be tuned to the *high-frequency* side of the other station's signal when VFO operation of the transmitter is

contemplated. This practice will provide the correct offset relationship.

The PM-2 is packaged in an attractive heavy-gauge aluminum cabinet. The end plates of the case are made of moulded plastic, and have a wood-grain finish. The top of the cabinet is painted an off white, and can be removed to provide access to the circuit boards. A two-tone finish sets off the front panel to impart a professional appearance. The main tuning-dial calibration is silk-screened on the panel.

This little package should make an excellent companion for the camper, vacationer, CD operator, or the QRP enthusiast who likes to garner his DX the hard way. — *WICER*

Some QST Abbreviations used in Text and Drawings

- A — ampere
ac — alternating current
af — audio frequency
afc — automatic frequency control
afsk — audio frequency-shift keying
agc — automatic gain control
alc — automatic load (or level) control
a-m — amplitude modulation
anl — automatic noise limiter
ARC — amateur radio club
AREC — Amateur Radio Emergency Corps
ARPSC — Amateur Radio Public Service Corps
ATV — amateur television
avc — automatic volume control
bc — broadcast
BCD — binary-coded decimal
bcj — broadcast interference
bel — broadcast listener
BFO — beat-frequency oscillator
BPL — Brass Pounders league
ccw — counterclockwise
c.d. — civil defense
CD — Communications Department (ARRL)
coax — coaxial cable, connector
COR — carrier-operated relay
CP — Code Proficiency (award)
CR — cathode ray
CRT — cathode-ray tube
ct — center tap
cw — continuous wave (code), clockwise
dB — decibel
dc — direct current
DF — direction finder
dpdt — double-pole double-throw
dpst — double-pole single-throw
dsb — double sideband
DX — long distance
DXCC — DX Century Club
EC — Emergency Coordinator
ECO — electron-coupled oscillator
EME — earth-moon-earth
emf — electromotive force (voltage)
FAX — facsimile
FCC — Federal Communications Commission
FET — field-effect transistor
FD — Field Day
fm — frequency modulation
fsk — frequency-shift keying
GDO — grid-dip oscillator
H — henry
hf — high frequency
Hz — Hertz
IC — integrated circuit
ID — inside diameter
i-f — intermediate frequency
IW — Intruder Watch
k — kilo
kc — kilocycle
kHz — kilohertz
lf — low frequency
LO — local oscillator
lsb — lower sideband
luf — lowest usable frequency
mA — milliampere
MARS — Military Amateur Radio System
Mc — Megacycle
mf — medium frequency
MG — motor-generator
mH — millihenry
MHz — Megahertz
mic — microphone
mix — mixer
MO — master oscillator
MOSFET — metal-oxide semiconductor field-effect transistor
MOX — manually-operated switching
ms — millisecond
m.s. — meteor scatter
msf — maximum sutable frequency
mV — millivolt
mW — milliwatt
nbfm — narrow-band frequency modulation
NC — normally closed
NCS — net control station

NO - normally open
 npn - negative-positive-negative
 NTS - National Traffic System (ARRL)
 OBS - Official Experimental Station
 OD - outside diameter
 OO - Official Observer
 op amp - operational amplifier
 OPS - Official Phone Station
 ORS - Official Relay Station
 osc - oscillator
 OVS - Official VHF Station
 oz - ounce
 PA - power amplifier
 PEP - peak-envelope power
 PEV - peak-envelope voltage
 pF - picofarad
 PIV - peak-inverse voltage
 pm - phase modulation
 pnp - positive-negative-positive
 pot - potentiometer
 PRV - peak-reverse voltage
 PSHR - Public Service Honor Roll
 PTT - push-to-talk
 RACES - Radio Amateur Civil Emergency Service
 RCC - Rag Chewers Club
 revr - receiver
 rf - radio frequency
 rfc - radio frequency choke
 RFI - radio-frequency interference
 RM - Route Manager
 rms - root-mean-square
 RO - Radio Officer (c.d.)
 RST - readability-strength-tone
 RTTY - radio teletype
 s.a.e. - self-addressed envelope
 s.a.s.e. - stamped s.a.e.
 SCM - Section Communications Manager
 SCR - silicon-controlled rectifier
 SEC - Section Emergency Coordinator
 SET - simulated emergency test

SNR - signal-to-noise ratio
 spdt - single-pole double-throw
 spst - single-pole single-throw
 SS - Sweepstakes (contest)
 ssb - single sideband
 SSTV - slow-scan TV
 SWL - short-wave listener
 SWR - standing wave ratio
 sync - synchronous, synchronizing
 TCC - Transcontinental Corps
 TD - transmitting distributor
 TE - transequatorial (propagation)
 tfe - traffic
 tpi - turns per inch
 T-R - transmit-receive
 TTY - Teletype
 TV - television
 TVI - television interference
 usb - upper sideband
 uhf - ultra-high frequency
 V - volt
 VCO - voltage-controlled oscillator
 VCXO - voltage-controlled crystal oscillator
 VFO - variable frequency oscillator
 vhf - very high frequency
 vlf - very low frequency
 VOM - volt-ohm-milliammeter
 VOX - voice-operated break-in
 VR - voltage regulator
 VTVM - vacuum-tube voltmeter
 VXO - variable crystal oscillator
 W - watt
 WAC - Worked All Continents
 WAS - Worked All States
 wpm - words per minute
 ww - wire wound
 wv - working voltage
 xtal - crystal
 μ - micro (10⁻⁶)

QST

Strays

Stolen Equipment

The following list of equipment has been stolen from Texas Instruments, Inc., 13500 North Central Expressway, Dallas, Texas:

KWM-2A Transceiver	S. No. 16922
w/136B-2 Noise Blanker	
KWM-2A Transceiver	S. No. 16942
w/136B-2 Noise Blanker	
312B-4 Cabinet Speaker	S. No. 63314
312B-4 Cabinet Speaker	S. No. unknown
516F-2 Power Supply	S. No. 58705
516F-2 Power Supply	S. No. 58521
30L-1 Linear Amplifier	S. No. 27604

Anyone having information that will assist in locating this equipment is asked to contact Dave Leopard, Texas Instruments, Inc., 13500 North Central Expressway, Dallas, Texas, 57222.

The following equipment was stolen from me on March 31: Galaxy V transceiver, Serial No. 4110 V 892, Milton Green, K9FYD, 1927 Mulford Rd., Rockford, Ill. 61108.

While in Florida, on April 2, my car was burglarized in North Ft. Myers, Fla. Stolen was a Lafayette 6-meter solid-state transceiver, Model HA750, Serial No. 10041. Anyone having information about this equipment is requested to contact WABDIO, L. Haut, 3329 Blue Lake Dr., Flint, MI 48506, tel. 313-742-0470.

Feedback

The 1N914 diode, CR2, of Fig. 2, page 28 (May 1970 *QST*) is shown improperly connected. The anode should connect to the gate of Q1, and the cathode should go to ground.

In the Hayward article on RC-Active Filters, May 1970 *QST* p. 51, the values for R3, R3, R9, and R12 were omitted from the parts list. They are all 68,000 ohms, 5-percent tolerance. Also, the filter draws 5 mA, not 55 mA.

The collector resistor shown in Fig. 6-7, on page 29 of April *QST* (Stoffels, "Let's Talk Transistors"), should be 100 ohms - not 100,000 ohms.



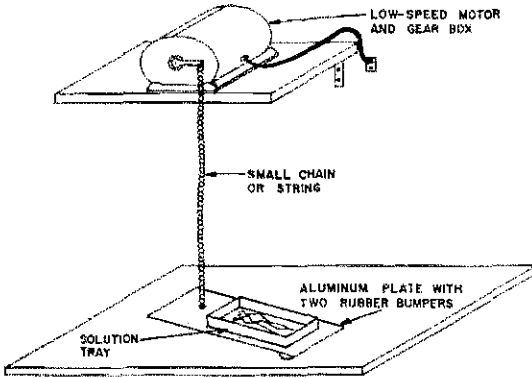
Hints and Kinks

For the Experimenter



PRINTED CIRCUIT AGITATOR

After reading the article in January *QST* about etched-circuit boards, a different method of agitating the tray came to mind. I took a fairly heavy piece of aluminum, and on the under side of one end, mounted two rubber bumpers. These bumpers, or feet, allow it to rock without moving around on the workbench. A small chain, as shown in the sketch was added to the other end of the piece of aluminum and was attached to a rotating arm mounted on the output shaft of the motor/gear assembly. The amount of tray motion is adjusted by properly placing the chain on the moving arm. The assembly can be moved, cleaned, or stored by just removing the chain. — *Harold D. Mohr, K8ZHZ*



When mounting the motor above the tray, the level of agitation can be adjusted by moving the chain on the rotating arm.

EASY PRINTED-CIRCUIT LAYOUT

After reading the article on printed circuits in January 1970 *QST*, some procedures that I use came to mind. On laying out the board, I use Clear-Print graph paper, ten squares to the inch, since most solid-state components use 0.1 inch or multiples thereof, for lead spacing. The lines on the graph paper are handy references for drawing interconnections. Crossovers are placed so they cross at the gap formed by a component.

After laying out the circuit, the graph paper is trimmed to size and affixed to the board with a transparent tape. A size-60 drill is then used to cut mounting holes through the paper layout. The layout can now be used as a schematic (or wiring) diagram when painting the etch-resist material on the board. I use nail polish for this. The brush tip should be cut at an angle to allow the lines to be made finer. — *Ross W. Stevens, W6FRE*

KEEPING THE KEY IN PLACE

If the operating table has a smooth surface, keeping the key or paddle in place can be a problem. Removing dust from the rubber feet often helps, but the heavy-fisted operator still might have problems. An easy cure is to cut a piece of fine-grained sandpaper to the size of the keyer base and fasten it to the operating table (rough side up of course) with a few pieces of wide masking tape. If the operator wants to change the position of the key, he can simply move the sandpaper.

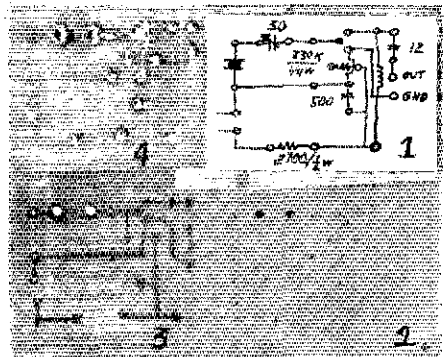
The same system can be used to keep the rotor control box, lamps, and other items from walking around the desk. — *WIFBY*

ANOTHER SOURCE FOR COIL FORMS

For those fellows who like to wind their own coils, another source for form material may be your local coin dealer. Clear plastic tubes are used by collectors for storing their coins. There are six sizes of "coin tubes" ranging from the one-cent to the silver-dollar diameter. To use the coin tubes, cut off the top and bottom sections with a fine-bladed hacksaw, or just cut off the top section and leave the bottom section for use in mounting with a small screw. — *Stan J. Zuchora, W8QKU*


SPAGHETTI

Your local hospital is an excellent source of spaghetti tubing. For medical applications, the tubing can only be used once. A request to a doctor or nurse will usually bring you enough plastic tubing of various sizes to provide a lifetime supply for ham purposes. — *WIKLK*



A sample of W6FRE's board shows the schematic drawn on graph paper, a drilled pattern, the nail-polish resist, and the final etched board.

Hamfest Calendar

JUN		1970				
S	M	T	W	T	F	S
	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Alabama - The annual South Alabama Hamfest will be held June 14 at the Knights of Columbus Hall and is sponsored by the Mobile ARC. Registration will start at 10:00 A.M. with speakers and lots of fun planned. There will also be a dinner-dance party the night before the Hamfest at Kobets Restaurant, depicting a Hawaiian Luau, starting at 7:30 P.M. For reservations, tickets and more information contact Ham Wentworth, W4IAX, or write P.O. Box 7232, Mobile, Alabama 36607.

British Columbia - Vancouver Island Annual Picnic is Sunday, June 14 at Shawnigan Lake. For more information contact any Vancouver Island amateur or Victoria Short Wave Club, Box 134, Victoria, B.C.

California - The San Gabriel Valley Radio Club banquet will be held June 5 at 7:30 P.M. at Ricky's Restaurant, 323 W. Valley Blvd., Alhambra, California.

Denmark - The F.D.R. Bornholm sections International Ham-meeting will be held during the period July 12 to July 19 at the beautiful camping site at Lyngholt Camping, on North Bornholm. A very interesting ham program has been arranged with activities for the entire family. A camp station will be operating on most bands and modes. For more information on this write (and include return postage) OZ4EF, Box 121, 3700 Rønne, Bornholm, Denmark.

District of Columbia - The Tidewater ARC invites all amateurs to a Hamfest on June 20 at Lakewood Park, Norfolk, Virginia. For details on tickets and program write WA4SPF, RARC, P.O. Box 9701, Norfolk, Va. 23505.

England - The Amateur Radio Mobile Society will be holding a Carnival Rally on July 5 at Alconbury, U.S. Air Force Base, Huntingdonshire, England. There will be talk-in stations on 160 and 2 meters, a "bring and buy" stall, exhibits, camping and probably an informal dinner Saturday night followed by a film show. For more information write E. M. Wagner, G3BID, S. Ferncroft Ave., London, N.W. 3, England.

Georgia - The Atlanta Radio Club will hold its 44th Annual Hamfest June 13 and 14 at the North DeKalb Shopping Center. There will be many contests for the amateurs as well as games and other activities for the ladies. Further information may be obtained from John Fearon, 3384 Peachtree Rd., N. E., Suite 705, Atlanta, Ga., telephone 261-4924.

Illinois - The Shawnee Amateur Radio Association (SARA) Hamfest will be held August 2 at Herrin City Park, Herrin, Illinois. For details write Bill Johnson, W9FR1, 302 W. Kennicott, Carbondale, Illinois 62901.

Illinois - The Western Illinois ARC is holding its 10th Annual Hamfest on June 7 at the Adams County Fair Grounds located North and East of Quincy, Illinois. Call-in frequencies will be 3.910, 7.258, 146.94, and 146.34 MHz. Swap shop, games, lunch, all-covered facilities, the event will be held rain or shine. Camping facilities are available on the fairgrounds. For further information contact WA9ARG, Marshall Goins, 2316 Van Buren St., Quincy, Illinois 62301.

Iowa - The Iowa 160-meter Picnic will be held in Webster City, June 21 at the Hamilton County Fairgrounds. For information write Hamilton Co. ARA, Steve D. Klaver, WA0SVN, Rural Route, Ellsworth, Iowa 50075.

Kansas - The HBN Annual Picnic is to be held June 14 at Lees Summit, Missouri. Contact K0LPE or K0HGI for more information.

Manitoba - The Seventh Annual International Ham Fest will be held on July 11 and 12 in the International Peace Garden at Boissevain, Manitoba, and Dunsceith, North Dakota. Write Dennis L. Coulter, K0RSA, P.O. Box 303, Grand Forks, North Dakota 58201 for details.

Maryland - The Tidewater ARC invites all amateurs to a Hamfest on June 20 at Lakewood Park, Norfolk, Virginia. For details on tickets and program write WA4SPF, RARC, P.O. Box 9701, Norfolk, VA. 23505.

Mississippi - The Mississippi Ham and Swapfest will be held Sunday June 14 at WP Bridges Park, Hy. 55 South. Supper will be served on Saturday night June 13 prior to the Hamfest at Johnny Mize restaurant. For reservations and information contact W5LWY or W5MUG.

Missouri - The HBN Annual Picnic is to be held June 14 at Lees Summit, Missouri. Contact K0LPE or K0HGI for more information.

New Jersey - The first Hamfest and Picnic of the New Jersey Chapter of N.A.H.C. will be held at West Brook Park, West Milford, N.J. on June 21 (rain date June 28). For information contact M. Tomi Cox, WB2JRT, R.D. 3, Newfoundland, N.J. 07435.

North Dakota - The Seventh Annual International Ham Fest will be held on July 11 and 12 in the International Peace Garden at Boissevain, Manitoba, and Dunsceith, North Dakota. For details write Dennis L. Coulter, K0RSA, P.O. Box 303, Grand Forks, North Dakota 58201.

Ohio - The Goodyear ARC of Akron will hold its Third Annual Hamfest Picnic on Father's Day, June 21 from 10:00 A.M. to 6 P.M. at Windgoot Lake Park, one mile West of Suffield, Ohio on old Route 224 near Route 43. Mobile check-in on 50.4 MHz a-m and 146.94 MHz fm. For further information write Luther Elliott, W8RHN, 2246 Eastlawn Ave., Akron, Ohio 44305.

Pennsylvania - Second Sunday in June, Third Annual Hamfest of the Foothills Radio Club, Inc., of Greensburg, Pa., will be held in Wendel Park, Wendel, Pa., 3 1/2 miles South of U.S. Route 30, Irwin, Pa. All activities under an enclosed pavilion, rain or shine. Snack Bar for lunch, parking is free, displays and the traditional "trunk-line" merchants. New this year: public ham-gear auction and a club display contest.

Pennsylvania - The Somerset County ARC invites you to its 5th Annual Hamfest at Casheer Church Grove, 5 miles North of Somerset, Pa. on old U.S. 219, on Sunday June 7. Follow the direction signs when you get off the Pennsylvania Turnpike at Somerset. Registration starts at noon. Loads of free parking, free tables for the flea market, and all indoors. Delicious country food at reasonable prices. Bring the family to the country and unpolluted air!

Saskatchewan - The Saskatchewan Hamfest will be held July 3, 4, and 5 at Luther College, Dewdney Ave. and Royal St., Regina. Accommodations are available at Luther College at \$2.00 per person per night, \$4.00 per family per night including any children you can accommodate in the room with your own sleeping bags. Breakfast \$1.00, lunch \$1.25. Banquet included in registration fee which will be announced later. Unlimited space for campers at 50¢ per night on the college grounds.

Tennessee - The Music City Hamfest will be held on June 21 at Edwin Warner Park, Picnic Site No. 3 in Nashville. Sponsored by the Nashville ARC and the Old Hickory Net Club, we hope to make it an annual affair. Plenty of parking space, playground for the children, bring the family and join us.

Texas - The South Texas Emergency Net Convention will be held at the Gourmet Inn, New Braunfels, Texas, June 5, 6, and 7. Additional information may be obtained by writing Jerry Connaway, 110 Rosemont Dr., San Antonio, Texas 78228.

Virginia - The Tidewater ARC is sponsoring a Hamfest June 20 at Lakewood Park, Norfolk, Va., from 10:00 A.M. until 4:00 P.M. Registration fee is \$2.00. There will be an auction of used gear. Further information may be obtained by writing WA4SPF, RARC, P.O. Box 9701, Norfolk, Virginia 23505.

A Bonus to the Public

The Value of Amateur Satellites to Non-Hams

BY WILLIAM A. TYNAN,* W3KMV/W4GKM

Statements that our hobby must operate in the public interest to justify its existence are not new to amateurs. We've been providing public service communications, keeping technically alert, and contributing toward communications advances throughout an impressive history. In this article, W3KMV discusses how amateur space projects must similarly justify themselves as being in the public interest.

IT IS not news to most of us that amateur radio, like all other radio services, must operate in the public interest, convenience, and necessity in order to justify its existence. This requirement is spelled out in the Communications Act of 1934 which established the Federal Communications Commission. Familiar to all is our continuing record of providing emergency communication during floods, fires, hurricanes and similar disasters. This is but one example of our fulfilling this requirement. Not so well heralded, but of great significance nevertheless, are the many contributions of a technical nature which amateurs have made through the years to the radio art. The amateur space program offers a fresh opportunity for us to demonstrate anew our worth in this area.

By the same token, in order for any specific chapter in the amateur space program to proceed it must be shown beforehand that more than amateur radio will benefit. The securing of a ride into space for Australis-Oscar 5 along with Tiros-M is a perfect example of this. It was necessary to convince NASA officials that worthwhile information would be forthcoming from a successful launch. As a necessary culmination to the AO-5 mission, Amsat and Project Australis are presently working on a report to NASA documenting its results. This report will deal with many aspects of the satellite's performance, but, of particular interest will be data on unusual propagation obtained from the ten-meter beacon.

Let's look at a proposal recently made by Amsat to NASA for a relatively sophisticated amateur space experiment. In this case it's not an amateur satellite but two amateur experiments which Amsat proposes to be included on a large NASA satellite of advanced design. The satellite is the Applications Technology Satellite (ATS), in this case the "G" model of this series.

The ATS Spacecraft

ATS-G, planned for launch sometime in the mid-70s, will be placed in synchronous orbit over the equator so it will appear, from the Earth, to be fixed in space. The ATS series of satellites is designed to carry a number of experiments intended to investigate the feasibility of employing space technology for improved communications, navigation and weather forecasting. For example both ATS-1, and ATS-3 already in orbit, have transmitted TV pictures of the entire half of the earth facing them and have been used for experiments in air-to-ground vhf communication. ATS-G, which will be designated by a number suffix once in orbit, will carry a thirty-foot parabolic antenna with a pointing accuracy of 0.1°. NASA, in its call for experiments, has indicated its particular desire to receive proposals which take advantage of the large antenna. Amsat's proposal includes two independent experiments both of which utilize the large dish's capability.

Channelized Repeater

One experiment proposes a channelized repeater with an up-link in the two-meter band and a down-link in the vicinity of 432 MHz. Channelizing will allow a number of stations to use the repeater simultaneously without the problem of one high-powered station capturing the entire repeater.

The case which Amsat makes for this experiment is that it will demonstrate the feasibility of satellite communication for simple low-power terminals including mobile stations such as might be carried on small ships or private aircraft. The simple terminal aspect may have significant interest for developing nations which may have considerable difficulty affording the large earth stations presently being built for use with the Intelsat series of communications satellites. At present, much of the communications between villages in such countries is via hf which accounts for some of the pressure felt on our amateur bands at every frequency conference. Therefore, if the Amsat repeater experiment is accepted for inclusion on ATS-G it may lead to other non-amateur satellites providing improved communications for a variety of services.

ATV Experiment

The other ATS-G experiment proposed by Amsat, which also takes advantage of the gain offered by the satellite's thirty-foot dish, is a demonstration of direct satellite-to-home television broad-

*Amsat Public Relations, Box 27, Washington, D.C. 20044.

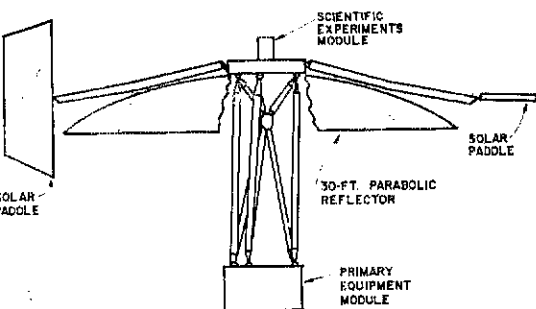


Fig. 1 — ATS-G spacecraft general arrangement.

casting. The homes in this case being those of amateurs and other experimenters who would equip themselves with the necessary high-gain antennas and converters to go ahead of their regular TV sets. The space-to-earth picture transmissions would be in the 420- to 450-MHz amateur band so interference to earth TV stations would not be a problem as it would be if any of the regular television channels were used. Specially equipped amateur TV stations, operating in another band, would supply the pictures to the satellite.

This Amsat TV experiment is similar, but differs significantly, from another TV experiment slated for ATS-F scheduled for launch in 1973. In this, wide band fm television signals will be broadcast to special receivers to be set-up in India. This will be used in a country-wide test of the potential of educational TV for that large populous nation. The significant difference between the two experiments is that the ATS-F transmissions employ special standards not compatible with any home TV receivers. The Amsat ATS-G proposal is for broadcast of signals which can be received on regular television sets by the addition of a relatively simple converter and the necessity for that is simply to be able to use an amateur band for the tests.

It doesn't take much imagination to visualize the impact which successful completion of such an experiment might have on future television broadcasting throughout the world.

Both of these proposed experiments are examples of what effect the amateur space program may have on the future of communications. Such effects are certainly not limited to amateur space experiments riding on non-amateur satellites. The same reasoning can be applied to all-amateur satellites as well. Indeed, if it cannot be so applied, and launch-agency officials are not sufficiently convinced that some good will come to people besides amateurs, all-amateur satellites may never get off the ground. The amateur space program provides another opportunity for us to show that we, as amateurs, can still make contributions to communications and related fields as we have done in the past.

Your Help Needed

The Radio Amateur Satellite Corporation (Amsat) has just celebrated its first birthday. In its first year of operation it has been instrumental in getting Australis-Oscar 5 launched by NASA, the

first amateur satellite to be launched by the civilian space agency. It has also submitted the detailed proposal for two amateur experiments for inclusion on the ATS-G spacecraft.

Additionally, plans are underway for a repeater satellite, dubbed Amsat-Oscar B, with an estimated life of at least one year. Plans call for Amsat to build the satellite's structure and solar power supply system while soliciting construction of the rest of the electronics by other groups. Talks are presently underway with a European group and with Project Australis to supply the repeater sub-systems. Groups interested in supplying other sub-systems such as telemetry and command are invited to contact Amsat.

In order to continue the work already started and to initiate new projects, Amsat must have the support, both financial and otherwise, of the ham community. Amsat membership is just five dollars per year, and contributions in excess of this amount are tax deductible. Write to Amsat, PO Box 27, Washington, D.C. 20044 for a membership application form. Help do your part in this new adventure in amateur radio.

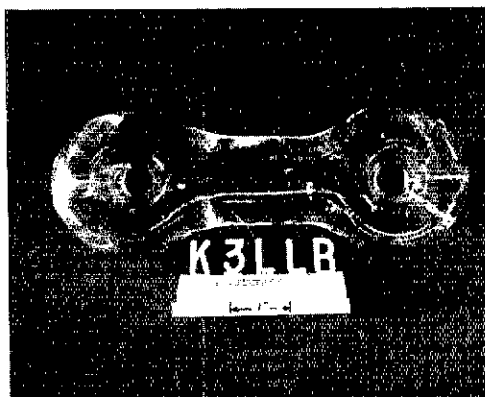
QST

Strays

Feedback

The balun referred to as the Hy-Gain BN-36 on page 38 of the March, 1970, *QST* is actually Hy-Gain's model BN-86, order number 242. Thanks to KØLFA of Hy-Gain for calling this to our attention.

November SS Results on page 67 of *QST* for April should have listed the winner of the Oak Park ARC awards on both modes as W8DQL. The score of W4VNE should have read 9200-100-46-A-10.



In the March issue we showed a Pyrex insulator made by Corning Glass Co. and stated that it was believed to be unique. Well, K3LLR has one and he wonders where the other four known to have been made are at the present time. His insulator was supposed to have been used at NSS at one time, according to W3AM who gave it to him. — *W1ANA*

Field Day Verticals Versus Yagis

A CASE ... bic ... STUDY

BY JOHN G. TROSTER, *W6ISQ

OKAY everybody, take ahold of this mast and when I say, 'heeeaaavvee,' everybody heee ... wait a minute. Wait just a millimicro ... when I say 'heave,' I mean the mast, not all them cans. Now you fellas go pick 'em all up. When this Field Day is over, we don't want to spend no time policing up the area. I think maybe some of you fellas been destroying the contents of them cans too fast and free."

"Aw, don't throw them cans away, Chief. Why don't we solder a few of 'em together and make one of them little beer cans vertical for two meters. We could maybe ... ahhhhhh ... make a scientific investigation of how a vertical works compared to our 12 element rotatin' Yagi."

"What do ya mean, 'scientific investigation'? You fellas crazy 'er somethin'? This is Field Day. We got 14 operating positions all ready to fire up. We got 10 big quads and Yagis. We got wire beams ... and you fellas wanna play science games with a few beer cans. I tell ya, we're out after lotsa QSOs and points and a big score. Yeah ... yeah ... ohhhhhh well, we got time. Might keep ya out a trouble. Go ahead. Hot up the iron and solder up a beer can vertical for two. Might even make us a few extrie points."

"Hooorrraaaayyyy ... on with science. A few old cans ... a few minutes ... few drops a solder ... aaaaannd we got us a two-meter vertical. Not bad, eh Chief? And saaaay, if we just emptied a few more cans, we'd have enough to make a 6-meter vertical too."

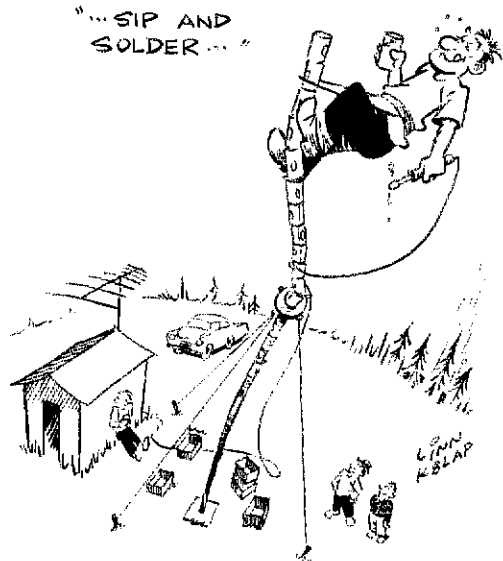
Waaaall, okay fellas, we still got a little time. Go ahead and make a vertical for 6. But hurry up. We want to set a new Field Day record this year."

"Say Chief, we're gonna be a few cans ... ahhhhhh ... thereabouts ... short. But since we're so far out in the boondocks, maybe we won't get much action on 2 and 6 meters either one. Sooo, maybe we should solder the 2 and 6 together and then add a few more cans so's we could start out our scientific studies on 10 meters. We'd sure get more QSOs on 10 anyway."

"I think you fellas is tryin' to pull a fast ... oh well, okay ... I can see ... you two fellas go back to town and buy another dozen ... Better keep a good supply ... ahhhh ... for first aid precautions. I hear tell there's whole herds a rattle-snakes lurkin' around these hills ready to attack any time ... yeeeah. But you other fellas keep soldering. I'll help over here with the can draining and fluid destruction operation."

"Hey Chief, Field Day has started. Can hear 'em on my mobyle."

"Omagosh, hurry up and come on fellas. Hot up another iron and sip, sip, sip a little faster. But everybody remember to take good notes so's we can write up our scientific findings for QST."



"We're gonna be about one can short to resonate on 10, Chief. But maybe we ought to try it out anyway."

"Okay fellas, attach up them guy lines ... ready ... heeeaaa ..."

"QRX one, Chief ... Q ... R ... X ... just checked on the mobyle and the skip has about killed 10. Maybe ... maybe if we had another couple a dozen six packs ... considering all the dented cans ... we could go straight to 15 ..."

"On to 15. We gotta drain and solder them cans a little faster fellas. You three fellas, take the truck and go back to town for more ... ahhhhhh ... solder. But maybe if you happen to pass a store that sells such things, you should stop and get six more cases of couple packs ... errrr ... a couple more cases of six packs. The rest of ya let's go ... sip and solder ... sip and solder ..."

"Ready for 15, Chief ... tie on them guys ... heeeaaaaavvvv ... it's up. Hooorrraaaayy. Solder on a piece a coax ... anywhere ... come on fellas, we gotta get to comparing verticals to Yagis. Ahhhhh ... hmamm ... cheeeesshh ... don't hear nothin'. Band must of gone out. We gotta go to 20 ... gotta save time. Solder up them cans in 5 foot sections and I'll shinny up and solder 'em in place ... piece by piece."

"Hooorrraaaayyy, here comes another car load. The solderers is gaining on the sippers ... sip and solder, sip and solder ..."

"We're dropping behind, Chief. Twenty is gonna be dead by the time we ..."

*82 Belbrook Way, Atherton, CA 94025

"On to 40 ... drain 'em faster mates ... sip and solder ..."

"Almost there fellas. How does 40 sound on the mobyle?"

"Waaaaall Chief, if JAs count for Field Day, we in like a crystal filter ... Maybe we can get a bonus multiplier if we work the Voice of America ... Yeah, 40 don't sound too good for North America."

"HMMMMMM, well if 40's no good, my vast experience dictates to me that 80s no good neither. But waver not in your dedication men. We came out here on Field Day to conduct a scientific investigation in the public connoivance and ... ahhhh ... nesssry service ... ahhhh ..."

"I thought you said we come out here to work lotsa QSOs in a contest."

"Think kilo-thoughts, men ... think kilos. So what do we do if 80 is no good?"

"Hit the sack."

"That's right. We change bands."

"Yeah Chief, but 40 and 20 is dead too ..."

"You're goin' in the wrong direction fella ..."

"You mean ... yeah, but whoever heard of a vertical for ... better strap on your spurs Chief, 'cause you got lotsa shinnyin' to do up a 160 meter vert ..."

"Mere details, lads. You keep forgetting that we committed ourselves to science ... and ya gotta have a meaningful commitment to be reverent these days, ya know."

"But Chief, if we're supposed to be comparing verticals to rotary Yagis ... and if we go ahead now and sip and solder up a 160 meter vertical ... that means we gotta build a ... a ... to compare our vertical against. Impossible! Who ever heard of ... why nobody never heard of a rotary for ... we don't have enough ..."

"Tut tut ... you're micro-thinking again. But fortunately for the scientific community, and the honor and glory of the club ... your old Chief has been *mega*-thinking."

"Yeah but how we gonna make a rotary for one-sixt ..."

"You see yon truck over yon ... ahhh ... there? ... the one with all them cases thereupon? Well, inside them cases is all the tubular goods we're gonna need to construct us the world's first portable Field Day 4 element 160 meter yotary ragi ... errrr ... if the solder holds out."

"You been *giga*-thinkin', Chief."

"And so dear friends, let us each to the completion of his appointed scientific task. You knaves here, upward and onward with your proud vertical. Sound the klaxon when you wishist me to fly to the top to secure another section thereon. And I, dear comrades, shall hie me to my laboratory atop the tailgate of yon truck where I shall construct the rotary antagonist for your slender spire in the sky ... ahhhhh ... gimme one a them can openers, will ya Charlie?"

DET



June 1945

... An appeal to the public to buy 7th War Loan Bonds, signed by 5-star Generals and Admirals is on the front cover this month together with a montage of photographs.

... K.B. Warner follows with an appeal to organize for disaster relief using existing services such as W.E.R.S.

... Cathode-follower circuits, their principles of operation and applications are ably covered in an article by Lt. Hulén M. Greenwood, AC. There are eight pages of this, only a little biddy bit of math, numerous diagrams and charts.

... Phil Rand, W1DBM, describes an "Anti-squealer" for superregenerative receivers. What this is, is a fixed-tune preselector, using an 852. Of course, this is an amplifier, as well. While specifically designed for the Abbott-TR4 transmitter-receiver, it is equally adaptable to other receivers.

... The A.F. & T. Co. has filed application for the construction of seven microwave relay stations between New York and Boston. This first linkage must have worked real well, considering that the country is now covered with these effective automatic-relay stations.

... Ha! An article on Hyperbolic Functions. These things I found particularly useful to me personally, once I got over the awe and wonder of them. Really not much different than trig functions once you grasp the general idea.



June 1920

... The study of fading on 200 meters goes on apace. And, with the summer season coming on and its expected lull in operating activities, Warner urges the membership to concentrate on the rebuilding of stations. Traffic Manager Smith predicts, however, that the increase use of cw will permit more activity on the air than would be possible if everything were spark.

... The OLD MAN vents his feelings about the lousy gibberish heard on the air in a characteristic yarn "Rotten Air." Seems the same kind of stuff is still to be heard even now - worse, if anything.

... A Radio Club of America paper by Walter S. Lemmon describes Recent Developments in Radiotelephones. Mostly to do with some war-time W.E. and G. E. sets.

... Good ole Matty, 9ZN reports on experiments with underground antennas, using two insulated wires 47-feet long and buried around four-feet deep. Huh. He says that the signal to static ratio is considerably improved. The wires are in line, some sort of dipole.

... There are now twelve instead of six divisions in the League, resulting a less burdensome workload for the various Directors.

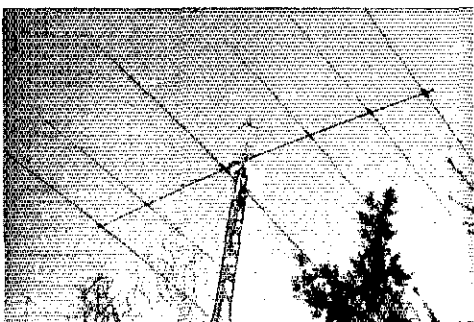
... Mr. Bowden Washington, chief engineer of Cutting and Washington points out a number of theoretical errors in M.B. West's paper on "Improving Transmission." This is a very good communication indeed. - *WIANA*

Results,

1970

ARRL

WN7NHS, Mike, our Washington Section Winner sports a TH6DXX beam financed



entirely by a paper route! He managed 402 QSOs in 57 sections, not bad for a beginner!



Novice

Roundup

REPORTED BY AL NOONE,* WAIKQM/WB6SAZ

CONTINUING its yearly growth, the 1970 ARRL Novice Roundup returns exceeded those of last year by approximately 25% or 117 more entries. Out of 590 entries, 456 were Novices, 110 Higher Classes and 24 Check Logs. Returns were received from 63 sections including Alaska, Hawaii and the West Indies.

Highlighting this years scores are the TOP TEN Novice entrants to follow: WN4NRI Va. - 53,352, WN4NGC Va. - 53,132, WN6DJI L.A. - 50,850, WN9AJP Wisc. - 47,428, WN2MAN NLI. - 38,940, WN9ZKL Ind. - 36,725, WN3NKO WPA. - 35,175, WN2HID NNJ. - 33,835, WN7MLZ/7 Ariz. - 33,516, and WN9COA Ill. - 33,462.

Special congratulations are also in order for WN6DJI who managed QSOs with all 75 sections. A word of thanks to the General and higher classes who participated. You can be assured your efforts are greatly appreciated by the many WNs who QSOed you.

Hope C U all in this months Field Day.

Soapbox

"I enjoyed the contest but where was Utah?" - WN2HIS. "The contest is great fun and the only thing wrong is the ORM." - WN8EIZ. "My biggest thrill was working W1AW." - WN4OAI. "Thanks a lot for staging an excellent contest, I only wish I had more time to operate." - WN0AHY "Swell contest but how about making it shorter, say 2 weekends?" - WN9BJX "Next contest for me is to get my general." - WN1LSH. "Thanks for the great contest. I got 3 more states for WAS and my code speed up about 5 wpm." - WN3MGS. "Enjoyed all the QSOs, especially surprised by a call from SMSBNX." - WN2MDY "Please cast my vote for making the contest shorter, the XYI has just about had it with me. hi." - WN8AYW. "My

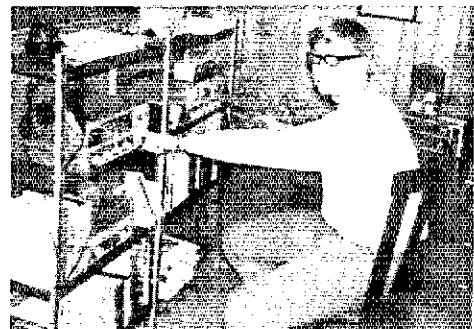
* Communications Assistant, ARRL.

OM WA7LKA is glad the NR is over so now he can get on the air once again." - WN7MKQ. A great time and hope to be in next years NR when I have my general." - WN2EWC. Thanks to the generals who were patient with me." - WN4NRD. "I think you should count DX QSOs as multipliers." - WN2MAN. "Didn't hear a single Wyoming station." - WN4OFO "Somehow the dishes got done, the house got cleaned, the kids got bathed and the meals got made. I owe most of the credit to the OM who took care of the kids on the weekends so mama could join in the fun." - WN1LGI. "Very excellent contest and may I say that I sure was surprised to find so many fine operators in the whole contest. It is quite an experience to operate from WP4 land, sure hope to have the same results in future contests to come." - WP4DIW. "How I worked California and 10 other states remains a mystery to me." - WN1KJT. "Fifteen new states and Canada. Great!" - WN1MCO. "I like the Novice Roundup but sure wish you could have it during summer vacation because I think most novices are either in High School or College." - WN9CPT. "It was very interesting, nothing wrong with the score that another dozen states would not have helped." - WN2LRT. "Finally got Hawaii after almost 2 years." - WN8ATX "It was a great experience, especially for a novice just breaking into ham radio." - WN4OPG. "This was my second Novice Roundup and seemed to be much more activity on weekdays this year." - WN7KMM "Bright spot of the contest was an "88" from WN1LGI who had told me in a Qso a few weeks earlier that she got on the air between "dishes and diapers." - WN2LLR "I got my novice ticket during Field Day last year and ever since then I have been making new friends." - WN1LSV "Please keep the contest just as it is." - WN9CXZ "I enjoyed my limited time in this contest. It gave me a chance to work on my code speed, work a few new states, and test my new vertical. I hope to be handing out contacts

next year as a General." -- **WN4ODK** "Every novice I worked is an A-1 operator in my book and a credit to the hobby." -- **W2ECW** "I hope to have my advanced license next year and work it from the other side, hi." -- **WN5ZRB**

Scores

Listings are grouped by ARRL divisions and sections. The operator of the station listed first in each section is award winner for that section. Example of listings: **WN3NME** 12,100-210-55-26, or total score 12,100, different stations worked 210, sections worked 55, total operating time 26 hours.



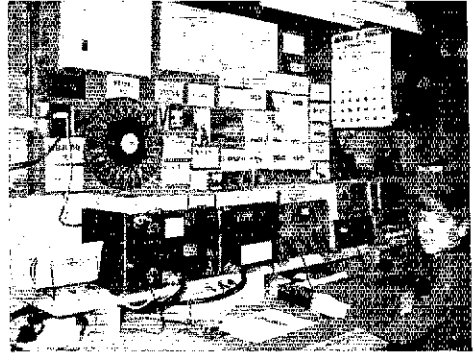
Four of our Division Leaders were kind enough to send pictures. They are from top to bottom, **WN2MAN**, Rich, Hudson Div; **WN4NRL**, David, Roanoke Div; **WN5WZO**, Wesley, West Gulf Div; and **WN9AJP**, Jeffrey, Central Div.

ATLANTIC DIVISION		WN9BOW	23,932	386-62-39
<i>Delaware</i>		WN9AFW	22,265	350-61-34
WN3NME	12,100 210-55-26	WN9CXZ	15,939	253-63-35
<i>Eastern Pennsylvania</i>		WN9BMY	14,280	223-60-40
WN3LUA	18,038 311-58-38	WN9ZOY	13,110	210-57-40
WN3MME	16,750 335-50-38	WN9AUR	10,951	233-47-34
WN3KPI	14,465 253-55-40	WN9YNX	9504	188-48-26
WN3NNA	13,208 244-52-33	WN9CDC	9212	196-47-33
WN3MYG	11,275 260-41-34	WN9APL	8004	174-46-18
WN3NOX	6169 179-31-	WN9BUJ	7555	170-41-26
WN3NNK	5772 148-39-38	WN9ACF	5964	142-42-27
WN3LEJ	4392 122-36-10	WN9CLN	5964	142-42-11
WN3MPH	4329 096-39-18	WN9CJC	5320	132-35-16
WN3MOL	3025 106-25-06	WN9CGK	5040	116-40-18
WN3NRI	2277 069-33-04	WN9DEN	2640	070-33-14
WN3MRP	2231 082-23-18	WN9HSZ	1600	100-26-15
WN8IGZ/3	2072 074-28-40	WN9CPI	1728	072-24-15
WN3NOY	1512 057-21-07	WN9CBF	1368	057-24-12
WN3NAY	1430 055-26-	WN9CZS	504	032-12-06
WN3IKO	1420 061-20-08	WN9ADH	448	054-07-29
<i>Maryland-D.C.</i>		WN9RXY	435	019-15-04
WN3MTI	21,180 353-60-38	WN9CGJ	318	028-11-03
WN3MJP	13,038 221-53-27	WN9ZTK	110	011-10-11
WN3NPS	12,474 231-54-20	<i>Indiana</i>		
WN3NHG	11,648 209-87-40	WN9ZEL	36,725	565-65-35
WN3LOV	8832 184-48-	WN9YZG	21,609	343-63-39
WN3MKC	5217 111-47-23	WN9DAW	5565	159-35-20
WN3IXH	3774 102-37-	WN9CIK	4620	105-44-23
WN3NCT	3000 100-30-11	WN9ZAS	4176	116-36-21
WN3MSX	2442 074-33-11	WN9AOI	3306	087-38-14
<i>Southern New Jersey</i>		WN9CPV	3286	091-31-11
WN2PQF	23,188 359-62-39	WN9BAT	2926	077-36-10
WN2MHK	15,785 287-55-40	WN9CNH	1316	047-28-09
WN2YSW	10,440 174-60-18	WN9CXF	1148	062-14-09
WN2LXV	10,098 173-51-40	WN9CMU	1040	050-16-11
WN2IDJ	8281 154-49-23	WN9BSA	833	049-17-05
WN2KMK	2448 092-24-13	WN9CAC	615	031-15-12
WN2KUG	774 033-18-16	<i>Wisconsin</i>		
<i>Western New York</i>		WN9AJP	47,428	658-71-39
WN2EWC	24,512 373-64-04	WN9CJ7	22,076	339-64-32
WN2MBP	21,276 394-54-37	WN9BJR	19,680	308-60-40
WN2KZM	14,868 344-42-39	WN9CDR	17,169	291-59-35
WN2LBU	14,404 277-52-39	WN9AMT	16,579	281-59-31
WN2RFI	14,256 254-54-22	WN9AZZ	12,880	230-56-13
WN2LUF	10,650 198-50-35	WN9BHC	11,891	233-47-40
WN2HGS	10,452 186-52-40	WN9ZUG	11,826	219-54-37
WN2LRT	7515 167-45-38	WN9AOI	10,146	178-57-11
WN2JIG	6520 163-40-24	WN9CUN	9225	225-41-29
WN2FAI	6160 140-44-15	WN9BJO	6952	138-44-30
WN2LCC	5985 156-35-37	WN9RIX	6808	164-37-36
WN2LOI	5612 122-46-29	WN9CSL	6720	130-48-25
WN2MBN	5400 170-30-35	WN9ART	3168	076-33-09
WN2MEW	3822 147-26-40	WN9BSP	2916	081-36-10
WN2LRB	3810 127-30-33	WN9COT	1428	051-28-04
WN2ICL	3255 083-35-07	WN9ZSG	702	039-18-10
WN2LNB	3002 069-38-26	WN9CHP	370	017-10-11
WN2LNB	1320 055-24-09	WN9BWP	150	015-06-23
<i>Western Pennsylvania</i>		WN9ZLU	24	006-04-02
WN3NKO	35,176 525-67-40	DAKOTA DIVISION		
WN3MDY	16,877 312-51-25	<i>Minnesota</i>		
WN3LKT	6060 202-30-18	WN0ZHG	17,328	294-57-29
WN3MGS	4002 148-29-16	WN0ZQA	11,058	194-57-17
WN3MIE	3278 061-18-06	WN0AJX	3308	093-41-12
WN3NAZ	1140 037-20-12	WN0ABY	3844	124-31-24
CENTRAL DIVISION		WN0ZZN	3276	074-39-23
<i>Illinois</i>		WN0AJA	2691	069-39-07
WN9COA	33,462 487-66-38	WN0YGF	1740	060-29-07
<i>North Dakota</i>		DAKOTA DIVISION		
WN0ZCT	19,593 296-63-34	<i>Minnesota</i>		

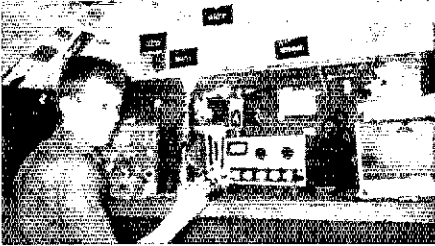
Section Winners



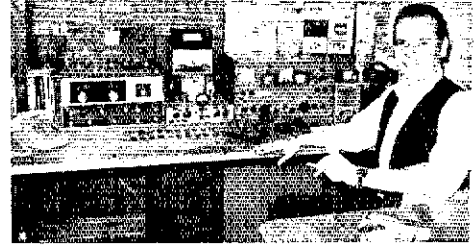
WP4DIW, Eric Puerto Rico



WN1LSV, Larry Rhode Island



WL7GPM, Victor Alaska



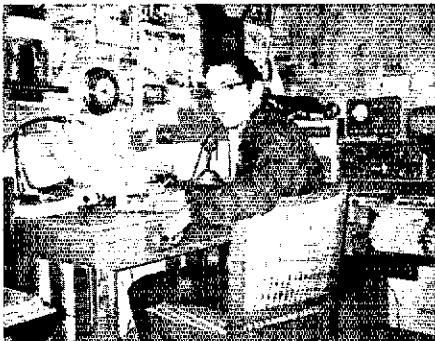
WN4JGZ, Jerry N.Carolina



WN4MTQ, Frank Kentucky



WN2EWC, Robert W. New York



WN0VJF, Jon Kansas



WN1LNP, Gordon E.Mass.

New Mexico		WN6GCG	12,528 206-58-38
WN5YLM	6644 151-44-39	WN6JFL	11,596 223-52-19
WN5VOR	35 007-05-01	WN6DCC	10,908 202-54-40
Utah		WN6MSP	7,379 357-47-32
WN7LGX	11,550 210-55-20	WN6NTA	4808 136-28-
WN7NCZ	39 003-03 01	WN6JZL	3780 108-35-06
Wyoming		WN6NCO	3465 099-35-19
WN7NOG	11,648 324-52-	WN6GJD	3288 087-34-31
SOUTHEASTERN DIVISION		WN6GHH	1450 048-25 09
Alabama		WN6MBO	1,350 054-25-16
WN4OKT	6468 144-42-22	WN6RFP	550 055-10-40
WN4NFV	6435 133-45-24	WN6EFL	420 030-10-09
WN4OJD	5112 127-36-18	Orange	
WN4PHS	5029 107-47-12	WN6LEI	20,416 304-64-18
WN4PBT	320 072-10-06	WN6GFA	14,874 207-67-21
Eastern Florida		WN6LJN	5940 117-45-04
WN4MIQ	29,232 439-63-24	WN6FKU	493 079-17-14
WN4NRD	23,546 366-61-37	San Diego	
WN4MEJ	19,738 386-48-35	WN6NYT	25,358 394-62-34
WN4OJA	16,940 298-55-16	WN6IVE	14,168 233-56-40
WN4ONC	15,504 294-51-27	WN6LSO	6885 135-51-22
WN4OAI	13,588 301-43-25	Santa Barbara	
WN4PKP	12,691 289-49-27	WN6KDI	20,068 346-58-40
Georgia		WN6FZV	8400 168-50-15
WN4OPH	15,822 293-54-21	WN6ENU	1125 075-15-08
WN4PBE	9536 173-52-21	WN6FNZ	330 034-10-04
WN4NBY	9102 207 41-30	WEST GULF DIVISION	
WN4MGN	3060 080-34 18	North Texas	
WN4PKB	1100 044-25-10	WN5WZC	28,121 446-61-35
WN4POA	1 001-01-	WN5ZKU	27,050 335-61-40
West Indies		WN5WQW	13,311 261-51-30
WP4DIW	26,562 456-57-32	WN5AAR	11,526 226-51-29
Western Florida		WN5YDB	2760 092-40-08
WN4ORM	33,264 504-66-34	WN5ZGJ	798 018-21-05
SOUTHWESTERN DIVISION		Oklahoma	
Arizona		WN5WVK	21,889 371-59-25
WN7MLZ/7	33,516 512-63-22	WN5ZRW	18,703 317-59-20
WN7KBN	8228 172-44-36	WN8ENJ/5	12,084 213-53-24
WN7KNL	2450 070-35-24	WN5IOM	4750 125-38-22
Los Angeles		WN5YMZ	4558 096-43-24
WN6DJI	50,850 678-75-31	WN5ZHV	468 026-18-23
WN6FVY	21,600 400-59-21	South Texas	
WN6FYO	22,425 310-69-35	WN5ZRB	26,775 410-63-40
WN6EJB	13,520 245-52-39	WN5ZIB	24,285 385-63-24
		WN5ZBK	15,895 789-43-43
		WN5ATM	12,189 239-51-37

Non-Notice Scores

K1EJ 612, W1AW (6 ops.) 5424, W1FTR 7568, W1MRW 2528, W1CTO 1325, W1JWQ 16,188, K7IRF/H 504, K2CC (W1JQA, opr.) 858, K2EKM 2079, K2LFG 9020, K2MFF (WAZ2FUI, opr.) 4480, W2ECW 7661, W2EMV 2580, W2NLP 6716, WAZ2LUX 13,181, WAZ2FUF 145, WAZ2GMD 4200, WAZ2GNN 4255, WAZ2KI 4828, WAZ2LU 1275, WAZ2YH 4760, WAZ2YWR 15,125, W2B10H 3133, W2B2IOF 294, W2BJAO 4736, W2BKJ 2184, W1JQA/2 1564, K3HNP 1914, K3VZV 20,727, W3ADQ (W43NGJ, opr.) 2408, W3EOT 8788, W3JAP 6880, WAZ3JY 4410, WAZ3JE 987, WAZ3WF 2697, WAZ3YV 12,712, WAZ3KMY 924, WAZ3KNJ 3150, WAZ3LCC 8976, WAZ3LOH 12,103, WAZ3LTB 3410, WAZ3LZF 1292, K4ADT 10,089, K4RTO 1898, K4CAK 2380, K4JM 19,924, W4DR 8800, W4GEO 19,154, W4KFC 5100, W4OGH 5250, W4YOK 2695, W4A0FS 13,446, W4B4GL 2816, W4B4PU 20,040, W4B4USG 13,216, W4C4AI 2496, W4N2B 2760, W4BQDN 3565, W4B4CGW 9204, K4AFH/4 1176, K5PKV 9024, W5EJ 5544, W5RFS 2075, W5VOT 5700, W5WCK 16,933, W5W0E 741, K6SLR 4815, W6IQK 456, W6LS (W6DDB, opr.) 7802, W6G60W 540, W6G6OQ 888, W6GHTM 19,364, W6MFR 795, W6F5YN 126, W6V6VS 7154, W6V6YCA 3721, W6ZPC 4134, K5MHG/6 846, K6KVC/6 1344, K7KHA 4875, W7LT 10,920, W7WMY 10,712, K9VLR/7 684, W9WTF/7 5453, W8QHW 29,900, W8RCC 42, W8MCO 2108, W8M7Y (K8LLX, W8BS VU ZVO) 4040, W8SSCY 13,468, W8SGV 1500, W8VCT 1050, W8WWS 840, W8KYRS 1344, W8ZDT 6680, W8ZME 3232, W8BAYC 920, W8R8KA 176, K9HYF 17,875, K9KLP 5355, W9RJI 2697, W9SNO 17,040, W9LNR 1800, W9WTF 4859, W9WZV 10,800, W9YCY 3080, W9YVZ 704, W9ZJL 1846, W9YAJB 1330, W9C/LT 152, W9PATY 3312, W9MGS 10,146, W9WJN 9750, W9WVOW 8808, W9DYV 13,303, W9ZXY 4059, V33AIA 2736, V13BUC 8232, V3C/OA 6794, V3FDH 17,080, V3RFSH 4401, V44AR 1012, V5RSI 3120, V5FTT 1932, V6AGX 280.

Check Logs: W1FH, K2COR, W2LU, W2ZRW, WAZ2LX, W2HSH, K3YBV, W3JD, WAZ3LS, W3MHP, W4KO, W4UQ, W5RE, W5NLY, W6KYA, W6OFO, W6UJ, WAZ7LD, WARYK, W8BI, W9CND, W9WZV, V3E3R, V3DNR, V3GJA, VE7IO, S5B5X.

A.R.R.L. QSL Bureau

The function of the A.R.R.L. 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 4 1/2 by 9 1/2 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.

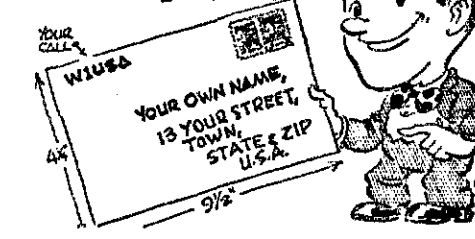
- W1, K1, W1A, WN1 - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2, K2, WA2, WB2, WN2 - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3, K3, WA3, WN3 - Jesse Bieberman, W3RT, RD 1, Valley Hill Rd., Malvern, Pennsylvania 19355.
- W4, K4 - H. L. Parrish, K4HXE, RD 5, Box 804, Hickory, North Carolina 28601.
- W4, W4B, WN4 - J. R. Baker, W4LR, 1402 Orange St., Melbourne Beach, Florida 32951.
- W5, K5, WA5, WN5 - Kenneth E. Isbell, W5QMI, 306 Kesterfield Blvd., Fund, Oklahoma 73701.
- W6, K6, WA6, W6, WN6 - No. California DX Club, Box 11, Los Altos, California 94031.
- W7, K7, WA7, WN7 - Willamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8, K8, WA8, WN8 - Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, Ohio, 43215.
- W9, K9, WA9, WN9 - Ray P. Birren, W9M5G, Box 519, Elmhurst, Illinois 60126.
- W0, K0, WA0, WN0 - Des Moines Radio Amateur Assn., PO Box 88, Des Moines, Iowa 50301.
- KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.
- KZ5 - Gloria M. Spears, KZ5GS, Box 407, Hulbo, Canal Zone.
- E, H6, WH6 - John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.
- K1, W1, 7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - L.J. Fader, VE1FO, PO Box 903, Halifax, N.S.

- VF2 - John Ravenscroft, VE2NV, 343 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R.H. Huckleby, VE3JW, 20 Almont Road, Downview, Ontario.
- VI4 - J.C. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, Saskatchewan.
- VE6 - Karel Letelaar, VE6AAV, Sub. PO 55, N. Edmonton, Alberta.
- VE7 - H.R. Hough, VE7HR, 1291 Simon Road, Victoria, British Columbia.
- VE8 - George E. Kondo, VE8 ARRL QSL Bureau of Department of Transport, Norcross Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 6, St. John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.
- SW1 - Leroy Waite, 39 Hannum St., Ballston Spa, New York 13020.

(These bureaus prefer 5x8 inch or #50 manila envelopes.)

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of QST.

IS YOURS ON FILE WITH YOUR QSL MGR?



July 'Open' CD Parties

APPOINTEES—OFFICIALS—LEAGUE MEMBERS

JOIN THE FUN!

JOIN THE FUN!

JOIN THE FUN!

IT WAS just last year, in fact May 1969, that the ARRL Board of Directors voted to expand one of the quarterly ARRL CD Parties to include all League members.

What, you may ask, is this CQ CD all about, anyway? CD in this case designates the ARRL Communications Department. CQ CD is, in effect, a call for all ARRL appointees (and elected officials, too) to get together, work each other and enjoy a brisk test of operator and equipment. The object is to work as many of the eligibles as possible in as many different ARRL sections (p. 6) as possible. The same station may be worked on each of the bands, but a section may be worked just once for credit. Thus, the maximum multiplier will be 75. Now, how come that, when there are only 74 sections? Well, for many years Yukon and the Northwest Territories were grouped together to form the VE8 section. Because of the small number of hams therein, this section (as such) was dropped quite a few years back. However, the VE8 multiplier was retained in ARRL contests — just for fun!

The exchange is brief and to the point. Appointees/officials transmit a short designation of their "status" plus ARRL section. Non-appointees-officials may transmit: member (MBR), life member (LM) or charter life member (CLM) whichever is applicable; plus ARRL section.

The appointees and officials you'll run into, with some "probable" cw abbreviations of their designations, are shown below:

President	.....	PRES
Vice President	.....	VP
Past President	.....	PASTPRES
Director	.....	DIR
Vice Director	.....	VDIR
Assistant Director	.....	ADIR
General Counsel	.....	GC
Associate Counsel	.....	ASSFGC
QSL Manager	.....	QSLMGR
Section Communications Manager	.....	SCM
Asst. Section Communications Manager	.....	ASCM
NTS Official	.....	NTSMGR
Contest Advisory Committee	.....	CAC
Repeater Advisory Committee	.....	REPAC
Section Emergency Coordinator	.....	SEC
Emergency Coordinator	.....	EC

CW

Starts 2300 GMT July 11
Ends 0500 GMT July 13

PHONE

Starts 2300 GMT July 18
Ends 0500 GMT July 20

You may operate any 20 hours out of the 30-hour periods. Times out must be 15 minutes or more to count as off-time.

Route Manager	.....	RM
Phone Activities Manager	.....	PAM
Headquarters Staffer	.....	HQ
Official Relay Station	.....	ORS
Official VHF Station	.....	OVS
Official Observer	.....	OO
Official Bulletin Station	.....	OBS
Official Phone Station	.....	OPS

Scoring is simple. Count 5 points per QSO (remember now, you can work the same station, for example, on 160, 80, 40, 20, 15 and 10 meters — vhf too!). To this figure add your ARRL code proficiency credit (you must have the certificate at that time). Multiply this new sum by the section multiplier.

Suggested frequencies in past parties have sort of "shaken down" to the following pattern: CW, up from 3535 7035 14035 28035; PHONE, up from 3955 7265 14295 21395 28600. (Try 160 meters at 0600 GMT and keep checking periodically for 10 and 15 meter activity.) Activity on 6 and 2 meters is welcomed!

Reporting should be done on ARRL CD Party report forms. An addressed stamped envelope sent now should get the logs to you in time for use in mid-July! The cut-off date for receipt of entries at Hq, is August 15. All participants reporting activity will receive a copy of the appropriate CD Bulletin containing final results. High-claimed CD scores will, as usual, appear in QST.

Remember now, CQ CD CQ CD CQ CD de
—W1YYM K

MULTIPLIER CHECK-OFF LIST										
1	2	3	4	5	6	7	8	9	0	VE
Conn	ENY	EPa	Ala	Ark	EBay	Ariz	Mich	Ill	Colo	Mar
EMass	NLI	Del	EFla	La	LA	Ida	Ohio	Ind	Iowa	Que
Me	NNJ	MDC	Ga	Miss	Org	Mont	WVa	Wisc	Kans	Ont
NH	SNJ	WPa	Ky	NMex	SBar	Nev			Minn	Man
RI	WNY		NC	NTex	SCV	Oreg			Mo	Sask
Vt			SC	Okla	SDgo	Utah			Nebr	Alta
WMass			Tenn	STex	SF	Wash			NDak	SC
			Va	C. Z.	SJV	Wyo			SDak	VE8
			WFla		SV	KL7				
			W. I.		KH6					



23rd ARRL VHF Sweepstakes

K6YNB/6

REPORTED BY AL NOONE,* WA1KQM/WB6SAZ

IN keeping with what appears to be a long standing tradition for January, we have nothing to boast about, propagation wise, during the 23rd VHF Sweepstakes. Tropospheric conditions were good at times, for the winter period, and activity, as always, was excellent. As far as Sporadic-E was concerned, one avid VHFer comments: "I caught what I believe to be the only such opportunity for this in a flurry of very short duration Saturday night. It netted me an EFLA contact." - WIHDQ.

It was interesting to note the ever increasing amount of ssh activity on 6 meters. On the other hand, it appears we had an unusual high amount of cw activity on the low end of 2 meters. Contacts were plentiful, due in no small part I'm sure to the tremendous club participations.

Some 865 logs were received here at HQ, representing 53 sections of the USA. This is again a slight decrease from the previous year. Could it be possible that the New Year spirit (s) still abounds on January 110-11?

Top Ops

Top single-operator entries are as follows:

K3IPM	46,260
WA3CAG	37,324
WA2FGK (K2LNS,opr.)	27,810
W3ZD	25,488
W3KKN	22,776

*Communications Assistant, ARRL.

Canadian High Scorer:

VF3ASO	3720
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Top multi-operator entries are as follows:

W8CCI	38,250
W2JK1	34,432
WB2WIK	29,008

Clubs

The *Mt. Airy VHF Radio Club* continues its winning streak, 10th year in a row! Wonder what they do with all their gravels? Re-capturing second place, the *Rochester VHF Group* just managed to squeeze by the *South Jersey Radio Association* who took third. The only other scores over 100K were submitted by the *Mobile Sixers Radio Club* followed by the *Hampden County Radio Association*.

Club entries were again down, 27 vs. 31 in 1969. Did your club compete? If not, why not? There is nothing like all-out participation in a contest to help you to enjoy your hamming more, and to learn more from it.

Hope to see you all next year.

1971 VHF SS
Jan. 9-10

Scores

In the tabulation to follow, scores are listed by ARRL divisions and sections. Unless otherwise noted, the top scorer in each section receives a certificate award. An asterisk denotes a Headquarters staff member, ineligible for an award. Columns indicate final score, number of contacts, number of different sections worked, and hands used. A represents 50 MHz., B 144 MHz., C 220 MHz., D 420 MHz., E 1296 MHz., and up. Multioperator stations are shown at the end of each section tabulation.

ATLANTIC DIVISION

Delaware

W3CGV 5016 132-09 ABCD
W3BHG 4488 102-12 AB
K3WYG 3300 75-12 A
K3JRP 840 28-05 A

Eastern Pennsylvania

K3PM 46,260 771-20 ABCD
WA3CAG 37,324 602-21 AB
W3ZD 25,488 472-17 ABC
W3KKN 22,776 438-16 ABC
K3JUV 20,300 406-15 ABCDE
W3CL 16,368 372-12 ABC
W3HRY 15,200 330-10 ABCD
WB2LZD/3 12,896 202-22 A
WA3EYJ 12,204 226-17 B
K3JZ 11,968 352-07 ABCD
W3LZ 11,000 250-12 ABC
K3GAS 10,944 288-09 ABCD
K3JUD 10,878 259-11 ABCD
K3FOD 10,710 315-07 ABC
K3QMK 10,692 243-12 AB
W3BCU 10,682 243-12 AB
WA3JYV 10,692 243-12 AB
W3CJO 10,260 285-08 ABCD
W3CCX (W3SAC), op.r.
W3SAD 10,098 297-07 ABC
W3GFW 9600 300-06 ABC
WA3FPS 9600 300-06 AB
W3HK 8900 215-10 ABC
W3MVF 8600 215-10 ABC
WA3JE 7744 242-06 ABC
WA3JMM 7680 240-06 AB
W3FTB 7632 239-06 AB
WA3CZ 7260 242-05 AB
K3JTY 7232 226-06 ABC
WA3BIV 6946 151-13 AC
K3MXX 6888 246-04 ABC
K3IGK 6435 215-05 ABC
WA3CND 6020 215-04 AB
WA3ERJ 5954 229-03 AB
WA3HIT 5908 211-04 AB
WA3JGY 5852 154-09 AB
K3HSS 5472 171-06 AC
K3JGJ 5320 190-04 ABC
K3DMA 5276 201-03 AB
W3DYL 5220 145-08 AB
K3OBY 5200 200-03 ABC
WA3NLT 5100 170-05 AB
W3BN 4862 143-07 AB
WA3HFL 4602 177-03 AB
K3ZPO 4590 135-07 AB
W3NSJ 4560 152-05 ABCD
K3BOY 4536 162-04 AB
W3KXH 4508 161-05 A
K3ACR 4340 155-04 A
WA3MBN 4340 155-04 AB
K3AQH 4060 145-04 AB
WA3MT 4032 144-04 AB
K3FTB 3796 146-03 AB
W3QXY 3744 144-03 AB
WA3BHE 3654 87-11 AB
K3KMN/3 3232 101-06 AB
WA3EOP 3000 100-05 AB
W3CXO 2961 71-11 AB
W3GS 2880 96-05 A

W3PST/3 2808 108-03 AB
WA3NVO 2808 117-02 AB
K3DLS 2782 107-03 BC
W3YXJ/3 2782 107-03 AB
WA3JGC 2782 107-03 AB
W3ZRR 2568 107-02 AB
K3ATL 2448 72-07 A
W3HYO 2240 80-04 B
WA3JNK 2232 93-02 A
WA3HSR 2184 91-02 AB
K3ZKC 2080 80-03 ABCD
W3BRU 2080 80-03 A
K3JDD/3 1988 71-04 A
WA3KFT 1960 70-04 AB
WA3VQ 1920 60-06 AB
W3WJ 1680 70-02 A
K3JYA 1638 63-03 A
WA3BHE 1560 52-05 AB
W3AWA (W3JO), op.r.
1482 87-03 A
1482 87-03 A
1456 52-04 AB
K3WJ 1344 56-02 ABC
K3WJK 1344 56-02 ABC
W3FGQ 1344 56-02 A
K3JLL 1300 50-03 A
W3JGQP 1272 53-02 A
L272 53-02 AE
WA3BRV 1008 42-02 A
WA3BNV 1008 36-04 B
K3SZG 962 37-03 AB
WA3LE 960 40-02 A
W3JWC 858 33-03 AB
WA3KTV 840 35-02 A
K3MSV 792 33-02 A
W3JUC 704 32-01 AB
K3AA 696 29-02 AB
W3RH 598 23-03 A
K3GT 576 24-02 A
W3CXO 576 24-02 B
WA3EKM 546 20-04 A
WA3GFZ 480 20-02 A
W3OXB 442 17-03 A
K3ROL 418 19-01 AB
W3WX 374 17-01 A
K3HJ 352 16-01 A
K3YJ 319 15-01 AB
K3FH 308 14-01 AB
K3JZ/3 308 14-01 L
W3RA 308 14-01 AB
K3MGO 286 13-01 AB
WA3JZB 264 11-02 A
K3WFT 192 8-02 A
K3JBE 176 8-01 A
WA3JPN/3 154 7-01 AB
WA3GTR 154 7-01 A
WA3KRB/3 132 6-01 A
WA3BTE 110 5-01 A
WA3JCK 66 3-01 A
WA3KPF 44 2-01 A
WA3DNC (K3ZSG, WA3JVK)
WA3DNC (K3ZSG, WA3JVK)
20,020 385-16 ABC
K3MTK/3 (multi-op.)
19,116 354-17 AB
K3FYX/3 (+WA3NCW)
6,790 255-19 AB
WA3NCW/3 (K3FYX)
14,790 255-19 AB

WA3AAN (+K3PG) 14,148 262-17 A
K3ZQN (4 ops.) 8442 201-11 AB
WA3FAA (+K3UO) 4770 159-05 AB
W3DUD/3 (multi-op.) 4194 118-08 AB
Maryland, D.C.
WA3APO 6660 152-12 AB
W3LUL 4944 103-14 B
W3KMY 4186 92-13 A
W3OO 3948 96-11 AB
W3HR 2814 68-11 AB
K3PRP 1820 65-04 AB
W3OTC 1792 56-06 B
WA3LIU 1778 64-04 B
W3KUH 1534 59-03 B
W3PH 1508 58-03 AB
W3PZK 1430 55-03 AB
K3VH 1170 45-03 B
W3MHB 1144 44-03 B
K3NBI 1066 41-04 B
WA3HGC 1056 44-02 B
W3OBC 884 34-03 AB
K3GMB 840 35-02 AB
W3VC 840 35-02 B
W3MSN 832 26-06 AB
W3LN 756 21-08 B
K3LZX 672 28-02 A
W3NPI 672 28-02 B
W3FA 504 21-02 B
W3YAG 356 14-02 B
WA3JLO 221 9-03 A
WA3JGI (multi-op.) 10,560 176-20 AB
WA3NUL (4 ops.) 6704 141-12 ABD
W3PGA (6 ops.) 5880 140-11 ABD
K3MVO (4 ops.) 3196 94-07 AB
Southern New Jersey
W2BV 22,320 600-21 AB
W2FE 21,580 415-16 ABCD
W2BMTU 19,600 350-18 AB
WA2EMB 18,225 366-15 ABCD
W2AXU 15,196 262-19 ABCD
W2ZAK 12,958 341-09 ABC
W2LYS 9262 211-12 AB
W2BLV 8640 160-17 B
W2BNE 6322 219-09 ABC
W2TQ 6160 240-07 AB
W2ZU 4944 217-06 AB
W2JAV 6536 172-09 ABC
W2OAD 6204 141-12 AB
WA2FVU 6118 161-09 AB
WA2HYA 3460 195-04 AB
WA2AXF 5083 150-07 B
W2KF 4998 119-11 B
WB2YFH 4248 118-08 ABC
WB2YK 4160 160-03 AB
W2ORA 4158 150-04 AB
W2PH (K3HN), op.r.
4080 102-10 AB
4020 134-05 A
W2ONS 3909 130-05 AB
WA2RTY 3888 108-08 A
K3MZP 3723 133-04 AB
WA2RW 3706 109-07 K
K2DFE 3400 109-07 AB
W2CJF 3296 103-06 AB
W3NPFY 3107 120-03 AB
W2V 2970 99-05 B
WA2MGV 2776 106-03 AB
WB2UVB 2688 112-02 AB
W2VLD 2688 99-04 AB
K2QPN (K3SQS, op.r.) 2594 99-03 AB
2528 79-06 BDL
2408 86-04 AB
W2YHD 2392 84-04 AB
W2UCV 2240 70-06 A
K2LGH 2128 56-09 A
WA2ONB 2052 57-08 A
W2SD 2028 78-03 B
WB2SPT 1944 81-02 A
WB2YLG 1764 63-04 B
W2ZVR 1698 59-04 B
WB2ICB 1392 58-02 A
WB2ZMX 1376 51-03 AB
WA2RKA 1200 50-02 A
WB2LX 1144 44-03 A
WA3VEY 1131 44-03 A
W2EWN 1118 43-03 AB
WB2UW 1066 41-03 B
W2KAV 1032 43-02 B
W2KCF 936 39-02 A
W2BAY 720 30-02 AB
W2JUG (WA2HJ), op.c.
720 30-02 AB
624 26-02 A
616 22-04 A
582 23-02 B
480 20-02 AB
368 18-03 A
360 15-02 ABF
360 15-02 A
240 10-02 B
120 5-02 A



Here's the K3IVO gang attempting to install their 2 meter beam at 95 feet in sub-zero weather. Some people will go to almost any lengths to operate in the VHF Sweepstakes!

W2PAU (+W2ESX)	21,492	402-17ABC	WB2WYO	2904	131-02 A	WB2DPT	1430	65-01 B	WB2IUM	506	23-01 A
W2REB (+K2PWV)	13,616	296-13AB	K2YMM	2794	127-01 AB	WB2MBP	1416	59-02 AB	K2BBJ	484	22-01 AB
W2EPA (+WA2IUF)	7638	203-09 AB	WB2YHD	2750	125-01 AB	K2AIG	1386	63-01 AB	K2BRE	484	44-01 A
K2BWR (+K2ZRJ)	5239	85-21 AB	W2DUC	2706	123-01 AB	K2QPC	1386	63-01 A	K2MPL	418	19-01 AB
WA2DRI (4 oprs.)	4536	126-08 B	WB2HLI	2662	121-01 AB	W2WGL	1386	33-11 B	WB2EDT	418	19-01 B
WB2PZF (+WB2IJJ)	3640	130-04 A	W2OWF	2600	100-03 AB	WB2LJG	1344	56-02 A	W2ZHB	408	17-07 B
			WR2KCI	2568	107-02 A	WB2FAN	1320	60-01 A	K2OCN	330	15-01 A
			W2ECH	2520	105-02 AB	W2SRP	1296	54-02 B	WB2EPT	330	15-01 B
			WA2HWC	2508	114-01 AB	K2RQU	1276	58-01 A	E2ACQ	300	10-05 D
			WA2VVK	2472	103-02 AB	K2DHA	1254	57-01 B	WA2QGE	242	11-01 A
			WB2LAD	2472	103-02 A	WB2ZJY	1254	57-01 A	K2UCI	220	10-01 A
			WA2EIX	2392	92-03 AB	K2DZV	1232	56-01 B	WA2VMB (W2QJS, opr.)	198	9-01 A
			WA2BKV	2376	108-01 A	WR2MAC	1232	56-01 A	WN2LRB	198	9-01 B
			WA2CJL	2332	93-02 A	WB2SNA	1188	54-01 A	W2EJ	110	5-01 B
			WA2YRH	2232	93-03 ABD	WB2JGV	1166	53-01 AB	WA2QBD	88	4-01 A
			W2SFA	2000	100-01 AB	W2FDI	1122	51-01 A	WB2TIY/2	88	4-01 B
			WB2MCP	2156	98-01 AB	W2UAD	1122	51-01 B	W2OW (10 oprs.)	11,004	198-18 AB
			WB2QXB	2156	98-01 AB	WB2IKR	1122	51-01 A			
			K2SQI	2068	94-01 AB	W2ICE	1100	50-01 AB			

Western New York

K2YCO	11,000	220-15 ABCD	W2SFA	2000	100-01 AB	W2FDI	1122	51-01 A	WA2QBD	88	4-01 A
W2UTH	10,080	180-18 AB	WB2MCP	2156	98-01 AB	W2UAD	1122	51-01 B	WB2TIY/2	88	4-01 B
K2YRZ	8004	174-13 AB	WB2QXB	2156	98-01 AB	WB2IKR	1122	51-01 A	W2OW (10 oprs.)	11,004	198-18 AB
K2CEH	6440	140-13 ABD	K2SQI	2068	94-01 AB	W2ICE	1100	50-01 AB			

AFFILIATED CLUB SCORES

<i>Club</i>	<i>Score</i>	<i>Entries</i>	<i>Winner</i>
Mt. Airy V.H.F. Radio Club (Pa.)	500,110	65	K3IPM
Rochester V.H.F. Group (N.Y.)	255,552	121	K2YCO
South Jersey Radio Association	252,800	53	W2BV
Mobile Sixers Radio Club (Pa.)	120,993	31	W3IZU
Hampden County RC Assn. (Mass.)	105,736	61	K1ANF
Talcott Mountain U.H.F. Society (Conn.)	80,865	27	K1YON
Albany Amateur Radio Association (N.Y.)	70,968	57	WA2BAH
Suburban Amateur Radio Club (Pa.)	46,998	6	WA3EYJ
Southern California V.H.F. Radio Club	35,014	13	K6YNB/6
Six Meter Club of Chicago	28,580	16	WA9FIH
1200 Radio Club (Mass.)	26,065	16	K1MUC
York Radio Club (Ill.)	23,770	14	WA9RIJ
Rock Creek ARA (Md.)	23,758	14	W3LUL
Dayton ARA (Ohio)	20,802	10	WB8KF
Reading Radio Club (Pa.)	18,957	19	W3BN
Greater Pittsburgh V.H.F. Society	15,966	16	W3BWU
Queen City Emergency Net (Ohio)	13,046	11	WA8STX
Lake Success Radio Club (N.Y.)	11,796	8	W2TUK
Rancocas Valley ARA (N.J.)	11,066	5	WB2LWZ
Dutchess County V.H.F. Society (N.Y.)	9910	7	K2DNR
Mid-Hudson V.H.F. Society (N.Y.)	7156	3	K2BGU
West Park Radios (Ohio)	5322	6	K8YYK
West Jersey Radio Amateurs	4386	4	K2QPN
			(K2SQS, opr.)
Tu Boro Radio Club (N.Y.)	3865	3	WA2PMW
Hamfesters Radio Club (Ill.)	3464	3	WA9FXH
St. Louis Amateur Radio Club	2474	3	WA0TXV
Santa Cruz County Amateur Radio Club (Ca.)	1676	3	WB6JON

WA2GCF	5632	176-06 AB	WB2NJE	2016	84-02 AB	WB2HDN	1738	79-01 A	WB2INN	517	24-01 A
WA2ZNC	5066	149-07 AB	K2GMZ	1694	77-01 AB	WB2FDZ	1100	50-01 A	K2ERQ (II oprs.)	7300	146-15 AB
WA2YTK	4800	150-06 AB	WA2ABQ	1680	70-02 B	WB2ILU	1100	53-01 A	W2BPF (+WA2s AFG GCX)	5440	160-07 AB
WB2VUO	4662	111-11 AB	WB2YTH	1672	76-01 AB	WB2YWI	1056	48-01 AB	WA2MRW (10 oprs.)	2794	127-01 B
WB2JFL	4564	163-04 AB	WA2EJA	1650	75-01 A	WA2AQW	1034	47-01 A	WB2VPY (13 oprs.)	936	39-02 A
K2JA	4284	153-04 AB	WB2DCC	1632	68-02 A	WB2AMC	1012	46-01 AB			
WA2YPT	4284	153-04 AB	WA2IYZ	1606	73-01 A	WB2L TN	968	44-01 AB			
WA2KND	4264	164-03 ABD	K2QWC	1584	73-01 A	WB2NSD	968	44-01 AB			
WB2NFF	4256	112-09 A	DL7KX/W2	1536	64-02 B	WA2TDF	902	41-01 AB			
K2RHS	4134	159-03 AB	WA2EJS	1518	69-01 A	WA2YFZ	858	39-01 A	K2JNY	9248	136-24 AD
WA2YEK	4004	143-04 AB	W2U7L	1464	61-02 B	WB2RZI	832	32-03 AB	W3BWU	3644	87-11 AB
W3QY	3952	152-03 AB	WB2CMK	1464	61-02 AB	W2DYV	792	35-03 B	WA3SHR	3612	86-11 A
W2VVG	3900	150-03 AB	W2ECM	1452	66-01 AB	WB2HOI	792	36-01 A	K3AKR	2645	58-13 AB
W2ALL	3856	127-04 AB	WA2FKW	1452	66-01 AB	K2YAH	748	34-01 A	WA3ANO	1890	63-05 A
WA2THS	3388	121-04 AB	WA2EJY	1391	91-01 AB	WA2MON	728	26-04 AB	W3DJM	1456	92-04 A
W2MPM/2	3330	111-05 AB	WB2LZM	1391	89-01 AB	WB2RVV	726	33-01 A	K3CFY	1360	40-07 B
WB2GJL	3304	118-04 B	WA2BEH	1376	87-01 AB	WA21VN/2	692	31-01 AB	WA3BNO	1388	49-04 AB
K3WV	3276	126-03 AB	WA2EKR	1314	87-01 AB	W2EMX	660	30-01 B	WA3MOX	1188	33-08 A
WA2FVG	3144	131-02 AB	WA2ALW	1782	81-01 AB	W2FHS	660	30-01 B	WA3IRE	1092	42-03 AB
WB2ZFS	2992	136-01 AB	WB2KWB	1782	81-01 AB	WB2EID	616	28-01 A	WA3JLY	910	35-03 AB
K2RZI	2948	134-01 ABD	WB2MAZ	1782	81-01 A	K2ZRK	576	24-02 AB	WA3KYC	858	13-03 B
WB2KUY	2928	122-02 AB	WB2KYQ	1760	55-06 B	WB2WBZ	572	26-01 B	WA3GSH	806	31-03 A

W3IOH 720 30-02 A
 K3FIW 702 27-03 A
 K3MRH 650 25-03 A
 K3NOA 594 27-01 B
 WA3LOM 504 18-04 A
 K3QBI 418 19-01 A
 W3EWW 220 10-01 A
 W3KVS 192 8-02 A
 W3KWH (5 oprs.) 7398 137-17ABD

GREAT LAKES DIVISION

Kentucky
 K4WYN 870 29-05 A
 K4DEZ 336 14-02 AB
 W4PII 144 6-02 A

Michigan
 W88RGY 4522 119-09 AB
 W85YVW 2296 82-04 B
 W88VNI 1410 47-05 AB
 W8CVQ 1118 43-03 ABD
 W88AOZ 975 74-03 B
 K8AJC 682 31-01 A
 W88EOW 360 12-05 A
 K8WEX 88 4-01 AB
 W88SH (5 oprs.) 4320 108-10 AB

CENTRAL DIVISION

Illinois
 K9HMB 16,450 235-25ABD
 G3PAC/W9 8320 260-06 AB
 WA9FIH 6300 210-05 AB
 WA9ENM 5780 170-07 AB
 WA9RIJ 3840 128-05 AB
 WA9QPM 3696 132-04 AB
 K9ZVU 3504 146-02 ABC
 K9ZVW 3504 146-02 ABC
 W9BGX (WA9ULU, opr.) 3416 122-04 AB

Ohio
 W8KKF 5746 189-07 AB
 W88JX 4608 144-06 AB
 W88LOW 3120 78-10 AB
 W8HOK 2520 90-04 AB
 K8YYK 2444 94-03 AB
 W88BOB 2380 85-04 AB
 K8BPB 2340 78-05 A
 K8VAK 2132 82-03 AB
 K8MMH 1210 55-01 A
 W88AUO 1176 49-02 A
 W8JRN 1100 50-01 AB
 W88ZUQ 1056 44-02 A
 W88ZHE 1008 42-02 A
 W88FOZ 990 45-01 A
 W85YHN 952 34-04 AB
 W88MVV 924 33-04 B
 W88TYF 650 25-03 AB
 W88AFF 552 24-02 B
 W88COA 504 21-02 A
 W88VU 484 22-01 AB
 W88BNW 480 20-02 AB
 W88VRK 480 16-05 A
 W88CHT 456 19-02 A
 W88BOV 396 18-01 B
 W81DY 374 17-01 B
 W88BZN 286 13-01 AB
 W88DPW 242 11-01 B
 W88TQS 242 11-01 AB
 K88ZR 132 6-01 A
 K88OGH 110 5-01 A
 W81DM 66 3-01 A

K9ENZ 2800 100-04 AB
 WA9FXH 2632 94-04 B
 W901J 2522 97-03 AB
 WA9NRI 2380 85-04 B
 WA97NI 2160 72-05 B
 WA9UCX 1968 82-02 AB
 W9ABA 1856 58-06 B
 WA9ZGF 1800 75-02 AB
 WA9RSH 1656 69-02 B
 WA9TZH 1512 63-02 B
 K9DTB 1344 42-06 AB
 WA9YZO 1224 51-02 B
 WA9GUE 1222 47-02 AB
 W9ZYI 1200 50-02 B
 K9YIQ 1188 54-01 AB
 WA9SDT 1176 49-02 AB
 WA9NKM 1056 48-01 AB
 W9PMJ 990 45-01 AB
 K9ONA 968 44-01 AB
 W9ZSQ 946 43-01 AB
 W9GYN 888 37-02 B
 WA9BMC 880 40-01 A
 WA9NTA 840 35-02 A
 WA9RFR 748 34-01 AB
 WA9WJB 748 34-01 A
 W9EFT 744 31-02 B
 WA9TRZ 704 32-01 AB
 W9KBU 576 24-02 B
 WA9ZYG 552 23-02 B
 WA9OWE 550 25-01 AB
 W9B9GY 550 25-01 AB
 E9DKI 462 21-01 A
 WA9RWU 440 20-01 AB
 WA9MSZ 392 14-04 A
 W9WIC 352 16-01 A
 W99CLO 312 13-02 B
 WA9NFW 308 14-01 B
 WA9YFB 176 8-01 A
 K9S2T 154 7-01 AB
 WA9FIH/9 110 7-01 AB

W88CCI (6 oprs.) 38,250 425-35 AB
 W88RXM/8 (5 oprs.) 6688 176-09 AB
 W88VND (W88CKB DFD JXM) 2816 88-06 AB

HUDSON DIVISION

Eastern New York
 W82SHH 18,618 321-19 AB
 WA2BAH 7326 167-12 AB
 W2CRS 6380 110-19 ABC
 K2BGH 6350 127-15 AB
 K2DNR 5400 100-17 B
 WA2DTE 5060 110-13 AB
 W82AAX 3648 76-14 AB
 W82VLM 3629 96-09 AB
 3488 109-06 B
 WA2VUO 3040 80-09 AB
 W82GXF 2646 63-11 AB
 WA2MCP 2204 58-09 AB
 WA2WSY 2070 69-05 AB
 W82MHH 1904 68-04 AB
 W82SWA 1736 62-04 AB
 K2GSF 1600 50-06 B
 W82JBT 1548 65-02 AB
 K4GXV/2 1500 50-05 A
 WA2JOYV 1368 57-02 AB
 W82LZU 1272 63-02 AB
 WA2EAH/2 1110 37-05 AB
 WA2MGO 1104 46-02 AB
 WA2GGD 1092 42-03 AB
 W82TBN 1034 47-01 AB
 1032 43-02 AB
 WA2JWO/2 980 35-04 AB
 WA2BQP 968 44-01 AB
 WA2LZU 960 40-02 AB
 W2CDQ 960 40-02 AB
 WA2GXM 960 40-02 AB
 W2DSK 884 34-03 A
 WA2BFJ 728 28-03 A
 W2FFN 720 30-02 B
 K2ACB 696 29-02 AB
 WA2LNX/2 672 24-04 AB
 W2HZZ 640 20-06 B
 W82BPS 624 26-02 B

K9YHB (K9AYR, WA9E EJD TMC) 4755 237-06 AB
 W9BGX (W9ICE, WA9S LKZ ULU) 4755 158-05 AB

Indiana

WA9MEF 4256 112-09 AB
 W9GMJ 1800 60-05 B
 K9LSB 1428 42-07 A
 WA9YXA 798 29-04 A
 W9BZ/N (6 oprs.) 2006 59-07 A

DAKOTA DIVISION

Minnesota

K9GYO 672 28-02 A
 WA9SBZ 672 28-02 A
 WA9DMS 264 12-01 AB
 W9LUY 88 4-01 A

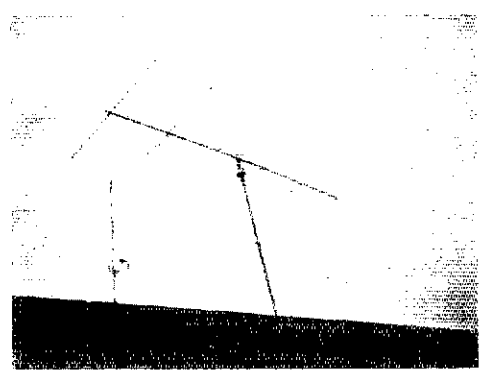
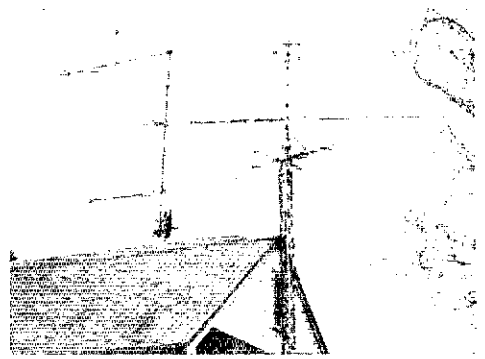
DELTA DIVISION

Mississippi

WA8RMS 2928 61-14 AB

Tennessee

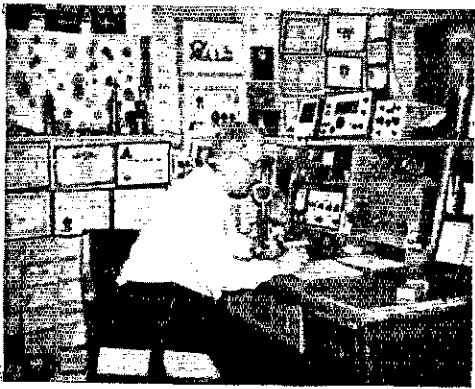
K4IUV 5616 104-17 AB
 WB4CXC (4 oprs.) 3582 100-08 AB



From top to bottom, the antennas above belong to WA3DNC, K6GSS and WA8ZHE.

W82HXZ 616 22-04 B
 W82ZCM 600 25-02 B
 W82HWU 550 25-01 B
 W82JLR/2 550 35-01 B
 W82HJH/2 540 18-05 AB
 W82JWR 528 34-01 B
 W82ICZ 520 30-03 AB
 K2ECJ 506 23-01 B
 W82VIB 506 23-01 B
 W2IP 480 15-06 AB
 W82BDG/2 468 18-03 AB
 K2BIF 456 19-02 B
 WA2BER 440 20-01 B
 WA2VQZ 385 18-01 A
 K2CT/2 (WA2VQZ, opr.) 374 17-01 A
 K2ARO 330 15-01 B
 K2UKE 308 11-04 B
 W2IWI 286 13-01 B

WA2ETB 286 13-01 AB
 W82VEQ 286 11-03 B
 K2KXS/2 264 11-02 AB
 W2KVN/2 240 10-02 AB
 W82SWB 320 10-01 A
 W2AWF 192 8-02 B
 WA2HAQ 168 6-04 B
 W82OGN 154 7-01 A
 WA2UWL/2 (WA2BRA, opr.) 144 6-02 AB
 W2KBH 132 6-01 B
 W2KVN 110 5-01 B
 W82PNB 110 5-01 A
 WA2LNX 88 4-01 A
 W82PNB/2 66 3-01 AB
 WA2JIK 44 2-01 A
 WA2KCB 44 2-01 A
 W82RYZ/2 44 2-01 A



Helping to keep NNJ on the map, we have WA2BNF who managed 87 contacts in 7 sections.

K6IBY 2058 49-11ABC	<i>Southern Texas</i>	
WA6FIT 2016 84-02 B	WSRAG 2090 48-12 A	
WB6VZY 1638 63-03ABCD	WASHNK 1760 44-10 A	
WA6MKN 234 9-03 B	CANADIAN DIVISION	
<i>San Diego</i>		
W6NLO 4212 117-08 AB	<i>Quebec</i>	
WA6HOT 770 28-04 AB	VE2AIO 1650 33-15 A	
<i>Santa Barbara</i>		
WB6WKC 360 15-02 A	VE3ASO 5720 130-12ABD	
WEST GULF DIVISION		
<i>Northern Texas</i>		
WA5LJM 1166 53-01 A	VE3CWT 1980 55-08BCD	
WA5ZUC 792 36-01 A	VE3DNR 962 37-03 B	
WA5CKF (6 ops.)	VE3CRU/3 812 29-04ABD	
3520 90-04 AB	VE3CMM 744 31-02 B	
	VE3AQF 132 6-02 B	
	<i>British Columbia</i>	
	VE7AZG 744 31-02 B	
<i>Oklahoma</i>		
WA5OUU 1036 37-04 AB	<i>Check Logs. WA3CZX, K4GL, W4ISS, WB4OOL, WA6BQQ.</i>	
K5WVX (+WSWAX) 3080 55-18 A		

W1LS 96 4-02 A	WB4LDO 616 22-04 AB
W1OPH/1 32 1-01 B	W4ZZZ/4 (+Rss MU MOU)
K1PYX (+WA1KFN)	2448 72-07 AB
4512 94-14 A	
K1QMV (+W1DGG)	
1200 50-02 B	
WA1IAM (+WA1IAN)	
1110 37-05 A	
NORTHWESTERN DIVISION	
<i>Idaho</i>	
V7LWE/7 72 3-02 A	
<i>Oregon</i>	
K7WXV 2016 77-04 AB	
K7ZCB 1104 46-02 AB	
<i>Washington</i>	
WA7JBG 1254 57-01 A	
K7GWE 1152 48-02 A	
WA7FHG 1656 44-02 A	
WA7NGR 902 41-01 AB	
K7IDX 462 21-01 B	
W7AKS 308 14-01 AB	
WA7LDN 308 14-01 A	
WA7JEG 364 12-01 AB	
WN7I ZE 44 2-01 B	
K7BRO (+WA7MJK) 2990 115-03 AB	
W7SBC (8 ops.) 558 39-01 AB	
PACIFIC DIVISION	
<i>East Bay</i>	
W6YKM 1836 54-07 AB	
WA6UKO 900 30-05 A	
WN6LUS 416 16-03 B	
WN6LUV 208 8-03 B	
WN6CCM 182 7-03 R	
WA6JUD/6 (+WA6 JLF JLD) 6570 219-05 AB	
<i>Sacramento Valley</i>	
W6DOR 1092 39-04 AB	
WA6CXB 768 32-02 AB	
WB6MZX 504 18-04 B	
W6SI 288 12-02 B	
WB6ATZ 234 9-03 A	
<i>San Francisco</i>	
K6TPT 1428 51-04 B	
<i>San Joaquin Valley</i>	
WA6CPP 1170 39-05 AB	
<i>Santa Clara Valley</i>	
W6VMY 3060 102-05 B	
K6GSS 2976 93-06 AB	
K6DTR 2070 69-05 AB	
WB6JON 930 31-05 AB	
W6EQG/6 810 27-05 A	
K6BDK 570 19-05 A	
W6KHS 176 9-01 A	
W6PIY/6 (8 ops.) 3600 120-05 AB	
ROANOKE DIVISION	
<i>North Carolina</i>	
WB4CES 756 32-02 AB	
W4EPV 624 26-02 A	
<i>Orange</i>	
K6YNB/6 12,300 308-10 AB	
WA6JKA 3150 88-08 A	

Strays

FREQUENCY MEASURING TEST FEBRUARY RESULTS

The February 14, 1970 FMT, open to all amateurs, brought entries from 140 participants who made a total of 777 measurements. Of these 68 ARRL Official Observers submitted 349, and 72 Non-00s made 428 readings. All Observers have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement.

Following is a report of the standing of the FMT leaders in this test. In consideration of the minimum possible error, due to 'doppler' and unavoidable factors, we accredit as of equal merit all those reports shown below computing 4/10th parts per million or higher accuracy. Our direct comparisons with the umpire's readings otherwise establish this order of listing. August QST will announce details on the next ARRL FMT.

OBSERVERS

- W1BGW W2AIQ WA2KSB W3BFF W3NNC
W3PYW W4CMP W4JUI W4NTO W4TOY
W5FMO W6CBX W6RQ W7UXZ W8GRG.

NON-OBSERVERS

- W1EO W1PLJ W2BQK K3LPP W4EPU
W4EV W4FMW WB4MFA W5UJF WB6AAL
K6MZN W7EJD W8NWU W9CAA K9KRW
W9MNY W0CFY W0WNY/9 VE8OK R. Ireland.

The Post Office Department promises faster mail service with Zip codes. Use yours when you write ARRL. Use ours, too. It's 06111.

AMATEUR RADIO PUBLIC SERVICE
NTS RACES AREC
In the Public Interest, Convenience, Necessity HAM

CONDUCTED BY GEORGE HART,* WINJM

WCARS AND WPSS

PREVIOUSLY, in this column, we have talked about the Midwestern Amateur Radio Service (MidCARS) and the Eastern Amateur Radio Service (EastCARS) and have alluded to WCARS a number of times but never gave any details. All of these groups are still going strong and deserve a lot of credit for enhancing amateur radio public service consciousness among amateurs who might not be exposed otherwise.

WCARS, according to information received from Vice President (of WCARS) WB6IZF, is a group of over 700 amateurs throughout the west devoted to monitoring 7255 kHz for the purpose of providing service to the public and to other amateurs. This frequency is basically a monitored calling and emergency frequency that, among other things, provides a traffic listing service with comprehensive coverage. Using it, traffic can frequently be dispatched directly to its destination city.

WCARS is open to everyone, but certain procedures are observed. The words BREAK-BREAK-BREAK are reserved for emergency traffic only, which is handled immediately, generally on frequency. Two breaks are for priority or urgent traffic, and just stating your call is sufficient for a routine break. Priority and routine traffic is generally handled off frequency.

WCARS operates as long as the band is open during daylight hours and in the evening depending on band conditions and availability of relays. Its counterpart in the midwest (MidCARS) operates on 7258 kHz and EastCARS operates also on 7255 kHz. Much the same procedure is observed on all three.

* Communications Manager, ARRL.



There seems to be some tendency to expand the same type of service to other bands. At the present, the only other one we know of is the Western Public Service System (WPSS) which operates on 3952 kHz. Since 80 isn't much during the daytime, this system picks up at about 6 P.M. PST, has a roll call at 6:30, then monitoring goes on until late in the evening. W7UU, a member of both WCARS and WPSS, was kind enough to send a copy of their newsletter, which reveals that W6BSW is president, K6KIH is vice president, there is a different net control every night of the week and the roster is well over 100, most of whom have phone patches.

As we have said before, these monitoring services perform a very useful and worthwhile function. Let's support 'em.

What's Happening?

The lead to this column is supposed to comment about what's happening in amateur radio public service — other than the daily routines, of course. If the lead cannot be tied to some specific event, we look around for a suitable topic to discuss. Perhaps you are getting tired of this "editorial philosophy." If so, we'd like to know about it — and be given something more suitable to take its place. Hw? — WINJM

Net Registration

Each year, during the summer months, a completely new edition of the Net Directory is prepared by the Communications Department and 1970 will be no exception. There are three very simple requirements for registration! (1) frequencies must be inside the amateur bands; (2) the primary function of each net registered must be a public service activity; and (3) for continuous inclusion in the directory, each net must be registered at least once annually. If you are unsure whether your net will need reregistration you can check by looking at the 1969 edition of the directory. If the date contained in column nine of the master listing is Jul9 or Aug9 there is no need to reregister your net unless there has been some change in the basic information contained in the directory. If the date is earlier than Jul9 (signifying July, 1969, the month and year the net was last registered), it must be reregistered in order to be included in the new edition of the directory.

W5AQK, right, was recently presented with a certificate for 14 years of outstanding service as Emergency Coordinator for Nueces County, Texas. Admiring the certificate with W5AQK are his XYL, W5BKG, and W5BEY, President of the Corpus Christi Amateur Radio Club.

A few registrations were received after the August, 1969, printing date for the 1969/70 directory. If your net is one of these and there has been no change in information, please do not re-register the net at this time.

Card form CD-85 (see illustration elsewhere in the column) has been designed to supply all the necessary information for registration and we would prefer that you use it to register your net. However, we will accept registrations in just about any form as long as the necessary information is given. The net registration cards are available from headquarters, or use a facsimile. But remember, the nominal cut-off date for registrations is July 15, 1970. Registrations arriving after that date may not be in time to make the 1970/71 edition and will have to be held for the next one. Also remember that only activities in registered nets qualify individual stations for PSHR points.

Here, then, are the directions for filling out net registration cards. Please follow them explicitly to avoid errors.

1.) *Name of Net.* Type or print as legibly as possible the name of the network precisely as it should appear in the directory. Please list the full name, but common abbreviations such as AREC, RACES, CD, etc. are acceptable.

2.) *Net Designation.* Many nets, especially those operating cw, have combinations of letters and numbers used for call-up purposes. Examples are WIN for Wisconsin Intrastate Net and M6MTN for Michigan Six Meter Traffic Net. If your net has a commonly understood designation, please list it. If not, leave the space blank.

3.) *Frequency.* List the net frequency in kilohertz. If the net uses more than one frequency be sure to correlate days and times. If a second frequency is used as an alternate, please indicate as such.

4.) *Net Manager.* List the call of the person in charge of keeping net records, etc., or list someone who can supply additional information about the net.

5.) *Days.* Indicate the days the net meets. Please be sure to list the days according to GMT. If your net meets Monday evenings local time, there

W4YDN is copying instructions from net control on how to determine the exact second totality of the solar eclipse will occur. See story in Public Service Diary.

NET REGISTRATION

Name of Net.....

 Net Designation (if any).....Freq.....Mgr.....
 (Call)
 Days.....Starts.....Ends.....GMT
 Direct coverage.....
 Purpose of Net.....NIS?.....
 Liaisons.....
 Previously registered?.....Submitted by.....
 (Your call)
 CD-85 (R664)

Net Registration Form CD-85. See instructions for use elsewhere in the column.

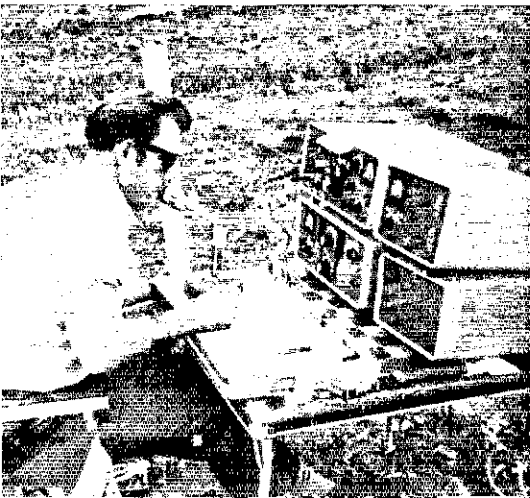
is the possibility that when converting to GMT the day changes to Tuesday.

6.) *Net starting and ending times.* The starting time will be exact. For the ending time, use the length of an average session. Again, use GMT and the 24 hour clock for listing these times. If, during daylight saving time, the net meets an hour earlier in GMT, indicate by an asterisk (*). If you are uncertain as to how to convert local time to GMT, Operating Aid 14, available from headquarters, contains a time conversion chart useful for this purpose.

7.) *Direct Coverage.* List here the area covered by regular participants in your net. If the net is part of a system, list the assigned coverage area. NTS nets have definite coverage borders: contradiction of these established boundaries will place the net's status in NTS in jeopardy. Do not list coverage obtained through liaison to other nets.

8.) *Purpose of Net.* Remember, to qualify for listing in the directory, the primary activity of a net must be public service. In this blank a word or two describing the actual nature of the service

As the eclipse progressed everyone took time out to have a look; left to right are WB4FZT, W4DSX and W4YDN. Although a thin cloud cover obscured part of the eclipse, the operation was considered generally successful.



Public Service Honor Roll March, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 25 points or more total in the nine categories below. Use form CD-190 or submit equivalent information through your S.C.M. See page 75, Nov. '69 QST for details. Please note maximum points for each category.

Table with columns: Call sign, (1), (2), (3), (4), (5), (6), (7), (8), (9), Total. Lists call signs such as W17PB, WA3JSS, W6LRO, etc., with their corresponding point values in each category and a total.

The following stations submitted points totals between 29 and 32. Beginning with July QST only those totals above 30 will be listed: (28) K1L8G; (27) WA2VYT, W8VDA/6; (26) W5MFX, WA6SCE; (25) W6EOT, WA7EQC.

The following stations submitted totals of 25 points or more but omitted the breakdown: W4UGU (55); K4AT, K9MNO (38); and WA0TZI (31).

*Denotes multi-operator station.

Category key: (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing liaison; (6) Legal phone patches; (7) Making BPL; (8) Handling emergency traffic; (9) Serving as net manager.

performed is sufficient (traffic, weather, emergency, etc.).

10.) Liaisons. This applies mainly to NTS nets, which must list the proper liaisons to be registered as part of the system. Other nets may list any nets with which regular liaison is carried out. Do not list liaisons with non-amateur services such as CB.

11.) Previously registered? Give the year in which your net last appeared in the directory. If it is a new net, enter "no." If registered previously, but under a different name, list the old name.

12.) Submitted by. Enter your call letters. If you have more than one call, list the one by which you are best known. Unauthenticated and unsigned registrations will be ignored.

That should take care of registration for another year. However, if at any time after registration there are changes in the basic registration data, we'd like to have fresh information for our master file. Requests for information on specific nets are sometimes received. The newer the information on hand, the greater is the likelihood that it will be of some use. - WA9HHH.

Public Service Diary

On March 17, VE2AUD was involved in an automobile accident in the Lachine, Quebec, area. Using the VE2RM repeater he called for assistance and was answered by VE2AKM. The Mercier

Bridge detachment of the Provincial Police was contacted and the police were soon at the scene.

The following day, VE2ZA was mobilizing when he discovered an accident near the intersection of the TransCanada Highway and St. Johns Road in Point Claire, Quebec. A car and truck were involved and the stalled vehicles were causing a hazard to other traffic. Using the VE2RM repeater, VE2ZA was able to contact VE2DM. The local constabulary was summoned, but were unable to handle the accident, it was again necessary to call the Provincial Police. — *VE2ALE, SEC Quebec.*

While tuning the band on the evening of March 29, ex-WA2KLI heard PY2DBN, aboard the tanker *Orient Star*, in contact with HC2HZ and WB2ZBL. The tanker had developed a mechanical problem and persons aboard the ship desired consultation with company officials. WB2ZBL was unsuccessful in reaching anyone in New York City and finally had to call the company's Texas office before the phone patch could be arranged.

In the meantime, PY2DBN had drifted and became lost in the QRN and QRM. WA5BHT, who had also been monitoring the frequency was successful in re-establishing contact with the stricken ship and soon had the necessary parties back together. Finally the patch was completed and presumably the tanker continued into port. — *WA2KLI.*

While testing a new 2 meter mobile rig on the evening of March 31, WA2BAN discovered a rather large and seemingly uncontrollable fire in Whippany, N.J. WB2WID in Livingston was called on the air and the necessary authorities were notified. — *WA2BAN, EC Livingston, N.J.*

About mid-February, the SEC of Georgia, WA4WQU, was contacted by W4PLE of the North Florida Amateur Radio Society and was asked to assist in setting up a communications network for a scientific group during the eclipse of the sun on March 7.

The net was to extend from Perry, Fla., in the northwest part of the state, to Jesup, Ga., along the path of the total eclipse. It was learned that all of the observation sites would be in isolated areas and that mobile units or portable units with emergency power would be necessary. It was decided the ideal situation was to have both a mobile and a fixed station available at each site in case one or the other failed.

Now the problem was to get enough man-power to do the job. An announcement was made on the Georgia SSB Net, giving all the details of what was needed. The response was fantastic; in two days all the necessary personnel were available, with enough alternates to assign extra operators to most observation sites.

Most of the communications crew were on the air Saturday morning to provide weather data to the staging area of the observation teams in Jacksonville, Fla. Weather was disappointing but at 0700 the caravan of ten buses, a score of private cars and several amateur mobile units departed for Waycross, Ga. By the time Waycross was reached, though, the weather had begun to break. Although the weather wasn't perfect and the scientific group had missed some of the eclipse because of the cloud cover, the operation was considered reasonably successful. About twenty-one Georgia amateurs participated in communications for the sun-watch. — *WA4WQU, SEC Georgia.*

BRASS POUNDERS LEAGUE

Winners of RPL Certificates for March Traffic

Call	Orig.	Re. d.	Rel.	Del.	Total
WSPPP	568	2458	1182	1276	5484
W3CUL4	297	1803	1746	29	3975
K6BPT	2887	581	502	79	3749
W4WAS	1277	1584	104	1450	3235
K9ONK	159	695	677	27	1558
W7BA	38	717	653	58	1436
W9LXQ	40	562	451	27	1080
K0ZSQ	15	480	5	475	965
K9Z8	27	468	440	5	940
W4SGPO	27	437	437	0	875
W4SLFX	63	388	369	12	832
W4SUPL	60	408	328	35	829
W9BIQ	23	400	372	7	802
W6RSY	23	381	284	86	754
W8UPH	29	379	340	37	765
W9JYO	111	254	249	5	719
W8EML	116	380	288	0	684
W3VR4	136	270	241	6	653
W6EOT	132	316	311	1	640
W10JM	138	310	310	0	628
W4SWZF	119	249	284	15	617
W4IEFY	143	281	199	65	588
N8UNA	143	49	15	86	563
W6VNO	129	292	246	0	547
W4JIM	157	249	227	10	533
W1PKX	64	259	169	38	530
K7KRX	15	243	260	1	529
W4MPX	119	248	145	12	511
K8INE	14	267	219	11	511

More-Than-One Operator Station

R2DLE	51	262	246	15	574
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BPL for 100 or more originations-plus-deliveries

W8BDSV 333	W2OE 136	K8KMQ 106
K4RS 231	W4HHP 132	W4IKZL 105
W4AMKH 220	W4HBT 30	K4CXYJ 102
W9AMB 192	W3FN 119	W9QQB 102
W7AT 186	W4MMV 115	W4BWL 101
W4SVR 176	W9UN 111	W4VYY 101
W6MFE 159	W43RI 110	Late Reports:
W4BYZ 155	W4QJ3 108	VE1RO (Sept.) 135
W4YXA 148	W3HK 106	*WA2DQ (Feb.) 106
	K3NSN 106	

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: K9AVQ. *Listed incorrectly in May QST as WA2EIO

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 origination 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.

Amateurs in Perry and Tallahassee, Fla., were also assisting the eclipse observation. In addition to supplying local weather information, which assisted in determining the best observation areas, various data on the eclipse was also passed by amateur radio. Mainly, 75-meters was used from about 1030 GMT until 2000 when the eclipse had passed. Six amateurs from Taylor County were involved. — *WA4GHE, EC Taylor County, Fla.*

On March 7, five amateurs of Monroe and Lenawee Counties in Michigan assisted the Wolverine Chapter, Boy Scouts of America, in holding a road rally. Amateurs were used as check-points along the route to ensure that no trouble developed and also reported arrival and departure times to the judges. — *W4SEFK, AEC Dundee, Mich.*

During the Easter Holidays, members of the Tampa Amateur Radio Club teamed up with Tampa Chapter of the American Red Cross in an effort to send Easter greeting by amateur radio, with the emphasis being placed on military personnel overseas. The MARS station at MacDill Air Force Base was contacted and all groups cooperated to make the operation a success. About twelve amateurs took part in various capacities. The operators were not strangers to handling tremendous loads of traffic; for the most part this was the same gang that operates W4DUG at the Florida State Fair each year, which usually

accounts for something like 3000 message originations. The Easter program wasn't quite that large, but it was a popular operation, and plans are underway to make a year-round service available. -W4BNE, EC Hillsborough County, Fla.

When we start going down hill, we really do a good job of it. Forty-one February SEC reports were received, two fewer than last month's low ebb. AREC participants were up slightly to 14,524. This is two reports down from February, 1969 when 16,059 AREC members were reported. Let's hope we do better during March, or the Wouff-Hong is gonna get a real work-out. Sections reported: Ala, Alta, Ariz, Ark, BC, Colo, Conn, EFla, ENY, EMass, EPa, Ind, Iowa, Kans, Mar, Mich, Nebr, Nev, NMex, NLI, NNJ, NTex, Ohio, Okla, Ont, Org, Ore, Que, SF, Sask, SDak, SNJ, STex, Tenn, Utah, Va, Wash, WFla, WMass, WNY, WPa.

Traffic Talk

Lots of discussion on traffic subjects in the mail, these days. The one for this month has to do with the counting of originations and deliveries.

Not the slightest bit surprised are we to find that those who originate a lot of traffic feel that more credit should be given for originations, while those who deliver a lot feel we don't give enough emphasis (or credit) for deliveries. Certain of the high-volume traffickers feel that the brunt of the traffic handling load is undertaken by the relayers. That's life. What you are doing is what you think is most important -- otherwise you wouldn't be doing it, right? But the world turns on differences of opinion, and we have a turning world in traffic circles.

The lessons of history are always valuable, often ignored. Early QSTs show messages handled but the BPL, when it appeared, showed no breakdown; we assume a message was a message, whether it was originated, relayed or delivered, and that each such function counted as one message handled. Not until the late 20's did the BPL start to show a breakdown into originations, deliveries and relays, with the latter counting two for each relay -- one for receiving, one for sending. At first a straight 100 qualified for BPL, but this was soon raised to 200 or fifty deliveries -- a delivery being any message received for delivery, whether or not any extra effort was subsequently involved. In the early 30's the BPL requirement was raised to 500, or 100 deliveries. Then, in 1936, there suddenly appeared, without any explanation, a new column in the BPL called "extra delivery credits." These were extra credits for delivery where the latter was accomplished by extra effort.

In 1949, the categories were changed. Originations remained the same, but what were formerly classed as "deliveries" became part of a new "received" category, and what were formerly classed as "extra delivery credits" became "deliveries." The "received" category included all messages received by radio, and the "relayed" category were the messages relayed to another station. Each category counted as one point, 500 total or 50 or more "delivered" required for BPL. The following year the BPL requirement was changed to permit adding deliveries to originations for a total of 100 or more for BPL, and that's where the requirement still stands today.

Some traffic men feel we should give an extra credit for originations, since there would be no traffic if stations didn't originate some. Others feel that we should discourage mass originations to

prevent "junk" traffic from cluttering up our nets. And still others feel that relaying is the "bread and butter" of traffic handling and that no special credit should be given for originating and delivering. Some opinion is that giving extra credit for originations and deliveries, especially the latter, would unduly favor those living in or near large cities.

All kinds of opinions are available. All you have to do is ask around. If the sentiment blew strongly in one direction, there would be cause for concern, and possibly some action. As it is, only small handfuls seem to be dissatisfied and the great "silent" majority is happy with the counting system and BPL requirements now being observed. The indication at present is "status quo." Let's hope it stays that way. -WINJMJ.

National Traffic System. Not many comments from the managers this month, so we'll catch up a bit on certificate issuances that, because of space limitations, have not previously been heralded here. K2KIR has issued EAN certificates for 1969 to: W1s BIG FMG NJM WCG YKQ ZPH, K1s ESG PRB T2H, WA1s IH HSN, W2s 1R GKZ MTA PU QC ZRC ZVW K2RYH, WA2s BIN BLV CAL, WB2s OYF RKK SMD, W3s EML LOS NEM, K3s HKK MVO, WA3s IPU IVH, W4s EVN IRE NLC UQ SQQ K3KUP, K5CAG/J, W8s ERD IMI IXJ PMJ SQQ, K8KMO, WA8s POS TTF, W9UCE/J, VF2RRD, VF3s AWF BZB CYR DBG EBH and G1. Fine job, men, and sorry it took so long to get to these. Over on 2RN, W2FR has made issuances to K2IAT, WA2s FBI GOC HSI ICL, WB2s FIF TUI VPR and ZDK, WB4CVY and W8B2Y/4 got 4RN wallpaper from manager W4SHU. W7BO reports celebrating his eighth anniversary at the helm of RN7. W9HRY has sent certificates to K4OCO, WA4VZZ, W9s CZY DND NXG QLW, K9s AVO HYV, WA9s QKP RAK VXM WMT and WA0VKI/9, VF3ERU, filing the report for new ECN manager VE3GI, says that net has switched to 7025 for the early session, probably for the duration of daylight saving time, K7NHU revels in finally having achieved a perfect "sessions held" month on TWN. In the true spirit of an RN manager, though, Bob isn't satisfied; now he's gunning for perfect section representation.

March reports.

Net	Sessions	Traffic	Rate	Avg.	Rep(%)
EAN	31	2013	1,382	64.9	97.8
CAN	31	1240	1,080	40.0	100.0
PAN	31	1471	1,135	47.5	98.9
1RN	61	623	286	10.2	86.9
2RN	62	542	759	8.7	98.7
3RN	62	541	402	8.7	96.8
4RN	51	474	377	9.8	79.8
RN5	62	618	360	10.0	91.8
RN6	62	1143	707	18.4	100.0
RN7	62	373	335	6.0	47.3
R8N	62	712	484	11.5	93.5
9RN	62	682	501	11.0	97.6
TEN	62	521	501	8.4	80.0
ECN	62	175	198	2.8	96.2
TWN	62	326	272	5.3	84.2
Sections ¹	2026	12237		6.0	
TCC Eastern	124 ²	1009			
TCC Central	93 ²	811			
TCC Pacific	124 ²	1323			
Summary	2751	26,834	EAN	15.8	
Record	3129	33,737	1,420	14.2	

¹Section and local nets reporting (64): EPA, FTIN, EPAEPTN (Pa.); QKS (Kans.); AENB, AEND, AENH, AENO, AENF (Ala.); SSZ, OLZ (Okla.); NJEPTN, NJAN, NIN, NISN, PVTEIN (N.J.); GN, VEN, QH, FPTN, TPTN, NHN, PMTN (Fla.); C. O. AREC/RACES, BN, OSN, BCEN, OSSB, OUCN (Ohio); CCN (Colo.); OMN, WSSB (Mich.); NUN, SCN (Cal.); WMN (Mass.); MSPN, Minn. 40 CW, MSN, MJN (Minn.); CNL, CNE (N. & S. Car.); VN, VSBN (Va.); WSN (Wash.); QIN (Ind.); ECATN (Ky.); WSRN, HWN, WSSN, WIN, BEN (Wisc.); NYS (N.Y.); WVN (WVa.); IIN (Ill.); MDCTN (Md.-D.C.); CN, CPN (Conn.); W. Que. VHF; BSN (Ore.); OZK (Ark.); GSN (Ga.); MTN (Man.); BUN (Utah).

²TCC functions, not counted as net sessions.

(Continued on page 87)

Happenings of the Month

FCC'S REPEATER PROPOSALS - QRX

Docket 18803, FCC's proposals for regulation of amateur repeaters (see p. 87, April *QST*), has a comment deadline of May 15, with reply comments due by June 1. The League's Board of Directors met on May 1, after the normal deadline for this issue, but highlights of their decisions including that on Docket 18803 appear on p. 10 of this issue. The text of the ARRL comments to FCC on this matter will be in a later issue of *QST*.

GA. HAM PLATES FOR PICKUPS

With the increasing popularity of truck-mounted "campers," more and more people are using the pickup trucks as private vehicles. In Georgia, only passenger cars could qualify for call letter license plates until this year. Bill Keating, W4KE, reports that Act 1295 of the Georgia Legislature which becomes effective July 1, 1970 will permit the special plates on "private passenger pickup trucks, station wagons and cars."

AMATEUR RADIO WEEKS

Amateur Radio Week in New Mexico was held March 30 through April 5 by proclamation of its Governor, David F. Cargo. Emergency communications and person-to-person goodwill were mentioned as reasons for the observance.

California's week - May 11 through 17 - coincided with the joint ARRL Pacific and Southwestern Divisions Convention at Fresno on the 15th through 17th. Governor Ronald Reagans's letter to the amateurs, forwarded to *QST* by Leon Saroff, WB6YFT, commented on amateur communications in time of floods, fires, hurricanes and tornadoes and phone patches for servicemen as reasons for the commendation of radio amateurs.

Many of the "weeks" will be observed June 21-27 which culminates in ARRL's Annual Field Day. Please be sure hq. is informed of any such observance in your area.

THREE REQUESTS FOR RULEMAKING

In April we reported that FCC had turned down three League requests in Docket 18540 as "not germane" to its central issue, credit for foreign licenses toward the two years needed for Extra, and toward the 25 years needed by Extra Class licensees for a two letter call.

Each of these ideas - 1x3-letter calls for Extras regardless of tenure; reduction of the Extra Class waiting period from two years to one; "grandfathering" of holders of the old Commerce Department/Federal Radio Commission Extra First Class license to the present Extra Class - has now been reintroduced as a separate request for rulemaking. Arguments used are essentially the same as those in the earlier filing (page 91, October 1969 *QST*). A similar petition combining the three proposals has been filed by William K. Smith, WA3JHB.

AMATEUR LICENSES IN CANADA

Amateur licenses in force as of March 31 are shown in the table below. For the second year in a row, the number of amateurs in Canada has declined, presumably as a result of the increase in license fees. Over the two-year period, when there would normally be an increase of about 800 in total strength, there has been instead a decrease of about 600. Thus, it appears a net of some 1400 individuals have allowed their station licenses to lapse because of the fee increases (\$10 now, per year, as opposed to \$2.50 until 1968).

REGION	1966	1967	1968	1969	1970
Pacific	1635	1711	1768	1777	1728
Western	1132	1138	1166	1108	1096
Central	1252	1231	1255	1163	1177
Ontario	4313	4472	4634	4523	4388
Quebec	2055	2169	2233	2157	2138
Atlantic	1306	1399	1446	1333	1379
TOTAL	11693	12120	12502	12061	11906

The Boy Scouts of America have a relatively-new program for high school boys and girls: specialty Explorer Posts. The Radio Amateur Transmitting Society of Nashville, Tennessee, sponsors Explorer Post 15, specializing in ham radio. Here David Rogers tries to copy a transmission while Beth Guinn heckles. Post Advisor is ARRL Delta Division Director Max Arnold, W4WHN. If your club is suffering from "tired blood" or could use an interesting project, you might contact your local Scout office about the possibility of sponsoring an Explorer Post in radio.



ARRL FIGHTS FEE INCREASE

The League has filed comments with FCC in Docket 18802, vigorously protesting the proposed increase in license fees in the amateur service (page 82, April QST). The action was authorized by the League's Executive Committee in a mail vote and reflects members' comments — a ratio of about 25 to 1 against the fee increases! Here's the text:

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of)
Amendment of Subpart G of)
Part 1 of the Commission's) Docket
rules relating to the schedule)
of fees.) 18802

To: The Commission

OPPOSITION AND COUNTERPROPOSAL

The American Radio Relay League, Incorporated, with more than 80,000 licensed United States amateur radio operators as members, not only opposes the proposed increase in fees in the Amateur Radio Service but also requests that the present fee structure and related practices be revised to remove impediments to fulfillment of the national policy of encouraging the continued growth and development of the Amateur Radio Service.

In support whereof, the following is respectfully submitted:

Background

When the Commission first proposed in 1962 to impose fees upon applications in the Amateur Radio Service, the League vigorously opposed the proposal and cited, in support of its opposition, Section 303 (g) of the Communications Act of 1934, as amended, 49 USC Section 303 (g), and Section 97.1 (then Section 12.0) of the Commission's Rules. Section 303 (g) directs the Commission, as the "public convenience, interest or necessity requires," to "study new uses for radio, provide for experimental use of frequencies, and more generally encourage the larger and more effective use of radio in the public interest." Section 97.1 of the Rules provides:

97.1 Basis and purpose.

The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international good will.

The validity of the concerns and arguments of the League and other amateurs who opposed the proposal was recognized by the Commission in its Report and Order, 34 FCC 811 (1963), by which the fees were imposed:

With particular reference to amateur radio, it is argued that the assessment of fees will have the effect of discouraging the experimentation and technical development in radio which the Commission has the responsibility of promoting under Section 303(g) of the Communications Act of 1934, as amended. In view of the comments which were filed, we believe the two areas in which the proposed fees may possibly discourage the larger and more effective use of radio are the field of amateur radio and the experimental use of frequencies. As stated hereafter in this Report and Order, we have determined that it would be in the public interest to revise generally the proposed fees for filing applications in the Amateur Radio Service and to dispense altogether with the proposed fee for filing application for an experimental license. These changes were effected, in part, as a result of further reflection on the Commission's responsibility under Section 303(g). (Emphasis supplied)

The \$5.00 fee originally proposed for all applications in the Amateur Radio Service was eliminated for Novice Class applications, and was reduced to \$2.00 for applications for a modification of license and to \$4.00 for all other applications. However, the fee for a special call sign pursuant to Section 97.51 of the Rules was increased to \$20.00.

The League continued to oppose the imposition of fees by joining in an appeal to the United States Court of Appeals for the Seventh Circuit. The lawfulness of the fees was affirmed in *Aeronautical Radio, Inc., v. United States*, 335 F 2d 304 (1964), cert. denied 379 U.S. 966:

Finally we do not agree with intervenor American Radio Relay League that the imposition of fees upon amateur service is not within the authority of Section 140 [now 31 USC Section 483a] because many amateurs are engaged in "the official business of the Government", because some public service is rendered, and because an amateur radio license has no "value to the recipient." The Commission took the commendable public service into consideration in setting the nominal fee¹⁴ and exempting novices and those amateurs who participate voluntarily in emergency communications networks. It also considered the possibility that a greater fee might discourage the use of radio by amateurs, and set the fee at a minimum so as not to interfere with the purpose of the Communications Act¹⁵ to encourage and enlarge the use of radio by amateurs in the public interest. And we see no requirement in Section 140 that "value to the recipient" need be pecuniary value. That is but one of the factors that the Commission had to take into account and as we have indicated before, the Commission may in its discretion determine what weight should be placed on each of the factors.

¹⁴For initial licenses and renewals, for five years, the fee is \$4.00 — for a modification of an amateur license, \$2.00. A \$20.00 fee is charged for special amateur call signs.

¹⁵47 USC §303(g) provides that the Commission shall "generally encourage the larger and more effective use of radio in the public interest."

The instant proceeding was initiated by a Notice of Proposed Rule Making released February 19, 1970 (FCC 70-188, 35 Federal Register 3815), in which the Commission quoted as follows from the report of the House Appropriations Subcommittee (House Report 91-316, June 19, 1969, pages 7 and 8):

The Committee also feels that fee charges should be further reviewed and adjusted upward with the objective of assuring that the activities of the Commission are more nearly self-sustaining. The Committee will expect a report on these items during the budget hearings for 1971.

The Commission then quoted as follows from the report of the Conference Committee on the Independent Office Appropriations Bill, 1970 (House Report 91-649, November 18, 1969, page 6):

The committee of conference is agreed that the fee structure for the Commission should be adjusted to fully support all its activities so that taxpayers will not be required to bear any part of the load in view of the profits regulated by this agency. (Emphasis supplied)

The following fee schedule is proposed for the Amateur Radio Service:

	Proposed	Increase
Initial license, renewal and new class operator licenses	\$ 9	\$ 5
Modification of license without renewal	4	2
Modifications of license with renewal	9	5
Special call sign (plus other applicable fee)	25	5

As in the past, no fees would be required for applications for the Novice Class, license applications for amateur stations under military auspices, and applications filed in the Radio Amateur Civil Emergency Service (RACES).

The contributions to the Amateur Radio Service to the public interest were discussed at some length in the League's 1962 opposition to the original fee proposal and in the League's brief in the Court appeal and will not be repeated here. In the intervening years, the contributions have continued and increased. Examples are the emergency communications rendered during and following the Good Friday earthquake in Alaska in 1964 and the most destructive hurricane on record, Hurricane Camille which devastated the Louisiana and Mississippi coast on August 17, 1969, and the continued interest in space communications. The contributions and importance of the Amateur Radio Service was the subject of an extensive study by the Stanford Research Institute, under sponsorship of the League, in 1965 and are reported by SKI in "Amateur Radio: An International Resource for Technological, Economic, and Social Development", published in August 1966.

With this background, the instant proposal will be examined.

The Fee Schedule Does Not Represent The Actual Cost to Many Amateurs

The fee for a single application does not represent the actual cost to a very high percentage of amateurs, particularly those seeking to upgrade or advance to a higher class.

In Fiscal Year 1969, 50,658 amateur examinations were given, of which 25,294 (49.9%) were

before a Commission employee. Of the latter, 3,675 (40.7%) applicants for General, 544 (4.6%) applicants for Advanced,¹ and 1,208 (27.2%) applicants for Amateur Extra Class failed the code test. Of those taking the written test, 1,016 (18.9%) General, 2,736 (27.4%) Advanced, and 889 (27.6%) Amateur Extra Class failed. Licenses were issued to 48.1% of the General, 72.2% of the Advanced, and 52.8% of the Amateur Extra Class applicants.² Although figures are not available, it is known that some passed the code test only on the second or third attempt.

A single fee of \$4.00, or even \$9.00, may not appear to be significant to many. But to the school boy -- the greatest single source of new amateurs -- even \$4.00 sometimes can be substantial. This is particularly so when it is remembered that examinations are given more frequently than quarterly only in the Commission's field offices, which are located in only 30 cities throughout the United States, including Alaska, Hawaii, and Puerto Rico, quarterly in only 31 cities, semiannually in only 15 cities, and annually in only 12 cities. The cost of obtaining a General or higher class of license often involves more than just the application fee because a high percentage of applicants must travel substantial distances just to have the opportunity to pay a fee for an examination he has only a 50% chance of passing.

But that is not all! If an amateur desires to advance to a higher class under the incentive license plan adopted by the Commission in 1967, the same procedure must be followed and the same expenses incurred at least one more time.

The end result is an extremely heavy financial burden upon many seeking to become a radio amateur. Any increase in fees may be the "straw that breaks the camel's back".

The Fears That Fees Might Weaken The Amateur Radio Service Have Been Realized

As shown earlier in these comments, the Commission recognized the possibility that imposition of fees might weaken the Amateur Radio Service. That concern was well founded.

Since fees were first imposed, on March 17, 1964, the rate of growth of the Amateur Radio Service has declined. Although other factors undoubtedly have contributed to this condition, every indication is that fees have played a most important role. The decrease in the rate of growth is apparent from the following statistics for the last eleven fiscal years:

Year	Licenses on June 30	Applications During Year
1959	191,493	102,942
1960	212,107	105,498
1961	216,720	116,884
1962	230,459	123,777
1963	247,603	117,571
1964	256,237	117,799
1965	258,881	119,431
1966	257,602	108,747
1967	257,935	121,490
1968	260,294	130,555
1969	262,052	131,605

The increase in the number of licenses in 1968 and 1969 is attributed in part to the extension of the

¹Most applicants for the Advanced Class received credit for having passed the code test when obtaining a General Class license.

²The figures for written tests failed and total licenses issued are approximate, but representative, because of the time lag in processing.

term of Novice licenses from one to two years. The increase in the number of applications in those years reflects the incentive license program which became effective late in 1967.

Amateurs and prospective amateurs range in age from schoolboys of 7 to retired persons of 70 and older. There are perhaps 5,000 handicapped amateurs — blind, or confined to beds, wheelchairs, or iron lungs. Many amateurs and prospective amateurs have only a minimal income, and some have none. Upon them, any increase in fees will be most oppressive.

The available information supports the conclusion that any increase in fees will be most harmful to the maintenance of a sound and healthy Amateur Radio Service.

A Fee Increase Is Incompatible With The Incentive Licensing Program

Perhaps the most controversial of all amateur radio policy and rule making proposals was the incentive licensing program adopted by the Commission on August 24, 1967, and effective on November 22, 1967. (Docket No. 15928, 9 FCC 2d 814) That proposal was initiated by a series of rule making petitions (RM-378, 470, 480 and 481), the first filed on October 26, 1962, followed by a petition of the League (RM-499) filed on October 1, 1963. In response to a notice of proposed rule making issued on April 1, 1965, over 1,700 formal comments representing the views of organized amateur groups and about 4,000 licensees were received and considered. In its Report and Order adopting the program, the Commission said:

5. To support its proposal for an incentive licensing program, the Commission stated in its notice [of proposed rule making] that revision of the present license operating privilege structure is an appropriate and desirable step to take at this time to insure progress and to place a proper emphasis upon the quality of the service, as well as upon its mere numerical growth and activity. . . Accordingly, the Commission concludes that a program providing for licenses with special privileges as an incentive to the general "upgrading" of licenses is in the public interest and should be adopted.

Under the incentive licensing program, an amateur is not eligible to even apply for the highest grade with the greatest privileges, the Amateur Extra Class, until he has held an amateur Conditional, General or Advanced Class license for at least two years (with certain exceptions). The Amateur Extra Class license is issued only after having passed an examination conducted by a Commission employee. Thus, an amateur who obtains the highest grade of license must have taken and passed at least two examinations.

A substantial number of League members, in correspondence to their Directors and to Headquarters, have expressed the opinion that the proposed increase in fees is incompatible with the incentive licensing program. They have noted (1) that at least two examinations are required to progress to the highest grade, (2) the high failure rate, and (3) the additional financial burden imposed by travel to an examination point.

The League has supported the incentive licensing program since its inception, even at the loss of the membership of some who opposed the program. The League wants to continue to support the program. However, if the cost of obtaining the highest grade of license is priced beyond the reach

of a significant number of amateurs, the League may be required by its membership to re-examine its position.

Amateurs Should Not be Required To Support Other Commission Services

The revised fee schedule is intended to increase the amount of fees collected from approximately \$4.5 million to \$24.9 million, the total of the Commission's budget request for the fiscal year ending June 30, 1971. In response to requests for further information, the Commission issued a Further Notice of Proposed Rule Making on March 4, 1970 (FCC 70-239, 35 Federal Register 4307), in which it gave the following breakdown of activity costs:

Activity	Cost	Percent of Total Budget Request
Broadcast	\$ 9,661,200	38.8%
Cable Television	1,145,400	4.6
Chief Engineer	323,700	1.3
Common Carrier	4,631,400	18.6
Field Engineering	1,294,800	5.2
Safety & Special Radio	7,843,500	31.5

The Commission explained that "the costs of activities of the Field Engineering Bureau are distributed among Broadcasting, Common Carrier, and Special and Safety Services in the proportion of activity devoted to each service."

Although the amount of fees collected from the Amateur Radio Service during Fiscal Year 1969 was not available at the time these comments were prepared,³ it is known that only 20,184 of the 131,605 applications received during that year were for Novice licenses for which no fees were charged. Assuming a fee of \$4.00 per application other than Novice, the total was \$445,648. Although some applications were for modifications for which the fee was only \$2.00, others were for two letter call signs at \$20.00 per request. Assuming a 125% increase in fees and no decrease in the number of applications, approximately \$1,003,000 or 4.03% of the entire cost of the Commission's operation, will be paid by the Amateur Radio Service!

Although a self-supporting Commission is a laudable objective, the cost should be divided among *all* of those being served, not just among some. The 35th Annual Report for Fiscal Year 1969 shows that 24,117 applications were received from the Public Safety Services, and that 64,743 fixed and 667,350 mobile transmitters were licensed to those services. In spite of the most substantial services rendered, not one dollar was collected in fees! Section 1.1117(b) of the Rules specifically exempts applications in the Police, Fire, Forestry-Conservation, Highway Maintenance, Local Government, State Guard, Hospitals, Disaster Relief Organizations, Beach Patrols, School Buses, non-profit Ambulance Operators and Rescue Organizations, Civil Air Patrol, Aeronautical Radionavigation, Aeronautical Search and Rescue, and Closed Circuit Educational Television Services. Nor are fees required for ship inspections pursuant to the Great Lakes Agreement, The Safety of Life at Sea Convention, and Parts II and III, Title III, of the Communications Act of 1934.

³Should figures become available from the Commission, this analysis will be revised by a supplement to these comments.

as amended. Yet the costs of administering all of these services are included in the cost of operating the Safety and Special Radio Services Bureau. The desire of Congress, as expressed in the two reports cited earlier in these comments, that the Commission be "more nearly self-sustaining" and that "taxpayers... not be required to bear any part of the load in view of the profits regulated by this agency", appears not only to have been misinterpreted by the Commission in its attempt to become completely self-sustaining, but also to exceed the authority to impose and collect fees bestowed by Title V of the Independent Offices Appropriations Act of 1952, 31 USC Section 483a.

This question did not arise when fees were first proposed in 1962 because there was no attempt to use collections from one service to pay for services rendered to another or non-fee paying service.

There is yet another reason why the fees now proposed may be excessive. The 35th Annual Report for Fiscal Year 1969 reports that at least 1,816 monetary forfeitures (fines) were imposed by various bureaus during that year. The amount to be received from payment of forfeitures appears not to have been considered in preparing the proposed fee schedule.

There Is No Indication That The Value To The Amateurs Has Been Considered

Even though the Court held in *Aeronautical Radio* that the "value to the recipient" need not be pecuniary value, it is respectfully submitted that there will be no additional value to the Amateur Radio Service by a 125% increase in fees. No new examination procedures, no new examination points, no increase in monitoring and enforcement, and no new call-sign privileges are contemplated. When fees were first proposed in 1962, both the Commission and the Court recognized that any but a nominal fee upon amateurs would exceed the authority bestowed by the statute. If the fees imposed in 1962 were marginal, any increase must be excessive and unlawful.

Present Examination Procedures Should Be Revised Or Certain Fees Abolished

One of the most frequent complaints to the League is the manner in which Commission-conducted examination procedures are administered.

Examinations are given in two parts, one a code test and the other a written test on theory, operation and rules. Usually, but not always, the code test is given before the written test. If an applicant first fails the code test, he is not permitted to take the written test or the written test previously given is discarded, even though his \$4.00 fee is intended to include a complete examination. If he passes the code test and then fails the written test, he receives no document showing that he passed the code test. His only recourse is to come back at a later date and follow the same procedure after having paid another fee.

This practice is both unfair to the applicant and expensive to the Commission. Code examinations must be given and the papers graded by the examiner, while the written examinations are graded at the Commission's Gettysburg offices. Code examinations frequently are given under far from ideal conditions, with poor acoustics, uncomfortable tables or arm-desk type school chairs, and unfamiliar surroundings. Almost without exception, the applicant is nervous. The end result is a

high percentage of failures even among well prepared applicants.

When an applicant passes the code examination but later fails the written examination, he should receive credit for the code element if he seeks reexamination within the next twelve months. Such a procedure will reduce the work load upon the Commission employee-examiner. The savings to the Commission by following such a procedure will justify the elimination of an entirely new fee for reexamination within the next twelve month period. A simple, fool-proof receipt or certificate can be given at the time the code examination is passed for surrender when reexamination on the written elements is requested.

Another frequent complaint to the League concerns the high speed 20 words per minute code test for the Amateur Extra Class license. Many of those eligible for that examination learned to copy code on a typewriter, either in training as a military or commercial operator or because of handwriting slowness or legibility. However, the general practice has been not to permit use of a typewriter for the code test because of distraction to others copying by hand. Although this is a valid concern, a rerun of the tape of the automatic code machine will take not more than five minutes or so and can be done while the examiner is receiving the handwritten papers of the first run. Such a procedure will encourage some to seek to attain the highest grade of license as contemplated by the incentive licensing program, and will increase the percentage of applicants passing the test, thereby reducing the overall and final cost of acquiring that grade of license.

The Commission is urged to consider these and other ways to reduce both its own workload and the actual cost to enter and advance in the ranks of the Amateur Radio Service.

Conclusions

The League and thousands of its members are justly and gravely concerned that any increase in fees will bring about a decline of the Amateur Radio Service which always has received the active support of Congress and the regulatory agencies under the national policy. Their concern is based upon the record since fees were first imposed six years ago. In fact, that record fully supports a reduction or elimination of the present fees or, in the alternative, a revision of certain practices and procedures to offset the adverse impact of the fees. The Commission is respectfully requested to not adopt the proposed fee schedule for the Amateur Radio Service but to reexamine and make less burdensome the present fee schedule.

Respectfully submitted,
The American Radio Relay
League, Incorporated
By Robert M. Booth, Jr.
Its General Counsel

April 20, 1970

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.

COMING CONVENTIONS

ROCKY MOUNTAIN DIVISION CONVENTION Estes Park, Colorado June 13-14, 1970

The A.R.R.L. Rocky Mountain Division Convention will be held Saturday and Sunday, June 13 and 14, at the Elkhorn Lodge. Planned activities include an fm repeater meeting, MARS meetings, cw contests, technical talks by Bill Orr, W6SAI, of Fimac and Yardley Beers, W0JF, of the National Bureau of Standards, ARRL open forum, DX forum, Traffic forum, League Officials meeting, and the formation meeting of the Colorado Council of Amateur Radio Clubs. League Headquarters will be represented by Ed Tilton, W1HDQ, and Dick Baldwin, W1IKE.

The convention sponsored by the Denver Radio Club will have the club station, W0OUI, on the air. A portable repeater will be set up on 146.34-146.94 Mc. fm courtesy of the Rocky Mountain Radio League. Leading manufacturers and distributors will be represented with displays of the latest equipment.

Saturday night will feature an informal chuck wagon steak dinner. The main luncheon on Sunday will feature a program of general interest.

YL activities will be handled by the Colorado YLs and will include a Saturday luncheon, afternoon bongo and tea, and an evening fashion show. All activities are for all YLs.

Convention headquarters is the Elkhorn Lodge; special rate is \$9.00 per person. For reservations write direct to the Elkhorn Lodge, Box 1560, Estes Park, Colorado 80517. Convention registration is \$4.00 before June 1 and \$5.00 after June 1. The chuck wagon is \$4.50 and the luncheons are \$3.00. Self-contained trailers and campers may be parked at the lodge and use all the lodge facilities for \$4.50 per family per day. Your registration, meals and camping may be put on your Master Charge or BankAmericard.

For tickets and information write to the Denver Radio Club Convention Committee, 13540 E. Center Avenue, Aurora, CO 80010 or call 366-8292.

OREGON STATE CONVENTION Bend, Oregon June 19-21

The 29th Oregon Amateur Radio Association Convention will be held in Bend, Oregon on June 19-20-21. Convention site is Pilot Butte Junior High School, 1500 F. Penn St.

The ARRL Hq. will be represented by Dick Baldwin, W1IKE, also Division Director, Bob Thurston, W7PGY, and Oregon SCM, Dale Justice, K7WWR.

There will be commercial displays, special contests, swap shop, tours, xmtr hunt, and smorgasbord banquet on Sunday (All you can eat!). Meetings include: ARRL, OEN, AREC, BSN, RACES, NTS, MARS. A Wouff Hong initiation is planned for ARRL members Saturday, at the stroke of midnight!

A large area adjacent to the convention site is being set aside for trailer and camper parking. The

charge is \$2 per unit per night. For those who enjoy mountain tops, a Saturday noon luncheon is scheduled for Mt. Bachelor Ski area. A \$2 ticket includes lunch, chair lift to 8000 feet and transportation if needed.

The cost of the Convention, which includes registration, banquet and all activities at the Convention Site is as follows: Pre-Registration (to June 1) \$10.50, Registration \$12.00, Non-Amateurs \$6.00. For tickets write to Cora Convention Committee, P.O. Box 723, Bend, Oregon 97701.

WEST VIRGINIA STATE CONVENTION Jackson's Mill, W. Virginia July 4-5, 1970

The Twelfth Annual West Virginia State ARRL Convention will be held July 4 & 5 at Jackson's Mill. The Mill is located near Weston, West Va. and is a natural for a family outing. Activities are planned for the whole family. The West Virginia Outstanding Amateur Award presentation, ARRL meeting, DX, vhf, ssb, RTTY, PON, cw contest, RACES, MARS, YLRL, SWOOP, swap & shop, flea mart, transmitter building contest, distributors displays of the latest amateur equipment, radio controlled model aircraft demonstration, special entertainment for the YLs and XYLs on Saturday afternoon and much more. Something different for the Saturday night activities: a family type stage show will commence at 9:00 P.M. and will be climaxed with a gala fireworks display.

Special permission has been granted again this year for a temporary assignment of the call letters W8WVA to be assigned at the convention site. Under the direction of Delf Norona, WA8NDY and Mary Jane Norona, WA8WCK, this station will be operating on approximately 3995KHZ.

Full registration includes lunch and dinner Saturday, dormitory lodging, breakfast and lunch Sunday and registration fee. "Early Bird" full registration until June 30, \$9.00. After June 30, and at the Mill \$10.00. Convention registration only, \$2.50. For tickets and full registration write to West Virginia State Radio Convention, Rt. 3, Box 287 Bridgeport, West Virginia 26330.

(Continued on page 87)

COMING A.R.R.L. CONVENTIONS

- June 13-14 -- Rocky Mountain Division, Estes Park, Colorado.
- June 19-21 -- Oregon State, Bend.
- July 4-5 -- West Virginia State, Jackson Mills.
- July 18-19 -- West Gulf Division, Orange, Texas.
- September 19-20 -- Georgia State, Augusta.
- September 25-27 -- NATIONAL, Boston, Mass.
- October 17-18 -- Hudson Division, Tarrytown, N.Y.
- Oct.31/Nov.1 -- Roanoke Division, Raleigh, N.C.

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

SLOW-SCAN FROM VK

The *Wireless Institute of Australia* advises that slow-scan or narrow-band TV has been approved by the Post Master General's Department for use on all amateur bands as presently authorized in Australia. Standards to be used are entirely at the discretion of the amateur, although bandwidth of emissions shall not exceed that of an A3 single sideband or double sideband signal.

Where A3 and A5 emissions are used simultaneously on the same carrier frequency, the total bandwidth shall not exceed that of an A3 double sideband emission. Identification is to be by call sign in visual form on televised picture and by teletype on telephony sound channel.

CONTEST

The *Radio Club Venezolano* invites amateurs to participate in the 1970 contest commemorating the 159th Anniversary of the Independence of Venezuela. The contest period starts at 0000 GMT Saturday, July 4, and ends at 2400 GMT Sunday, July 5. Complete details are available from the *Radio Club Venezolano, Concurso Independencia de Venezuela, PO Box 2285, Caracas, Venezuela.*

WIA ADOPTS PROJECT AUSTRALIS

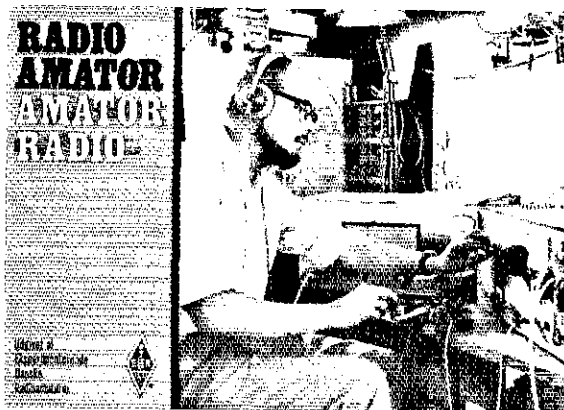
Project Australis, organized in 1965 at Melbourne University, is a group of amateurs dedicated to the design and construction of amateur satellites. The recent Australis-Oscar 5 spacecraft was their initial project.

Project Australis has now become an official activity of the *Wireless Institute of Australia*. WIA president VK3KI commented, "I believe that the Institute can play an important part in ensuring the success of this important activity, particularly by providing a firm base upon which the project may continue to grow, and by the provision of an administrative facility that is now much needed. I believe also that the Institute will itself benefit much from this closer association with a very worthwhile object."

NOTES

The *Amateur Radio Society of India* reminds amateurs that VU2 is the only allocated prefix for Indian amateurs. ARSI says that QSLs are frequently addressed to VU1 or VU3 stations. These

IARU/ARRL vice-president W5NW is shown operating as VK2BKM. The tube collection in the photo is that of VK2NS and includes one "valve" owned by Ross Hull in 1925, which had its filament lighted for the first time in 42 years to celebrate Soupy's visit!



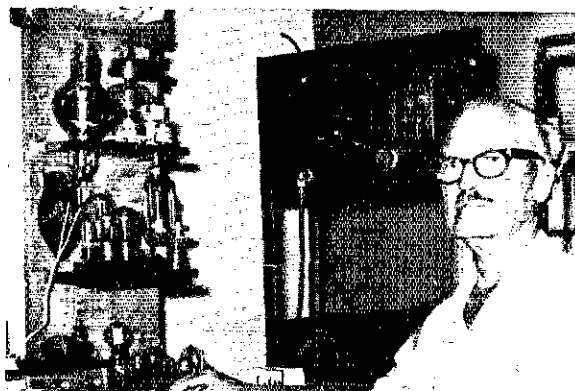
This is a booklet to promote amateur radio interest in Denmark, neatly produced by the *Eksperimenterende Danske Radioamatører*.

are apparently call-sign errors, or illegal stations. AC3PT advises ARSI that AC2, 4, and 5 are not currently on the air, and that AC3PT is the only active AC3 station.

The *Association des Radios-Amateurs de Monaco* reports an unusual arrangement for direct-mail delivery of QSLs to Monacan amateurs. As a special service to amateurs, the postal authorities will forward all mail addressed to the call sign only! Of course, cards coming from other countries should include "Monaco" as part of the address since other postal administrations might not get the message.

QSL BUREAUS OF THE WORLD

For delivery of your QSLs to foreign amateurs, simply mail cards to the bureau of the proper country as listed below. Cards for territories and possessions not listed separately may be mailed to the bureau in the parent country: e.g., cards for VP8s go to RSGB in Great Britain. W, K, VE and VO stations only may send foreign cards for which



no bureau is listed to *ARRL*. See "How's DX?" for QSL information on specific stations.

Algeria: ARA QSL Service, P.O. Box 2, Algier R.P.

Angola: LARA, P.O. Box 484, Luanda

Antarctica: KC4AA cards go to the Office of Antarctic Programs, National Science Foundation, Washington D.C. 20550. KC4US cards go to K1NAP, COMCBLAN, USN, CBCEN, Davisville, E. Greenwich, R.I. 02854

Argentina: RCA, Carlos Calvo 1424, Buenos Aires, BA

Australian French Antarctic Lands: via Malagasy Republic

Australia: VK1, VK2 QSL Bureau, W1A Box 1734, GPO Sydney, N.S.W. 2001; VK3 QSL Bureau, E. Trebilcock, 340 Gillies Street, Thornbury, Vic. 3071; VK4 QSL Bureau, H. Scholz, 95 Stephens St., Morningside, Brisbane, Qld., 4170; VK5, VK8, QSL Bureau, Mr. Geo. Luxon, VK5RX, 27 Belair Road, West Mitcham, S. Aust. 5062; VK6 QSL Bureau, Mr. J. Rumble, VK6RU, Box F319, GPO Perth, W.A. 6001; VK7 QSL Bureau, Mr. J. Batchelor, VK7JB, 39 Willowdene Avenue, Lower Sandy Bay, TAS.; VK9, VK0, Federal QSL Bureau, 23 Landale Street, Box Hill, 11 Victoria.

Austria: OSVSV, Box 999, Vienna 1/9

Azores: via Portugal

Bahama Islands: BARS, Box 6004, Nassau

Bahrain: (All MP4) Ian Cable, MP4BBW, P.O. Box 425, Awali

Barbados: ARSB, Highgate Signal Station, Flagstaff Road, St. Michael

Belgium: UBA, Postbox 634, Brussels 1

Bermuda: RSB, Box 275, Hamilton

Bolivia: UCB, Casilla 2111, La Paz

Brazil: LABRE, P.O. Box 2353-ZC OO, Rio de Janeiro/GB

Bulgaria: CRCB, Box 830, Sofia

Burundi: via Congo (9Q5) QSL Bureau

Canada: See *ARRL* QSL Bureau

Canal Zone: Gloria N. Spears, KZ5GS, Box 407, Balboa

Cape Verde Island: RCCV, CR4AA, Praia, Sao Tiago

Ceylon: RSC, P.O. Box 907, Colombo

Chagos: via Mauritius

Chile: RCC, P.O. Box 13630, Santiago

Colombia: LCRA, P.O. Box 584, Bogota

Congo: (TN8) QSL Bureau, P.O. Box 2239, Brazzaville

Congo: (9Q5) UCAR, QSL Bureau, B.P. 3748, Elizabethville

Cook Island: ZK1 QSL Bureau, %Radio Station Rarotonga, Rarotonga

Costa Rica: RCCR, Box 2412, San Jose

Cuba: ANRCA QSL Bureau, P.O. Box 6996, Havana

Cyprus: CARS QSL Bureau, P.O. Box 216, Famagusta

Czechoslovakia: CRC, Box 69, Prague 1

Denmark: FDR QSL-Central, Harry Sorensen, OZ6HS, Ingstrup-9480-Lokken

Dominican Republic: RCD, P.O. Box 1157, Santo Domingo

Ecuador: GRC, P.O. Box 5757, Guayaquil

El Salvador: CRAES, P.O. Box 517, San Salvador

Ethiopia: KSARC, ET3USA, APO, New York,

N.Y. 09843

Feroe Islands: OY-QSL Bureau, Sofus Rubeksen, OY3B, Undir Savartafossi, DK-3800 Torshvan

Fiji Islands: QSL Bureau, P.O. Box 184, Suva

Finland: SRAL, Box 10306, Helsinki 10

Formosa: QSL Bureau, CRA, Box 2007, Keelung, Taiwan, Rep. of China

France: REF, Boite Postale 70,75 Paris 12

French Oceania: RCO, P.O. Box 374, Papeete, Tahiti

Germany: (DL4 & DL5 only) DL4-DL5 QSL Bureau, 97th Signal Battalion, APO New York 09028

Germany: (Other than above) DARC, Box 86-03-20, D8 Munich 86

Ghana: GARS QSL Bureau, P.O. Box 3773, Accra

Gibraltar: RAF Amateur Radio Club, New Camp, RAF

Great Britain: (and British Commonwealth): RSGB QSL Bureau, G2ML, 29 Kechill Gardens Bromley, Kent

Greece: RAAG, P.O. Box 564, Athens

Greece: (SV0 only): Signal Officer, Hqtrs. IUSMAGG, APO, New York, N.Y. 09223

Greenland: via Denmark

Greenland: (U.S. Personnel) OX5A-E via MARS Director, XP1AA, 1983 Comm. SQ., APO New York 09023. OX4F-H via MARS Director,

XP1AB, 2004 Comm. Sq., APO New York 09121

Guam: MARC, Box 445, Agana, USPO 96910

Guantanamo Bay: GARC, Box 55, FPO, New York, N.Y. 09593

Guatemala: CRAG, P.O. Box 115, Guatemala City

Haiti: RCH, Box 943, Port-au-Prince

Honduras: RCH, Apartado 17, San Pedro Sula

Hong Kong: HARTS, P.O. Box 541

Hungary: HSRL, P.O. Box 214, Budapest 5

Iceland: IRA, Box 1058, Reykjavik

India: ARSI, QSL Bureau, P.O. Box 534, New Delhi 1

Iran: ARSI, APO New York N.Y. 09205

Ireland: IRTS, QSL Bureau, 24 Wicklow St., Dublin 20124

Israel: IARC QSL Bureau, P.O. Box 65, Herzlia

Italy: ARI, Via Scarlatti, 31, 20124 Milan

Ivory Coast: ARAI, B.P. 20036, Abidjan

Jamaica: JARA, Red Cross Bldg., 76 Arnold Rd., Kingston 5

Japan: (JA): JARL, Box 377, Tokyo Central

Japan: (KA only): FEARL-M, HQ 5AF, Box 1414 APO, San Francisco, Calif. 96525

Johnston Island: KJ6BZ, % MARS Stn., Det. 1, 1957 Comm. Gp., APO, San Francisco, Cal. 96305

Kenya: RSEA QSL Bureau, Box 30077, Nairobi

Korea: KARL, Central Box 162, Seoul

Korea: (HL9) HL QSL Bureau, Signal Section, USFK/EUSA, APO, San Francisco, Calif. 96301

Kuwait: Alhaff Nasir H. Khan, 9K2AN, P.O. Box 736, Kuwait, Persian Gulf

Laos: Houmphanh Saingnath, XW8AL, P.O.B. No. 46, Vientiane

Lebanon: RAL QSL Bureau, P.O. Box 1217, Beirut

Liberia: LRAA, Post Box, 1477, Monrovia

Libya: 5A QSL Service, Box 372, Tripoli

Liechtenstein: via Switzerland

Luxembourg: R. Schott, 35 rue Batty Weber Esch-Alzette

Macao: via Hong Kong

Madeira Island: via Portugal

Malagasy Republic (Madagascar): QSL Bureau, P.O. Box 587, Tananarive

Malawi: 7Q7RM, P.O. Box 472, Blantyre

Malaysia: QSL Manager, MARTS, Box 777, Kuala Lumpur

Malta: R. F. Galea, 9H1E, "Casa Galea," Railway Road, Birkirkara

Mariana Islands: see Guam

Marshall Islands: KX6 QSL Bureau, via KX6BU, Box 444, APO, San Francisco, Calif. 96555

Mauritius: Paul Caboche, VQ8AD, Box 467, Port Louis

Mexico: LMRE, P.O. Box 907, Mexico, D.F.
 Midway Island: KM6BL, Box 14, FPO, San Francisco, Calif. 96614
 Monaco: ARM QSL Bureau, Pierre Anderhalt, 3A2CN, 41 Bd du Jardin Exotique
 Mongolia: JT1KAA, Box 639, Ulan Bator
 Morocco: AAEM, P.O. Box 299 Rabat
 Mozambique: LREM QSL Bureau, P.O. Box 812, Laurencio Marques
 Netherlands: VERON, Postbox 400, Rotterdam
 Netherlands Antilles: VERONA, P.O. Box 383, Willemsstad, Curacao
 New Zealand: NZART, P.O. Box 489, Wellington
 Nicaragua: Mike Murciano YN1MO/W4, Box 902, Coral Gables, Florida, 33134, U.S.A.
 Nigeria: NARS QSL Bureau P.O. Box 2873, Lagos
 Northern Ireland: via Great Britain
 Northern Rhodesia: see Zambia
 Norway: NRRL, P.O. Box 21, Refstad, Oslo 5
 Nyasaland: see Malawi
 Okinawa: OARC, APO San Francisco, Calif. 96331
 Pakistan (East): Mohd, AP5CP, TARC, Dacca Signals, Dacca 6
 Pakistan (West): LARS, P.O. Box 65, Lahore
 Panama, Republic of: LPRR, P.O. Box 9A-175, Panama 9-A
 Papua: Via VK9 QSL Bureau.
 Paraguay: RCP, P.O. Box 512, Asuncion
 Peru: RCP, Box 538, Lima
 Philippine Islands: PARA QSL Bureau, P.O. Box 4083, Manila
 Poland: PZK QSL Bureau, P.O. Box 320, Warsaw 1
 Portugal: REP, Rua de D. Pedro V., 7-4, Lisbon
 Puerto Rico: Alicia Rodriguez, P.O. Box 73, San Juan 00919
 Rhodesia: RSSL, P.O. Box 2377, Salisbury
 Roumania: CRC, P.O. Box 1395, Bucharest 5
 Rwanda: via Congo (9Q5) QSL Bureau
 Samoa (American): Utulei High School Amateur Radio Club, % Director, Pago Pago, Tituliia, 96920
 Samoa (Western): Director of Post Office and Radio, Post Office, Apia
 Scotland: via Great Britain
 Senegal: Ch. Tenot, 6W8BF, P.O. Box 971, Dakar
 Sierra Leone: RSSL, P.O. Box 907, Freetown
 Singapore: SARTS, P.O. Box 2728, Singapore 1
 South Africa: SARL, P.O. Box 3037, Cape Town
 Spain: URE, P.O. Box 220, Madrid
 St. Vincent: QSL Bureau, P.O. Box 142, St. Vincent, West Indies
 Surinam: QSL Manager (PZIAR), SARL, P.O. Box 240, Paramaribo
 Sweden: SSA, Fack, S-122 07 Enskede 7
 Switzerland: USKA, Sonnenrain 188, 6233 Bueron/LU
 Syria: TIR, P.O. Box 35, Damascus
 Tanzania: RSEA, P.O. Box 2387, Dar es Salaam
 Trinidad and Tobago: T&TARS, P.O. Box 1167, Port of Spain
 Uganda: RSEA QSL Bureau, P.O. Box 3433, Kampala
 United States: See ARRL QSL Bureau in this issue
 Uruguay: RCU, P.O. Box 37, Montevideo
 U.S.S.R.: CRC, Box 88, Moscow
 Vatican: HV1CN, Domenico Petti, Radio Station, Vatican City
 Venezuela: RCV, P.O. Box 2285, Caracas
 Virgin Islands: Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, V.I. 00820
 Wake Island: Jack A. Chalk, KWGEJ, P.O. Box 415, Wake Island 91930
 Wales: via Great Britain
 Yugoslavia: SRJ, P.O. Box 44 Belgrade
 Zambia: RSZ, P.O. Box 332, Kitwe

Coming Conventions (Continued from page 84)

WEST GULF DIVISION CONVENTION Orange, Texas July 17-19

Pick your way to travel, by air, by water, or by land, but let it lead to the Orange House in Orange for the 40th ARRL West Gulf Division convention. Transportation from the airport is available. Come up the beautiful Sabine River and tie up at the Orange House dock. The Orange House is a Motor Hotel and is ready for you if you arrive by car, train or bus. If you are a camper then the KOA is ready for you.

Join the fun and fellowship beginning with a pre-convention party Friday evening the 17th. Saturday has a full schedule of activities for individual groups and technical sessions for all. At one of these sessions you can look forward to meeting Dr. Owen Garrett, a scientist-astronaut and ham, with NASA and assigned to Apollo-15. Saturday evening will be rounded out with a most relaxing dance.

The ARRL Forum, chaired by Director Roy Albright, W5EYB, will be held Sunday morning. Climaxing the convention will be the banquet Sunday noon and the presentation of awards. There will be plenty of activities for the ladies during the weekend.

Pre-registration, including the banquet is \$8.50. Pre-registration will end on July 13. All lunches and breakfasts are optional and tickets will be available at the convention registration desk. For registration forms, room reservations or other information write Orange Amateur Radio Club, P.O. Box 232, Orange, Texas 77630.

ARPS

(Continued from page 78)

Transcontinental Corps. March Reports

Area	Functions	% Successful	Out-of-Net Traffic	Traffic
Eastern	124	94.3	2492	1009
Central	93	94.7	1478	811
Pacific	124	95.2	2646	1323
Summary	341	94.7	6816	3143

The TCC Roster: Eastern Area (W3EML, Dir.) W1s BJG NJM WCG YKQ, K1ESG, WA1TM, W2s FR GKZ PU QC, K2s KIR RYH, WA2s CAL HMO UWA, W3EML, K3MVO, W4s NLC SQQ UQ, K4KNP, WB4GTS, W8s IZ UM, K8s KMQ QKY, WA8s OCG YVR, Central Area (W0LCX, Dir.) - W4OGG, K4s AT DPO, W5MW5MI, W9s CXY VAY, WA9s RAK VZM, W0s HI INH LCX UCE ZHN, K0AEM, WA0s DOU IAW RVR, Pacific Area (W6VNO, Dir.) - W5RF, W6s BGF BNX EOT IPW MLE VNO, K6DYX, WA6s BRG LFA R0F, W7s DZX EM GHT KZ, K7HLR, WA7CLE, K0JSP.

Independent Net Reports

Net	Sessions	Checkins	Traffic
Northeast Traffic	31	462	497
ECTTN	22	321	78
Eastern U.S. Traffic	30	116	101
Mike Farad E & T	26	373	253
20 Meter Interstate SSB	22	510	3523
Clearing House	26	455	277
7290 Traffic	44	2201	744
Hit & Bounce	31	356	379
All Service	5	71	18
North American SSB	26	426	395



Correspondence From Members-

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

FCC PROPOSES FEE INCREASE

● The FCC has before it Proposed Rulemaking, Docket 18802, which proposes to raise filing fees and add license fees in most communications services so as to recover the entire \$24,500,000 of the FCC budget. Presently the FCC recovers only \$4,500,000 annually from applications.

While we agree in principal with the philosophy that many government agencies are in a position to pay their own way, especially where the agency furnishes services to commercial enterprises, there are cases in which the service relationship between the government and a segment of the public which it serves is a mutually beneficial one, and in cases such as this, the citizen group involved should be given consideration.

Commercial broadcast, TV and communications services receive their highly profitable privileges for use of the public radio spectrum from the government, and because they profit from their use of the spectrum, it is only reasonable that they should bear the cost of the government regulation.

On the other hand, the amateur radio service is prohibited by law and international agreement, not only from any profit making, but even from earning its expenses. The Amateur Service is a purely voluntary one and even though it is in a sense a hobby and avocation, this service has been a training ground for skilled operators and technicians for the armed forces and civil defense. The armed forces have often commented on their fortune in having such a large reservoir of trained personnel to draw upon when major wars have required rapid expansion of our armed forces. *Maurice Singer, K5YMM, New Orleans, LA*

● I wish to express an opinion on the matter. No "hobby group" should have its enjoyment expenses thrust on another group. I would object to paying taxes to support a football stadium or a hockey rink (often we are forced to do this in Massachusetts). I don't believe that the FCC proposal would be a hardship or that it is out of keeping with the amateur service. We are obviously given preferential rates to citizens' band operators. Why should we be subsidized by our fellow taxpayers? We shouldn't.

If however the League is prone to raise an objection to the proposal, perhaps it should be tempered with the plea that the FCC reinstate its former policy of fostering amateur licenses wherever possible - i.e. the giving of examinations at hamfests and conventions, now currently banned for budgetary reasons. Compromises of this nature might bear fruit. *Eugene H. Hastings, W1VRK, Swampscott, MA*

● The new fee would mean that the progression from Novice Class to Extra Class would cost \$45.00 if each license were obtained in turn. The Amateur Radio Service is one of the few licensed by the FCC that is not for profit and whose license holders serve the public voluntarily.

We hope that vigorous action by the ARRL to oppose the license fee increase is initiated. *Members of the Sandusky Radio Experimental League, Sandusky, OH*

● Regarding the proposed fee increases, I can hear the QRM now! The raise from the present cost of 6.6¢ a month to the proposed 15¢ is little to pay for the privilege of operating.

So lets don't kick but count our blessings on being able to sign with a W/K prefix. Millions of others in other countries would pay any amount to be able to do so. *George L. Krause, W3DZA, Rockville, MD*

● Our club fully realizes that the present fees are inadequate in financing the expanding role of the FCC. Thus we do feel that a reasonable increase would be justified (perhaps a dollar or two in the case of a new or renewed amateur license). But the proposed five dollar hike in this fee represents a 125% increase. We cannot agree to such an action. Did someone say that the government is trying to cut inflation? *The William Allen High School Amateur Radio Club, Allentown, PA*

● Technical growth in the world is at an all-time high; for the United States to meet the challenge, as much assistance as possible must be provided for technical people. Amateur radio is a major contributor and source of technical competence. Amateurs provide tremendous technical support by being inventive and resourceful in the design and operation of apparatus. For this reason amateur radio should not be suppressed by taxation. *Hugh E. Wells, W6WTU, Manhattan Beach, CA*

● I think all amateurs should fight this docket. The F.C.C. proposes to charge the amateur more, while the commercial operators fees remain the same. Why don't they raise commercial ops' fees as they make money from holding a commercial ticket while amateurs receive no compensation. *David A. Heiber, WA0ZLU, Florissant, MO*

● It seems grossly unfair to make a newcomer pay \$9.00 each time he tries to pass a code test because the code test causes the FCC very little extra expense. To answer this objection the Club voted to offer as a variation to have the fee paid once and if unsuccessful on the code test, the applicant would be given one year before another fee would be required for that same examination. *Harold Wormser, WB4HSB Secretary, Broward Amateur Radio Club, Ft. Lauderdale, FL*

EDITOR'S NOTE: These letters, most of them greatly abbreviated, are only a portion of the letters, radiograms and comments to FCC we received on the proposed fee increases, virtually all in opposition to the FCC's suggested rates. The official comments of the League to FCC, a consensus of the ideas received at the headquarters from the membership, can be found in "Happenings of the Month," this issue.

● Amateur radio has aided the Federal Communication Commission by giving the Novice and Technician Class license examinations by mail (without charges). If this fee increase is approved then I would be in favor of all examinations he given in the presence of a official FCC examiner. *Donald A. Cofone, W6RDB, Fullerton, CA*

● Our club feels that the extra fee is unfair and will put a burden on the young amateurs (or would be amateurs), who have to depend on their small allowances or money they can make after school to get their tickets and rigs.

Also, considering all of the public service performed by amateurs without pay, we feel we should be licensed free, — other public service departments of the Government pay no fees! *Harold W. Servatius, WA7CTS, Orofino, ID*

● The life blood of this service is the bringing in of new people to try their hands and minds at the practice of this form of communication; encouragement rather than impediment is what is needed. *Romeo Bilodeau, K6PM, San Diego, CA*

IMAGE OF AMATEUR RADIO

● ARRL's Film, "Ham's Wide World" has been shown several times here on the Robins Air Force Base.

Comments have been very favorable and ARRL is to be congratulated to have come up with such a positive and well presented documentary on the past and present of the Radio Amateur.

All splinter-groups, please note — what have you done for the Radio Amateur or the Image of Amateur Radio? *Ulo Vilms, WB6LNS/J4, Warner Robins, GA*

DO-IT-YOURSELF HYDRAULICS

● The "Practical Solution to an Impractical Problem" described by W5LQH in April QST was perfect for my own personal antenna situation. I live in an apartment, and erecting a tower is against regulations. So, I employed OM Redlingshafer's idea, with some slight modifications.

I used a 40-foot tower, but dug a 40-foot-deep hole for it. I also used a 50-gallon drum, but before installing it I added a valve with a cable attached. Now, when I have the tower erected and see the apartment manager approaching, I merely pull the cable, opening the valve in the drum. The water springs into the drum and out onto the ground, bringing a resultant lowering of the tower. When it reaches the bottom of the hole, the antenna is parallel to, and level with, the ground. I have it painted green so that it blends with the ground. The manager always approaches only near enough to see that that nothing is amiss, and he never sees my 30-inch-diameter hole.

My next plans are for digging a larger hole about three inches deep so that the beam can rest below ground level, and then I can perhaps cover it with artificial grass. *James D. Cain, WA9AUM, Richmond, IN.*

● I substituted an old wooden beer barrel for the 55 gallon oil drum. However, the wood expanded when I put the water in the hole so that it became stuck. The solution to this problem was to pump the water out of the hole and pour in green beer and finally 50 pounds of salt. The results were fantastic! We got a perfect liftoff and the tower and beam were last seen heading down range emitting the familiar "Hi Hi Hi" — or was it "Ho Ho Ho"? *Sam Ward KIUX, Lincoln, RI*

● Occasionally when using this method one finds that the seal between the shaft wall and the oil drum is not sufficiently tight. This can occur from either poor soil or sloppy spade work while digging the 36 foot hole. What is needed to correct this is an "O" ring. This can be easily improvised by purchasing an inner tube from the garage at the time of acquisition of the oil drum. The tube should be stretched around the drum and partially inflated after the drum and mast have been lowered to the bottom of the shaft. We have found that if the tube is inflated with shaving cream from the usual pressurized containers, leakage rate through scratches is markedly slowed. In particularly rocky soil it may also be advisable to add a small jar of grape jelly for extra body. *Thomas C. Lloyd, Jr. W9LNB, Indianapolis, IN*

● W5LQH missed an obvious advantage when he backfilled the hole in the ground after he erected his tower.

If he had lined the hole with drums (top & bottom removed) and mounted a simple float to the bottom of the tower, he would be able to adjust the height of the antenna to take full advantage of low — or high angle radiation, whatever conditions are.

Another advantage would be to give fool proof protection against windstorm and lightning damage. Let the water run out of the hole, the antenna comes down to ground level, and there is nothing to worry about. Even the zoning commission might approve such a scheme to keep towers out of sight when not in use. *Wim Dykshoorn WB2K VE, Painted Post, NY*

● . . . Thirty-six-foot deep holes? Hmmmm. We have a lot of abandoned oil wells in the area and would be pleased to sell them in 36-foot lengths to any who want them — FOB here, of course. . *R.A. Ingrey, VESRI, Lloydminster, SK*

A WINNER

● When I first went through the March issue, I went right by "An Engineer's Ham Band Receiver" — too long — then settled down and read "High vs Low Band Antennas," real good, very interesting and of general interest.

Came the time that I should go through the whole issue, and, in fairness, sample all the articles. So, to "An Engineer's Ham Band Receiver." My first reaction was that this looks like a commercial developmental receiver, probably written on company time; real interesting, however.

In these days of "appliance operators" there probably won't be one guy in fifty that reads this article. However, we definitely need articles of this kind to keep the technically-inclined informed, and without the technically inclined in this hobby, we're dead. I doubt that I will actually make use of any of the ideas and developments here, but I support articles of this type. *Walter F. Greenwood, W0IJA, Montrose, CO*

● My vote is hereby cast for DL6WD as the author of the best technical article to appear in QST in years.

His "An Engineer's Ham-Band Receiver" shows our thin red line of home-brewers a way out of the thicket of spurious signals that surrounds us all (including the factory-brewers). *J. E. Gallo, W1AAK, Lynnfield, MA*

EDITOR'S NOTE: The ARRL directors, judging March articles for the Cover Plaque Award, agreed with W0IJA and W1AAK — this was the winner.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

- W1ATP, Theodore S. Valpey, Holliston, MA
 W1BAV, Ames Millett, Portland, ME
 W1BPH, Donald S. Bennett, Holden, MA
 W1DGF, Clinton F. Shaw, Warwick, RI
 W1IN, George B. Shaw, Woburn, MA
 WA11ZV, John Sexton, Berlin, CT
 WN1JCR, Wilfred M. Hamill, Bristol, RI
 W1JWC, William J. Lortie, Hingham, MA
 W1RFJ, Andrew J. Dietz, Stratford, CT
 W2BKC, Kenneth Bussey, Frankfort, NY
 W2BM, Earl Hermance, Hudson, NY
 W2BYL, Leon K. Sowers, Flushing, NY
 W2DGA, Matthew Walwork, Lake Hiawatha, NJ
 WB2EGN, Roy K. Everts, Sr., Ridgewood, NJ
 W2GFL, Harry C. Dracup, Moorestown, NJ
 W2HV, Edward D. Blodgett, Haddonfield, NJ
 W2JB, Benjamin N. Lazarus, New York City, NY
 K2JXY, George J. Skivington, Scottsville, NY
 K2LEW, Edwin J. Roger, Seneca Falls, NY
 W2RBF, Lewis B. Spencer, Haddonfield, NJ
 W2RRB, J. Glynn Lockner, Rome, NY
 K2UNI, Andrew Rogers, New York, NY
 W3ABB, H. Theodore Rights, Abington, PA
 W3FGN, Anthony R. Repici, Philadelphia, PA
 K3GOH, Alfred H. Brosius, Lewistown, PA
 W3IBW, James D. Booth, Catonsville, MD
 WA3JMQ, William T. Manahan, Blue Ridge Summit, PA
 W3MVF, David Bloch, Philadelphia, PA
 W3ZE, Wilbur B. Perine, Bethesda, MD
 K3ZGN, Alexander Hoyer, Mifflintown, PA
 W4BJK, Nels V. Jensen, St. Cloud, FL
 K4ROO, John A. Oates, Vienna, VA
 W4DRC/ex-W9OKZ, Harold A. Rensch, Ft. Lauderdale, FL
 W4EJE, Walter O. Nisbet, Jr., Charlotte, NC
 W4FGN, John H. Straub, Geneva, FL
 WA4GMA, Wayne Taylor, Mayfield, KY
 WN4JWP, Odis P. McFolin, Murfreesboro, TN
 W4KAH, Perkins Coville, Arlington, VA
 W4KGY, B. Harold Storie, Chattanooga, TN
 WA4KJW, Earl R. Price, Clearwater, FL
 W4QF, Elmer F. Eld, Hopewell, VA
 W4RLM, Julian Woodson, Roanoke, VA
 WA4ROP, James C. "Jake" Machen, Huntsville, AL
 W4SOM, Carl B. Ragsdale, New Port Richey, FL
 WA4TZI, Joseph Patterson, Ft. Pierce, FL
 WA4WVU, George A. Holder, Concord, VA
 W4YAL, Dr. Thomas B. Coleman, Louisville, KY
 WS4UU, Herman G. Stermer, Conway, AR
 W5IGW, Harold J. Day, Greenville, MS
 K5LFI, David Nicholson, Brownfield, TX
 W5LYW, Ralph W. Lautzenheiser, Springdale, AR
 K5MFY, Levi H. McGarrh, Stewart, MS
 W5OCG, William H. Peel, San Antonio, TX
 WA5SJR, William Smilanch Jr., Carlsbad, NM
 WA5WST, John A. Fulmer, Jr. Marrero, LA
 ex-W6AIG, Norel O. Gunderson, San Bruno, CA
 K6AJ, Harry Gaugh, El Cajon, CA
 K6AZK, Boyce Frank Elliott, Seal Beach, CA
 K6BGZ, Hugh Looman, Auberry, CA
 W6COU, Howard L. Smith, Carmichael, CA
 WA6DFI, William A. Sassaman, Palos Verdes, CA
 W6GJO, Joseph Geiger, Stockton, CA
 K6IYI, Carl Sundstrom, Palos Verdes, CA
 ex-KN6LEA, Monte R. Stark, Inglewood, CA
 WB6MEA, Thomas V. Davis, Alameda, CA
 K6NPN, Walter O. Harrns, Sacramento, CA
 K6ONI, Frank E. Carney, Green Valley, CA
 WA6PTW, John E. Mikkila, Redwood Valley, CA
 K6QIP, Thomas S. Faherty, Palos Verdes, CA
 W6RT, Brig. Gen. James G. Smith, Solana Beach, CA
 K6SFIJ, Raymond Goldsmith, Stockton, CA
 W6TC, Percy T. "Ted" Crosby, Sun City, CA
 WB6VKM, Robert K. Champion, San Diego, CA
 WB6VYZ, Donald P. Steen, Fresno, CA
 W6VZE, Charles Glidden, Burlingame, CA
 W6WOZ, John F. Meikle, Campbell, CA
 W6YC, Eugene B. DeTurck, San Francisco, CA
 W7AMF, Frank L. Black, North Bend, OR
 W7BAJ, Parley James, Salt Lake City, UT
 W7BGA, Col. Willard R. Seymour, Tucson, AZ
 WA7COE, Josiah S. Knowles, Seattle, WA
 W7CXR, Ernest E. Boyce, Auburn, WA
 K7FGX, Chester M. Bowdle, The Dalles, OR
 W7GGO, Glenn H. Luse, Spokane, WA
 W7R1C, Richard E. Lawrence, Jerome, AZ
 W8ADN, Virgil Wooley, Springport, MI
 W8BOS, Willard J. Hamburg, Cincinnati, OH
 W8BTL, Albert Labz, South Haven, MI
 W8EUQ, Miner Kerr, Lima, OH
 W8GUV, Harry E. Smith, South Charleston, OH
 K8HRS, Alex J. Dolgash, Ashtabula, OH
 WA8JCC, Paige F. Sions, Martinsburg, WV
 W8JSI, Irwin S. Lowitz, Cincinnati, OH
 K8KZR, John D. McCord, Charlestown, WV
 W8OYI, Ivan L. Lambert, Grand Rapids, MI
 K8OJG, Jay Bowers, DeGraff, OH
 W8ZGV, Francis W. O'Hare, Essexville, MI
 W9ADA, Lester O. Marholz, Glenview, IL
 W9FAF, Frederick Cooper, Kenosha, WI
 WA9EJJ, Herhert J. Cotner, Logansport, IN
 W9HSP, James F. Livers, Mooresville, IN
 W9HUW, Robert C. Clark, Lafayette, IN
 W9IPB, Solomon G. Myers, Pekin, IL
 K9JET, Frederick O. Stahhut, Indianapolis, IN
 W9KBI, Lawrence J. Guilette, Racine, WI
 W9KBT, Clinton E. Gates, Janesville, WI
 W9MA, Lester M. Smith, Salem, WI
 W9MRH, H. R. Crawford, Saybrook, IL
 K9RIC, Charles Blalock, E. St. Louis, IL
 W9TTC, Ernest A. Winternheimer, Indianapolis, IN
 W0BUL, Charles Gosch, Webb City, MO
 W0DDW, Billy C. Baldwin, Waterloo, IA
 W0EL, Courtright Hawley, Jr., Anamosa, IA
 W0FC, Henry J. Bannon, Webster Groves, MO
 W0FGP, Christian H. Knobel, Minneapolis, MN
 W0HWZ, Gerald Rothweiler, Denver, CO
 W0KFN, Catherine Tepley, Pipestone, MN
 K0LJU, Wesley O. Bice, Boone, IA
 K0LVI, Otto Schiernbeck, Davenport, IA
 W0VDH, Robert L. Filbert, Leavenworth, KS
 W0VPO, E. Nelson Toops, Waynesville, MO
 W0VVM, Elmer R. Stoockel, Davenport, IA
 W0WHC, Esmond D. Rider, Farmington, IA
 KH6FKO, Fenton Earnshaw, Honolulu, HI
 KP4AVB, Manuel Perez-Romero, Santurce, PR
 KP4CS, Manuel Sabat, Fajardo, PR
 VE3CUZ, George F. Stiff, Galt, ON
 ex-VE3YQ, James Robbins, Brantford, ON
 VE6AFB, John W. Buchanan, Edmonton, AB
 VE7UL, George Dunn, Kelowna, BC
 CP8AP/ex-W0YBH, Darwin Schlenker, Riberalta, Beni, Bolivia

YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,* WB6BBO

Field Day

JUNE IS roses, brides, graduation, Father's Day, and June is Field Day, the most exciting, colorful, and surprising event of the amateur radio calendar. From one coast to the other, from the Gulf of Mexico north into VE-land, women operators will be participating in this annual activity as a YL club project, or with the OMs of their local radio club. They'll be there bright-eyed and eager — and neither static, nor weather, nor quirks of the ionosphere, will keep these amateurs from their assigned positions, for Field Day has something for everybody.

It's a contest unlike any other contest, held out of doors with personnel roaming all over the place, and the operators sitting side by side concentrating on just one thing — points. It's a time when two operators often work at the same station, one to log, and one to operate. It's a solid stream of cw and a steady murmur of voices. It's Field Day.

It's weather. It's that windstorm that almost collapses the tent and three YLs clinging to the pole to insure safety of heads and equipment, while the operators never stop working. It's a cold wet mist creeping in and making Bugs stumble under numbed fingers, and it is humid, almost breathless air. It's rain in sheets, and it's electrical storms that stop all activity, except the vhf portables that aren't stretching long strings of copper between the operators and Jupiter Pluvius. That's Field Day.

*YL Editor, *QST*. Please send all news notes to WB6BBO's home address; 1036 East Boston St., Altadena, Calif. 91001.

It's operating. It's the veteran contest operator digging down under all the pile-ups for that weak, watery whisper as easily as he works the S-9 stuff. And, it is the faltering efforts of the beginners who have never tried it before and who will learn by doing (as amateurs have done since the beginning of the hobby) and who will leave well on their way to becoming polished contest operators. That's Field Day.

It's surprises. The brand new receiver that began transmitting smoke signals; the newly purchased Bug that kept falling apart no matter who tried to use it; the antenna that, after much testing, absolutely guaranteed excellent operation, but refused to load; the frozen moment that all activity stopped and no one moved when the skunk visited the site and roamed, in idle curiosity, for ten aromatic moments before leaving.

It's people. Little knots of people gathered around the station that is working them hand over fist. The rag chewers' corner where the fire and the coffee and the chatter go on most of the night. It's the starry-eyed Novice looking at the operation and pointedly showing poppa the most expensive gear. The Field Day Chairman checking points, and participants, and food. The club worrier who is sure something will go wrong, and who evinces great satisfaction when something does. It's the gust of amusement over the operator of some other station who uses a sing-song technique and weird phonetics.

And over, and under, and around Field Day is the throb of the generator that colors the entire activity with that special something that is Field

Bert, W3TND, fastening 6-meter antenna guy wire.



WA3ATQ, Harriet at 75-meter phone with K3ZDW logging.





WA3ATQ assisting, OMs W3KKN holding the mast, W3QXT steadying the ladder, installing FD antennas for PJ-YL.



Ellie, K3TNK with WA3ATQ logging.

Day. It's operating away from comfort, from the familiar shack under emergency conditions and the generator is the theme, the accompaniment to the continuous murmur of the voices and the sharp high-pitched cw.

Field Day is a miniature club meeting, a hamfest, a greeting of new members. It's a serious contest and a picnic. It's antennas, and weather, and equipment, and logs, and participants, and it's people, and coffee, and mosquitoes, and high-tension operating. It's all of amateur radio crammed into a few hours of fun and service. And when limp from exhaustion, and hoarse and dit-happy we get home, what then? We warm up the gear and go back on the air for that most delicious part of the entire activity, when everything from the stove that wouldn't light, conditions, skip, to the aching back from sleeping on

two chairs are recapped and enjoyed all over again. That's Field Day, CU there?

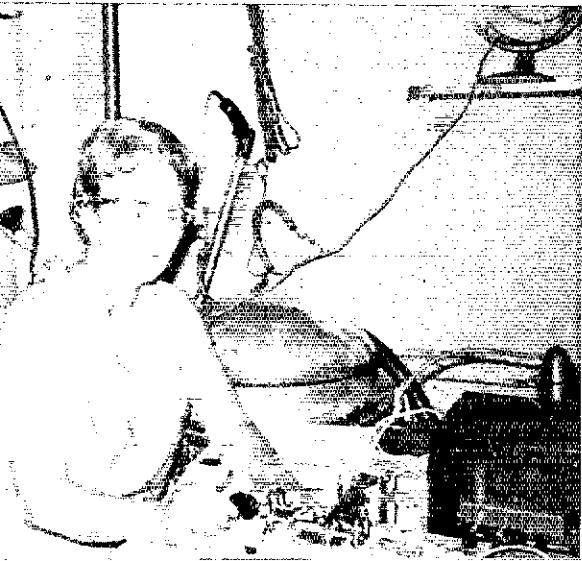
First YL in Antarctica, W6NZP/KC4

If you are an avid amateur, and an avid traveler to far-away places with strange prefixes, you find yourself (as Evelyn has done) coming very close to DXCC-"Eyeball." In her collection of countries, she has managed to roll up a very thundering score of seventy worked by personal visits to amateurs in those countries.

At 77, Evelyn is busy running the Scott Radio Supply in Long Beach, California. She is one of the founders of YLRC/LA, and, during the last war, was very active in WERS. Her abiding interest is DX, on the air, and in person. She has been DX herself, working from Fiji, New Guinea, and as KS6AF in American Samoa. When she isn't doing that, she is visiting amateurs all over the world.

WA3CAP, Amy, 80-meter cw, PJ-YL Field Day.

Sleep is where you find it. K3YPH, Dotie at PJ-YL FD.





Evelyn Scott, W6NZP, since her camera was lost, Evelyn had to model her "Little America" outfit at her home in Long Beach.

It isn't strange that in looking for new lands to visit Evelyn would decide to visit Antarctica, nor is it strange that in doing so she would become the first YL to operate from the land of penguins and ice. And she did just that after a trip south on a Norwegian ice breaker where she enjoyed the unique experience of breaking through icebergs on the way. The crew at KC4USP had been alerted of her coming visit, and were waiting to welcome Evelyn. The station was at her disposal and she worked for eight hours, barely making it back to the ship before it sailed.

Where next? "Siberia," says Evelyn.

Mid-west YL - Last Call

There is still time for those who waited for spring cleaning, Easter, and end to school before making plans for the Mid-west YL Convention. Registration won't close until the last gal checks in so just remember the dates June 19,20,21, 1970, at the Drifter Motel, 8416 Corunna Road, Flint, Michigan. All you have to do is be a YL with an amateur radio operator's license and you are eligible to attend. If you have an OM who would like to come along there are special activities for his interest while the gals are busy.

Plan Ahead

If the "big one" is on the calendar for you this year, there will be a very excellent program for YLs attending the National ARRL Convention, in Boston, Massachusetts, September 25-27, 1970.

More on Norwegian YLs

LA6XI, Traffic Manager of NRRL, has added five more calls to the list of YLs with amateur radio operators licenses in Norway. LA2ZH, LA3RN, LA4EN, LA6JJ, LA6LF, making a total of 54 women in Norway with amateur licenses.

Address Change

YLRL Eastern Membership Chairman, Marge Campbell, K4RNS, notifies her change of address

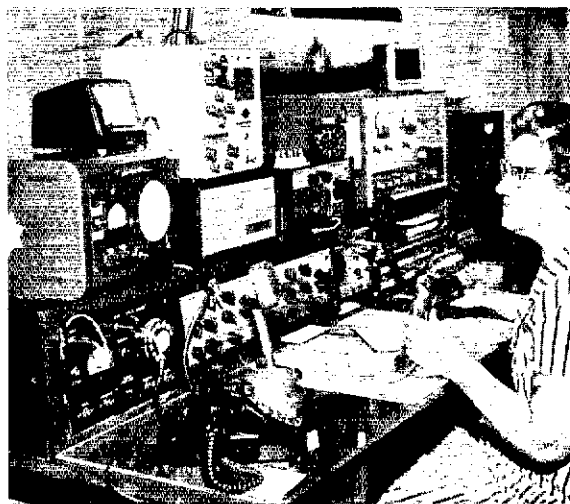
for all those interested in YLRL membership. Address all correspondence to Marge Campbell, K4RNS, 65 North Arbor Drive, Ormond Beach, Florida, 32074.

Mildred O'Brien, W6HTS/AF6HTS

Mildred's amateur license will be old enough to vote this December, for she was licensed in 1949 and, as are all of us, has been busier than a cat in a creamery ever since, and just as happy.

Far more familiar to many of us as AF6HTS, Mildred spends most of her time in Air Force MARS activity with her operating spread over cw, RTTY, and ssb. Although she enjoys all three, that "personal touch" of the phone patch comes first with her, and RTTY second. Cw comes in for her message service, relaxing, and teaching code to beginners, for in her full schedule she reserves a place for that important part of radio.

A member of RACES, she is active in the county emergency net and has assisted in communications services in many kinds of emergencies: forest fires, floods, the search for lost children, as well as long hours at the rig during the Alaskan Earthquake.



W6HTS, Mildred O'Brien.

Mildred's activities as W6HTS have resulted in WAS/10 Meters, WAC, many Public Service Awards, and WAC/RTTY, although she has not applied for a certificate for it.

Five members of the O'Brien family are amateurs. OM, Jack W6HSB, was active when spark was king, son, Jack is W6GDO, and his wife, Kay K6HHD, and a grandson, has the call WN6FZL. Another grandson has passed his test and is impatiently waiting for his call. When she isn't up to her ears in RACES, or AF MARS, W6HTS may be found on 20 meters.

QST

**SWITCH
TO SAFETY!**





CONDUCTED BY BILL SMITH,* KØCER

F2 — EME — MS — et al

OUR USUAL format calls for a lead on some pertinent topic, but this month there is so much interesting operating news that we will go into it directly.

50-MHz. DXers enjoyed another round of April F-layer openings, while finding South Americans and ZK1AA workable from the more southerly parts of United States. Rumors of the Japan-to-Argentina work are as yet unconfirmed. Here is a day-to-day report, and late information on the events of the March aurora.

March 8: WA5IYX, Texas, says the morning muf appeared to barely reach 32 MHz, but backscatter was noted from WA5TTH at 1905 GMT. At 1930, backscatter disappeared but suddenly returned, with exceptionally strong signals at 2230 GMT. WA5IYX heard and worked 4s, 5s, 6s, 7s, 8s, 9s and 0s until 2338 GMT when direct F-layer to Puerto Rico began. The KP4 signals ran typically 30 dB stronger than the backscatter signals. At 0000 GMT, March 9, the KP4s suddenly disappeared, followed ten minutes later by all backscatter signals. K5MDV, Louisiana, worked three 6s on backscatter around 2300 GMT and also heard 2s, 4s, and 7s. WA6HXM says the backscatter opening lasted almost four hours in the Los Angeles area. Pete worked 2s, 5s, 8s and 9s, and heard all other U.S. call areas except KH6 and KL7. WA0BOK, Nebraska, reports working KP4AZA at 2343 GMT on what appears to have been direct F-layer. Jack says the KP4 was workable for about 4 minutes. Jack's rig is a single 5763 running about 10 watts of a-m and a 4-element Yagi. Signals both ways were S9. VP2MJ worked WA5TTH, K5MDV and WA8HPY.

March 9: WA5IYX, Texas, reports late-evening (0220 GMT, March 10) Es to Georgia and Ala-

*Send reports and correspondence to Bill Smith KØCER, ARKL, 225 Main St., Newington, Conn. 06111.

bama, followed at 0250 GMT by the ZK1AA beacon near 50.1. The South Pacific DX faded at 0310 as another E-opening was building into Alabama and Louisiana. K5MDV, Louisiana, reports working VP2MJ, apparently on backscatter, but Ron didn't say at what time.

March 10: K5MDV worked TE into South America at 0155 GMT, contacting LU3DCA and hearing OA4C's beacon. K5AGI and WA5TTH, both Louisiana, worked LU3DCA and WA5TTH worked OA4C. The band closed at 0250 GMT.

Six-meter conditions between March 10 and March 30 could be considered normal, whatever "normal" is at 50 MHz. The activity beginning March 30 was likely the result of a March 28 solar flare. It touched off a series of interesting WWV GEO alerts, but produced no aurora workable at U.S. latitudes.

March 23: XE1PY worked several Argentina and Uruguay stations on F2 beginning at 2030 GMT, among them LU6EAM and CX1AAX. Rusty also heard ZK1AA at 2115 GMT.

March 30: JA1MRS, Japan, worked ZK1AA at 0247 GMT. WA5TTH, Louisiana, logged W5SFW, Texas, on backscatter from the South Pacific at 1906 GMT. From 1952 until 2020, Mary heard the ZK1AA beacon, direct F-layer. At 2021, K5AGI worked LU3EX and LU6EAM while hearing also Oklahoma, Arizona and Southern California on backscatter. W6ABN was the last signal heard, at 2216 GMT. During this period, XE1PY worked ZK1AA.

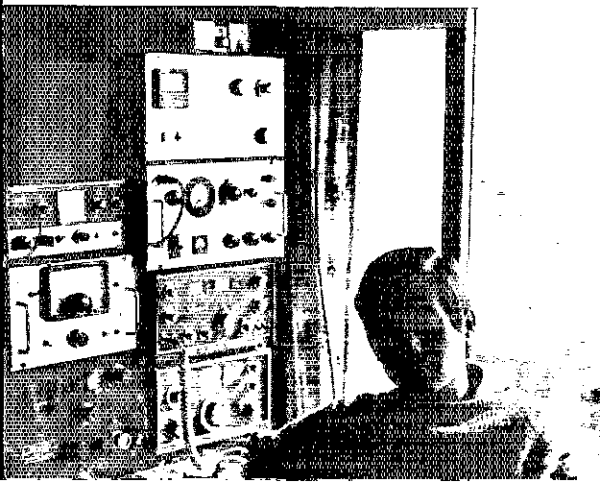
March 21: WA5TTH logged the ZK1AA beacon from 1855 to 1924 GMT. Later that evening, April 1 GMT, WB6NMT, WB6KAP and W6YKM worked ZK1AA from 0700 to 0720 GMT. (We understand that ZK1AA was worked several times by W6s during late March and April but contact dates were not reported to your writer.) VP2MJ heard ZK1AA 6 times in March and 8 days in April.

April 2: WA5TTH began hearing the ZK1AA beacon at 1831 GMT and after one year of trying. Mary and husband K5AGI worked ZK1AA at 1842. ZK1AA's signal faded on F-layer at 1911, but a K5AGI - VP2MJ contact was made on backscatter from the South Pacific at 1918. The band closed at 1940.

April 3: ZK1AA's beacon was logged by WA5TTH for 11 minutes beginning at 2009 GMT. VP2MJ worked XE1GE.

JA1MRS is one of Japan's leading six-meter DXers. Details of his station and recent contacts appear elsewhere in this column.

QST for



April 4: JA1MRS worked DU1ZAI in the Philippines at 1325 GMT. WASTTH heard the ZK1AA beacon from 1930 to 1934 GMT, beginning what proved to be an interesting day. Note this is the 27-day recurrence date for the March 8 aurora and F-layer opening. From 2030 until 2210, WASTTH heard W5WAX, Oklahoma, WA7FLB, Arizona, and WA6HXM on South Pacific backscatter. Between 2128 and 2210 GMT, WA6HXM worked the first reported F-layer DX between Southern California and South America this year. Pete contacted LU3DCA, LU8AHW and CX8GU. He also heard LU1MBJ plus several W5s and 6s on backscatter. W6YKM heard LU3DCA call him but couldn't work the Argentine through the Los Angeles interference. Fred did work K6ODV on backscatter. W5WAX says W5RAG, Texas, heard weak F-layer to Argentina at 2015 GMT but had to wait for an evening TE opening to work LUs and OA4C. WA51YX, San Antonio, worked Arizona and California on backscatter at 2100 GMT, followed by a F2 contact with LU9AX at 2115, and a partial contact with LU3DCA at 2128 GMT. The band closed at 2145 with backscatter from K5AGI. K6QEH was heard by VP2MJ at 2100z.

April 5: WA51YX began working South Americans on TE at 0135 GMT, including OA4C at 0200. OA4C also worked VP2MJ, XE1GE, W4s and 5s. The TE ended at 0330. At 1950 GMT, WA51YX began hearing backscatter from K5AGI followed at 2005 by ZK1AA on F2. WA51YX heard and worked ZX1AA until 2030. At 2118, F2 to South America began and lasted until 2125. WA51YX worked LU3EX, heard LU8AHW. JA1MRS worked KX6HK, Marshall Islands, at 0637 GMT. WA6HXM, in Los Angeles, logged the ZK1AA beacon between 0230 and 0330 GMT and says that WB6NML worked ZK1AA. WASTTH began hearing ZK1AA's beacon at 1933 followed around 2000 with contacts between ZK1AA and WASTTH, K5AGI and K5MDV, all Louisiana, and WA51YX in Texas. W5WAX heard ZK1AA weakly in Oklahoma at 2020 GMT while also hearing backscatter from Louisiana, Arizona and California. WASTTH lost ZK1AA's signal at 2049 and the last backscatter signal heard, W5WAX, faded at 2025 GMT. Mary says several other 5s, busy ragchewing 10 kHz above ZK1AA's 50.10 frequency, did not hear Stu call CQ! VP2MJ worked XE1GE.

April 6 - 7: No reports received, except reception of XE1GE by VP2MJ on the 6th.

April 8 - 10: WASTTH heard and worked ZK1AA each day between 1900 and 2100 GMT. (Makes one want to move to Louisiana!)

April 9: WA51YX noted the muf approaching 50 MHz towards South America at 1700 GMT, followed at 2000 by a pounding 599 signal from ZK1AA's beacon. Pat worked Stu at 2013.

April 11: K5AGI worked OA4C at 0205 GMT on TE at 1820, backscatter from the South Pacific began and K5AGI worked VP2MJ, followed at 1915 by a direct F-layer contact with none other than ZK1AA. John says Stu also worked several New Orleans area stations. Anyone in Louisiana who missed working ZK1AA just wasn't listening! WA51YX first noted backscatter from South America at 1835 GMT. A South American F2 opening began at 1945 with CX8BE followed by LU3DCA. The band quickly folded one hour later. While K6AGI was working ZK1AA, W5WAX in Oklahoma was knocking off contacts with South Americans CX1AAX, CX 8BE, LU3DCA and LU3EX on F2. Sam says the signals were terrific and that he heard LU3DCA work a station in Missouri.

April 12: W5RAG called a CQ at 1910 GMT and was answered by ZK1AA. WA5HNK and another 5 also worked Stu. This was the first time ZK1AA was heard in Houston. At 2025 GMT, WA51YX heard LU3DCA on bursts, apparently due to a meteor scatter-to-F2 link. Pat says the ms signals from LU3DCA indicated F-layer signals from LU3DCA present some 800 miles south of San Antonio. Wouldn't that be interesting on 144 MHz?

— — —

Urly, CE3QG, once a common catch on six meters, has disappeared and has not been reported this spring. Several stations, including XE1PY and OA4C, are trying to learn what has happened to him.

The June vhf contest should offer interesting DX possibilities. WØEKB, WØJCO and KØCER will be active from June 9 to 18 in Ketchikan, Alaska, with a yet-to-be-issued KL7 call. A kilowatt and stacked 5-element Yagis will be used.

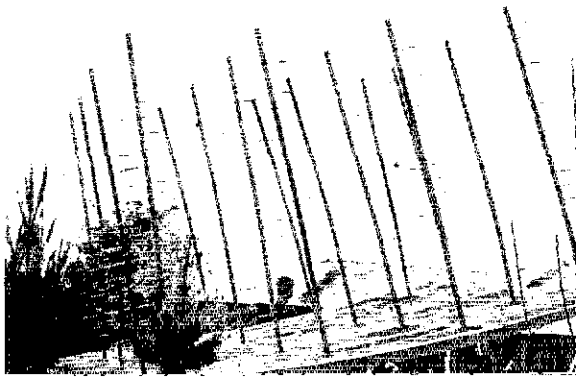
W4GDS, K8BBN and K8GMR will travel to Grand Cayman Island in the Caribbean June 7 through 14. The call will most likely be ZF1RS. W4GDS says they will run a kilowatt and 5-element Yagi.

And from the rumor mill, word has it that W5SEW will travel to British Honduras for some VPI DXing sometime during June.

Several stateside operations are planned from the relatively rare states of Utah and Idaho.

WA6HXM says K6ODV has been assigned Australian call VK2BBL and will be active on six meters, as well as 10, 15 and 20.

This array of sixteen 10-turn Helical beams was used by WB6NMT in the first successful 220-MHz EME contact, with W7CNK, and soon after, with K2CBA.



Nose, KH6IJ, well-known for his many ham exploits in the contest field, reports working ZK1AA often during March and April. Nose says also he is seriously considering 2-meter moon-bounce. You may be certain that if KH6IJ enters the EME field he'll do it right!

Japanese six-meter man JA1MRS writes of working ZK1AA several times last year and again this April. Michio has worked 9 countries during the present solar cycle: Philippines, Korea, Guam, Marshall and Cook Islands, Papua, Australia and Okinawa. JA1MRS has a homebrew 50-watt ssb rig and 6-element Yagi. Michio says his friend, JA1ODA, has worked similar DX, plus New Guinea and Wake Island, JA1ODA has 50 watts of ssb and stacked 4-element Yagis. Recent DX worked from Japan has mostly been numerous Australians.

Gene, KL7GLL, at Sitka, Alaska, says he now has a Viking 6N2 and 6-element Yagi, cw only. He will soon put the 6N2 on 2 meters and try meteor scatter into the lower 48. Gene also mentions that KL7EOG, Annette Island, has a SB-110 and 5-element Yagi but is apparently having rig problems.

K5PJR and K5CFN, both Oklahoma, are looking for nightly scatter schedules. K5PJR has a wide-spaced 5-element Yagi and a pair of 4CX250Bs. Tony comments on the fine scatter signal from K8BBN, Ohio. Amen brother, Jim's scatter signal is nearly solid in South Dakota!

WA3NGU and WA3NUY are ready to try scatter work from Nanticoke, Pa. K3EGK sends a late report on the March 8 aurora. John worked 6-meter state number 39, Rhode Island, all with 50 watts. WB9CSH bemoans the lack of activity in Southern Illinois. Offe moved there one year ago from Detroit where he says activity is high. He is running a 6er into a TV antenna. Perhaps more power and that 6-element Yagi you're considering will help. There shouldn't be any lack of stations in the St. Louis area.

Jim, W7VDZ at Casper, Wyoming, is now active with a kw and a 23-foot Yagi, offering summer Es and aurora contacts.

144-MHz moonbounce has nearly become commonplace within the last several months. Mainly responsible is the large antenna in Puerto Rico, built by Sam Harris, W1FZJ. Sam has a new call, KP4DJN.

VE7BQH says that KP4DJN worked SM7BAE, Sweden, K6MYC, and VE7BQH three times each during March, plus two contacts with KH6NS. Sam may have made other contacts not reported. K6MYC had a successful exchange with SM7BAE, April 10. VE7BQH had near contacts with K6MYC and he is hearing SM7BAE, scheduling KH6NS.

Mike, K6MYC, says there have been so many contacts that those participating aren't keeping score as close as they did previously. According to Mike, KP4DJN worked SM7BAE three times and VE7BQH twice between April 9 and 17, but the best EME path seems to be that between ZL1AZR and SM7BAE. They are having consistent contacts and usually with good signal levels. ZL1MO may soon join the growing EME ranks. He is hearing signals and expects to complete his transmitter soon. EME interest in VE1 and VE3 is growing rapidly, with several individuals and groups building systems. VK3ATN is busy completing a 28-foot steerable dish which will have also a steerable feed.

K1HTV, best known for his meteor scatter work, has built an 80-element collinear for moon-bounce. His first tests in early April were encouraging. On the 9th, Rich heard KP4DJN but signals were weak. The next day Rich answered a KP4DJN CQ and was answered by Sam, but signals again faded. (KP4DJN's frequency is 144.032) Results were similar on the 11th, 12th, and 13th, although on the 13th, K1HTV received a 229 report from KP4DJN. On the 14th, a series of schedules involving VK3ATN, K1HTV, K6MYC, ZL1AZR and VE7BQH was held. K1HTV heard some signal from VK3ATN, and VK3ATN reported reception of K1HTV and VE7BQH. Lionel, VE7BQH, says KP4DJN has also been running moonbounce schedules on 50 MHz with WB6NMT, W7FN and W7CNK. As yet, there has never been a 50-MHz EME contact.

Following are some late March 8 aurora reports. K2MHJ, Liberty Corner, N.J., lost interest in vhf last summer, but when he noticed unusual conditions on the hf bands he listened on 2 meters. What he heard prompted him to fire up his kilowatt into a 15-meter (!) Yagi and work such goodies as W5WAX, Oklahoma, and Illinois, Michigan and others. Bill says he's again gung-ho on vhf and will be on 432 and 1296 this summer with a 100-foot tower holding the antennas. WB2SIH added a new state, K4GOF in Kentucky, plus the usual helping of 1s, 2s, 3s, 4s, 8s and 9s.

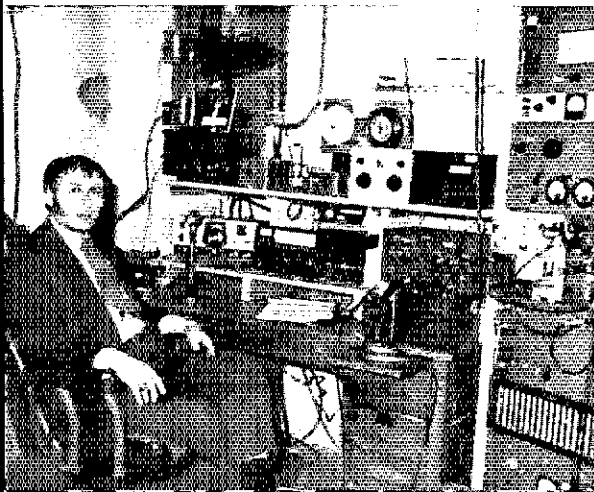
K4EJQ, says the aurora began in Tenn. about 1930 GMT and lasted three hours. Bunky worked all U.S. call areas except 5, 6 and 7. He heard no aurora at 432 MHz.

K2ZAT/8 recently retired from the Air Force to Ohio. Kelly is apartment-bound and is having the expected TVI complaints. Through a mutual agreement he does late-night operating with his kw and 15-element Yagi. He worked 9 new states during the aurora, bringing his total to 20. He briefly copied W0EYE, Colorado, but was unable to work Don. A Nebraska contact was Kelly's best DX. K2ZAT/8 wants tropo and ms schedules. Write to him at 720 Orville Street, Apartment 17, Fairborn, Ohio 45324.

W0MOX, Colorado, was working and missed the aurora's peak, but did manage two contacts into Nebraska. VE2DFO, plagued by an S9 line noise, couldn't work the weak ones, but did manage a few contacts including a 775-mile haul to W9PBP in Illinois.

XF1PY's 2-meter activity has been curtailed while he moves to a new home 75 miles south of Mexico City. Rusty says he will install a rhombic 15 wave-lengths long per leg pointed due north on

W0LCN, Minneapolis, is ready for summertime tropo DX on 144 and 432 kilowatt.



QST for

the states. He expects to rebuild the 28-element array used in Mexico City. The transmitter will be the same, a Collins 62S1 driving a SCX1500. The 62S1 will also be used for receiving, along with a 416B preamp. On six meters, Rusty will run a pair of 3-400Zs to 6 elements at 90 feet.

The only meteor scatter activity to report this month is a random meteor contact April 11th between W3BHG, Delaware, and WA0CHK, St. Louis. W3BHG says they had scheduled since January, so "persistence pays off." The contact resulted in a new state for each.

Meteor activity is now swinging into its annual summer peak, beginning with the April Lyrids shower. Those wishing to try meteor scatter for the first time will find the month-long period beginning in mid-July an ideal time. Shower and random-meteor activity peaks, and the chance of some success is good.

Central States VHF Conference

The Central States VHF Society will hold its fourth annual VHF Conference August 21 - 23, near Wagoner, Oklahoma. This meeting had its beginning at the same site, and it has since developed into one of the most travelled-to vhf affairs held anywhere. It is not large, as ham gatherings go, but the caliber of program and interest generated among outstanding vhf enthusiasts are unexcelled.

This year's Conference will be no exception. Already scheduled are discussions on solid-state devices, 50-MHz DX observations, 2300-MHz moonbounce, converter noise figure measurement, and a special feature, "VHF - Past, Present and Future," by Ted Mathewson, W4FJ.

The Conference is being held at a lake resort, and special activities for wives and children have been planned, to make attendance a family affair. Further information may be obtained from W5WAX or K5WXZ.

The West Coast session of similar nature, usually held in May, has been postponed to October or early November, likely to be in San Jose. Further details on this one later.

Fm Notes

VE6MX says Alberta 2-meter activity centers mainly around the VE6AUY repeater at Calgary, 146.46 input, 147.00 output. A net is held Wednesday and Friday at 0200 GMT. Stations active include VE6MX, VE6ASL, VE6APC, VE6AAX and K7DJV when tropo is good.

WB8CEH, Dayton, says his repeater is working, 146.34 input, 146.76 output. He says the channel is monitored constantly by K8YQH. K2LAY reports the Binghamton Amateur Radio Association (BARA) has a simplex operation on 146.94. The base station is operated by W2HDO. Other stations active are K2LAY, K2YYF, WA2MSQ, WA2OMI, WA2RXY and W2EDN.

VE6MX Crystal Warmer

With temperatures running from zero to minus 40, some thought must be given to frequency stability of fm mobiles used in Canadian winters. Crystal ovens are available for this purpose, but the simple crystal warmer shown has proven to be very satisfactory in my mobile rig.

Ron LaBorde, K5MDV, operates this impressive layout at Metairie, La. A 3-1000Z final is responsible for a big signal on 50 MHz.

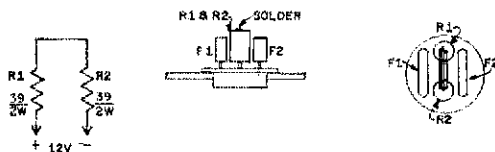


Fig. 1 - Details of the crystal warmer by VE6MX. The two resistors, drawing only 150 mA, generate a small amount of heat and help to stabilize the frequency in a mobile fm rig in severe winter weather.

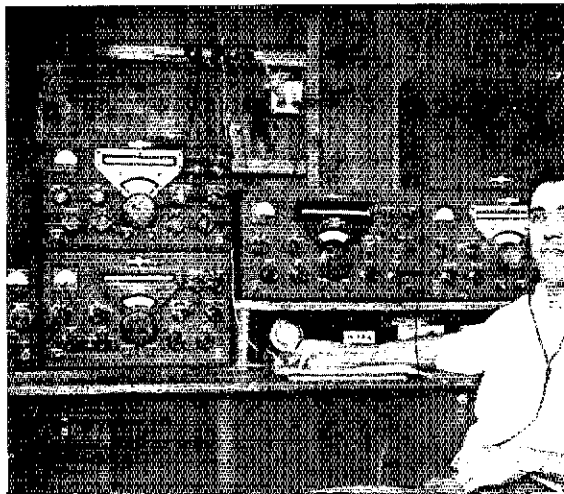
As shown in Fig. 1, two 39-ohm resistors are connected in series and mounted between the two crystals in a dual mount. The resistors are connected to the 12-volt line. They draw only 150 mA, so they may be left connected in mobile installations that are used frequently. A switch can be installed to cut off the small battery drain if the car is to be left unused for long periods, but otherwise the heating effect should be left on at all times, particularly in cold weather.

Not often do we get RTTY information, but WA2PMW, secretary of the Tu-Boro Radio Club at Whitestone, Long Island, reports much RTTY activity in the New York City area, nightly, after 0100 GMT, on 145.62. He says we should consider a separate box for states worked on 2-meter RTTY. That thought turns my hair grey after all the problems with the existing boxes! In addition to the NYC area stations, Louis notes K1LTJ, Conn., W2NCA, N.J. and WA3GBK, Maryland, as active. Anyone using RTTY on tropo or meteor scatter paths?

Jack, K4NTD, says Florida 2-meter ssb activity has boomed the past six months; 5 to 10 stations can be worked any evening from Jacksonville to West Palm Beach, and even W4CKB is on ssb.

220-MHz EME interest continues. WB6NMT (see Louis' array elsewhere in the column) says WA9RJ1 at Waterloo, Iowa may soon activate a 220 EME system. WIQXX is working on his system and Sam, KP4DJN, is working on dish feed problems. KH6EEM apparently is starting work again on his 220 system.

In Florida, WA4NKN, near Orlando, has recently completed a ssb mixer and receiving converter. WA4NKN has been hamming for nearly 50 years, and was on vhf in Wisconsin as W9GGH. Also on 220 in Florida is W4VND. WA4GHK is active but K4IXC is off again repairing wind-damaged antennas. John, you do have some tough luck!



432-MHz activity should be picking up again about now, with spring building projects awaiting favorable tropo conditions. WA1FSZ, Concord, N.H., is building a 5894 transceiving converter to go with his new 40-element collinear. Dale says WA1XZ and WA1LU, both in Bow, N.H., are building 432 gear. Sounds as though New Hampshire is about to become well represented on 432. In Connecticut, WA1MRF is interested in A1V and is on 144.08 nightly looking for other interested parties.

W2CUX reports on New Jersey activity. Orville says W2AZL, who owes me a letter (couldn't resist that, Carl!), has a 6939 ssb mixer going and has worked four states. W2CUX has built a similar rig, which is a W2AXU design. W2AZL says W2AXU has the best 432 ssb he has ever heard. K2QVS (good call for a reporter to this column!) has 8 states confirmed with only 2 watts measured output, and a 32-element collinear. Jay uses a 2-stage KMC 5000 preamp and offers a schematic and layout for a stamped, self-addressed envelope. He is presently working on a strip-line amplifier to boost his power to 100 watts. WA2EUS has a new 40-element collinear and 40-foot tower.

K3UQD will be ready for 432 EME July 1 with a 20-foot polar-mounted dish. The transmitter is a single-ended 8791 amplifier. Greg says 449-MHz fm works well in the Pennsylvania hills; better than 144. K3CFA continues his schedules across Pennsylvania with W3RUE, having reasonable success.

WA7GFP, Oregon, writes of a repeater on Mt. Scott, near Beaverton. Input frequency is 449.17; output 447.17. Further information is available from K7SJO.

K8REG says the March 8 aurora produced some buzz on 432. Vince heard aurora-reflected radar for 2 hours beginning 2030 GMT. He heard but couldn't raise K4EJQ, Tenn., at 2115 GMT. Vince doesn't understand why the aurora didn't produce more and better signals at 432.

W0MOX, Colorado, is building a 44-element Tilton Yagi array. In the Twin Cities, W0LCN has a kw. He wants schedules with Wisconsin, Michigan, Indiana, Nebraska, Missouri and North Dakota.

2300-MHz EME continues to be explored by W3GKP and W4HHK. Through April 10th, results of their attempts at the first 2300-MHz EME contact remained substantially the same as reported last month. They are regularly exchanging bits of information including calls, but they are not calling their tests a "contact" as yet, though many would accept their results as contact proof.

On April 6th, W3GKP had an interesting experience. Smitty was testing his system when he thought he heard another moon-reflected signal. He shut down his transmitter and heard DJ4AU calling him! Later the same day, Smitty ran the usual test with W4HHK getting indifferent results. The next morning a German newsman telephoned Smitty from Frankfurt to ask about his EME work!

W4HHK and WA4HGN made a couple of firsts on March 28th. They completed the first recorded 2300-MHz contact between Tennessee and Alabama, and the 118-mile path is probably the longest distance ever covered over an obstructed path or by home stations on 2300. W4HHK runs 275 watts output to an 18-foot dish, WA4HGN puts 10 watts into a tower-mounted 10-foot dish. Signals were 3 to 10 dB over the noise.

In Florida, K4NTD is also working on 2300. Jack recently completed a crystal-controlled converter, to listen for signals directly from the Apollo astronauts on the moon.

Finally, K4EJQ, is building a new 1296-MHz exciter to feed a 7-foot dish now located on that famous Tennessee mountaintop.

Late Report - Aurora

As we prepared to lock up this column on April 21, a major magnetic storm set off the first large auroral opening since the March 8 affair.

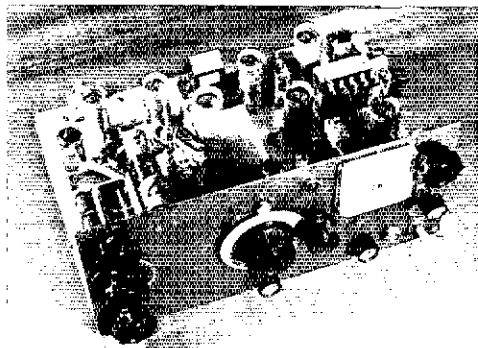
W0EKB, Omaha, telephoned that he first heard the aurora on 50 MHz at 1100 GMT. John next checked six meters at 1645 GMT and the aurora was in full swing, continuing throughout the day. By 2300 GMT many of us were home from work and the six- and two-meter bands filled quickly with huzz signals. Good 2-meter aurora was reported from most New England and Eastern areas, but W5WAX, who enjoyed March 8 aurora 2-meter contacts with New Jersey, could find no aurora on 144 in Oklahoma.

Six meters was productive from New England to Wyoming. K1JRW, Massachusetts, recorded many contacts while W7VDZ, Wyoming, enjoyed popularity handing out much-needed QSLs to the WAS seekers. From South Dakota, six meters didn't appear to be open for long-haul contacts. Signals were exceptionally good over 200- to 600-mile paths. Aurora was heard until 0515 GMT, April 22, when the propagation mode changed suddenly from aurora to Es. K0CER worked VE5US followed immediately by VE6MO. VE5US said he worked K1JRW at 0314 GMT, apparently on relatively rare auroral-associated Es. In past years, conditions similar to this allowed KL7FLC and VESBY to work over wide areas of the United States. VE5US was caught with the big rig down and was running 10 watts to a 14-foot log-periodic TV antenna!

There was surely other unusual DX worked April 21-22, and we'll report it next month.

QST

Strays FROM



Here's proof that some amateurs still build their own ssb equipment. The photo was sent in by Adrian Blancquaert, ON4KD, who says that he built the 75-meter, 50-watt ssb transceiver described by Day in June 1967 QST and which is also featured in the 46th and 47th Editions of *The ARRL Radio Amateur's Handbook*.

Adrian reports that the rig performs very well, and that he is quite satisfied with the project. Examination of the photo he provided indicates that he has done a fine job of building the transceiver. This is what we frequently refer to as a very "sanitary" job of construction! - W1CER



How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Whoa:

Shine with thine own apple, yet in thy vigor cast not dust on mine.

— ANON.

We've been so busy with slashing satire we haven't preached a sermon lately. Fun's fine but we're supposed to get serious once in a while. Okay, subject? Well, brotherhood is always timely. Brotherhood and profitless polemics. . . .

Experience, a most convincing teacher, trains us to be wary of promotions based on the negative. You know, ideas and opinions argued not so much on their own merits (which may or may not be considerable) as on an apparent need to depreciate or tear down something else. Ham radio's varied facets are traditionally vulnerable to such subtle demagoguery.

Oh, presumably there always will be QRM from a few who cannot boost their own favorite angles of our great game without odious comparisons — DXers who can't sell DX without running down casual rag-chewing, vhf men who can't push vhf without sneers at the dc bands, builders who can't praise experimenting without jeering so-called appliance operators, and vice versa all along the line. The sum value to amateur radio of all this back-biting can scarcely rise above zero. It can well amount to *less* than zero when arguments become obsessed with derogation.

A fairly predictable by-product of the return of FCC incentive licensing in its present form is tirades against this or that emission mode, expressions not so much in favor of one technique as against the other. Granted that it's not easy for a code hound to digest the proposition

* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

that he must pass another phone-accented examination or be ruled out of certain cw subbands, and that it's equally unpalatable for a mike specialist to have to pass another code test or be barred from certain phone subbands. But berating and belittling each other and each other's favored mode because of this development surely stands to benefit neither.

Currently we're too often treated to the out-worn spectacle of hard-core code adherents terming voice types glorified CBers, and phone-forever advocates calling cw enthusiasts atavistic smoke-signalers. This same tendency toward fratricide did amateur radio no measurable good in the Class A and B incentive-licensing days of the 1930s and '40s. It seems even less potentially gainful now. Opportunistic malevolences always lurking in the wings conceivably could find it advantageous one day to embrace and exploit agreement with *both* sides. And then?

No dirt on our other apples, please.

What:

DXers who made the scene within the past few years have a nontreat in store for them, a real ungoodie. Instead of loghuls of 10- and 15-meter WACs the coming sunspot minimum will gradually bring back less esoteric but still sporty 6₃₀ and ground-wave DX pursuits. Twenty, especially in northern latitudes, will begin to sound like a dead front end during hours of darkness. Even forty will skip out wearily past either coast. But 7 and 3.5 MHz, though riddled with exasperating absorptions and fadings, ought to come through in good DX stead with commercial QRM the limiting factor. This we can be quite sure of, but what about good old

160 meters? Well, it should become *very* interesting. If guys can knock off every continent and WAS during a solid sunspot maximum, the one we've just passed through, it stands to reason that a trend toward longer 1.8-MHz hop could really frost the cake. W1BB, long a student of the top-band scene, heartily agrees. As for the 1968-70 season just past, we'll call Stew's most recently issued *160-Meter DX Bulletins* to sketch the picture. W1BB does it in delicious depth but we'll have to make do with available space. . . . Some of the DX stations worked, heard or reported active were CO2QR, CX3BH, DL9KRA,

Contrasting, indeed, are these QTHs of the Month—the jungle site of last year's Marco neutral zone operation by K6JGS and T1ZCMF as 1N2A, and an aerial view westward over Market reef, OJØ-land, in the ice-locked grip of a Baltic midwinter. The islet's breakwater against stormy northern seas juts angularly to the right.

(Photo via Ws 4VPD 1CW, OH2ER-OJØMI)



RI9J, dozens of Gs, GC3IEW, GM3s BGW FXM IAA
 I4W TDS YPK, GW3s LPK WJN XJG YGH, HB9CM-
 HB0CM, HR2HH, HS5AB, JAs, IAA, IY3s, IJ1N
 HQ4 YAQ ZLLI 2PDK 3AA 3HN 3JM 3UT 4DWH
 7AO 7DVE, 7DLYA, KH6s FT, GJ1I, LI, RS, K17s
 DJ1 IR, KV4Z, MP4TAI, OE4 KUT 1PKW IWN 2LEI
 4KPB 5XKJ, 8UQ, two dozen OK-GLs, PABs NP, PN,
 PJ2VD, PYS, IAKG, P, 2BHD 2BKQ 2F98, TAZP, VKs
 (and AXs), ZAC, ZAPN 3GU 3KS 3QI 3PK 3XK 5KQ
 6NK, VO1HN, VP3 2KX 2LZ 3JT 3KY 9EP 9G, VS619D,
 Ws 4HR/VAP 9PH, K854, XE29K, YN8AA, YV5ANT,
 ZB2AY, ZC4AK, ZD9EM, ZLs and ZMs) IAYC 1MQ,
 5Z4s KL, LE, 9H1BL and 9X88P, all via cable. Conditions
 peaked sufficiently to allow solid subbanding at times,
 notably by I47TL, ES7, KV4Z, PJ9s CW 4D, VP9RO,
 ZP1C and 4M1A. Getting a piece of the action from our
 side were: Ws 1BB 1DMD 1HGT 1TX 2BP 2CMS 2EQS
 2GGJ, 2HVD 2HU 2RAA 2AJS 3CNS 3DPL 3FQI 3PE
 3HM 3IN 3MLV 3NPF 4GGO 4BVV 4DQS 5HTQ 6ERS
 6UJ 6KWE 6UJG 6VY 7HNZ 7CFJ 7DL 7JNG 7RM
 8AH 8ANO 8BHG 8DDO 8GLX 8HAI 8JIN 8JR 8ALP
 8N9J 9BKA 9CZT 9KYW 9PME 9QWV 9VY 9Y 9BE
 9NPL 9Y, Ks 1GCD 1K8U 1PBW 1SGD 2ANR 2BZT
 2GAL 2GNC 2HXJ 2FA 3KPO 3MBE HA 5TFG 6VZA
 7YXS 8ANE 8BHJ 8DHT 8UHA 8KRN 9PAW 9YWD
 WDFC, WAs 1CAG 1FHU 4RGT 4SGE 4VLM 4JQJ
 7HJC 7K0I 7K0Z 8URU 9EYV, WB8s RUV CJS, VEs
 1Z2 and 4DU. One-sixty's east coast DX monopoly
 was further weakened by the Six and Seven gang thanks to
 increasing top-band efforts in Hawaii, Alaska, Japan,
 Australia, New Zealand and other regions out their way.
 At the same time JAs and VKs are exciting each other with
 many a trans-equatorial 1.8-MHz QSO. As a 1X
 contest band great things could lie ahead for 160, VE9RN's
 DX press says the PA0 boys logged six 11s, call areas in this
 year's ARRL go. The March 7th partial solar
 eclipse quickened the band at high noon, according to
 W0NPL. "One-sixty opened up like it does so often just
 before sunset. Heard Ws 4BU 010VW, K88BI and others."
 Some real QRP doings on 160, too. W3FQJ, with
 100 milliwatts to an EIT, works W21PN on cw, a 200-
 mile haul. The former's triangular full-wave skywire helps
 Adding to the plethora of obstacles in the 2-MHz
 range, Ws 1BB 2BP and associates are bugged by ITV
 bush around 1826 kHz, the 116th harmonics of local
 television receiver oscillators. The 1825-1830-kHz slot is a
 traditional hang-out for European and other DX stations.
 Now that W/Ks in some areas are authorized to transmit
 in this "DX window," 160-meter DX chasers are engaged in
 a courteous campaign to help keep this small range
 open for weakies from across the waters. No. 1
 topic on top-band, no different than on other DX ranges,
 is, of course, antennas. Consensus from the boardwalks is
 that well-matched verticals with dozens of buried radials
 are hard to beat, although high-as-possible long-as-possible
 horizontals transmit DXceptionally for W1BB and others.
 Other location factors being equal, the vertical's big draw-
 back is susceptibility to noise pick-up. WA4SGR, for ex-
 ample, "borrowed" a 315-ft tower with qualified success.
 "Good signal reports were fogged but noise was a problem,
 10 to 15 dB higher than normal. What I gained in trans-
 mitting I lost receiving; just couldn't hear them."
 The balloon approach is always tempting on this band if
 you're in a spot free of power lines and other discouragements.
 The idea is a lot simpler than application, however.
 G3OIT's attempts to loft an effective balloon-supported
 1.8-MHz skyhook ran into complications. Keith tells W1BB,
 "We acquired some meteorological balloons and a hydrogen
 cylinder but, despite the fact there seemed to be no wind,
 the 2-by-6-ft balloons danced uncontrollably. To keep the
 radiator near vertical they had to be guyed upwind with
 450 feet of nylon cord. We did succeed in working twenty
 U.S. stations under conditions far from ideal." Wonder how
 many ARRL Field Day entrants will be trying balloon
 jobs this month. The Beverage receiving antenna,
 particularly famed in ham annuals as the design Paul Godley
 used in Scotland on successfully during ARRL's original
 Transatlantic Tests almost fifty years ago, is getting serious

widespread attention at K1PBW, W1BB and other points.
 They're space-eaters but quite uncomplicated. Stew de-
 scribes, "Mine consists of a 12-ft-high 1200-ft length of
 No. 16 plastic-covered war-surplus wire hooked on nails
 and tree limbs over a path hacked out with saw, axe and
 hedge clippers through dense woodland. The far end,
 pointed toward the target, is terminated through a 600-
 ohm resistor to ground or to a counterpoise. For the latter
 I use four 133-ft radials lying on the ground. The Beverage
 works in any terrain but is at its best over 'poor' ground.
 Its length is not critical — the longer, the more directive
 — and 1000-1300 feet seems about right according to
 K1PBW who has tried wires as long as 2600 feet." W1BB
 notes a signal loss of up to six dB in the favored direction,
 a noise reduction of twelve dB or so, or an over-all signal-
 to-noise gain of about six decibels. This ratio is more than
 enough to open an apparently dead band during periods
 of mediocre conditions. G3OIT adds his experience with
 such monsters in lines to W1BB: "When G3PQA and I
 pooled resources for a combined Beverage effort I heard for
 the first time what such an antenna can do. I was amazed.
 I would never have believed that any aerial could make so
 much difference. We enjoyed 15 copy of U.S.A. signals on
 160 that we would never have even heard above European
 QRAL on an ordinary half-wave. I only wish I were on good
 enough terms with the local farmers to put up a 1000-ft
 westward-facing Beverage. We also put up one to the south
 — imagine me hacking a path through 200 yards of dense
 blackthorn with 'PQA behind me reeling out wire." Sure
 sounds like fun, fellows, but watch out for poison ivy!
 In the promising years of quiet sun ahead there's
 the usual big limiting factor to DX fun on old 160. That's
 lack of activity at the far end. The band is just not available
 to hams in numerous overseas countries. In many other
 lands it's barely available on a stiffly restricted basis. Per-
 haps this situation can be improved. Anyway, it's not too
 early to set your sights for the 1970-'71 top-band season.
 Season? What's wrong with right now when the summer
 static pauses? Winter stillness lies south of the equator;
 if you can manage to pull through VKs, ZIs, PYS, ZSs, etc.,
 they'll probably have little trouble hearing you. A rotary
 Beverage, anyone?

* * *

Later we'll be getting back to the higher ranges with
 assistance from (20 cw) Ws 1BV 1DAL 4ZM 4YOK
 4YT 5BZK 5G 5KKW 6KAY 7YTN 8YGR 9DY
 9LNQ, Ks 3VUI 4TWJ 5AHG/6 8PYD 8TRF 9GAV,
 WAs 1FHU 1KJZ 1JMR 2BHI 2F08 2HDZ 2KEA 2YWR
 3GVP 3IHB 3K5Q 4CZM 5UAX 5YMW 98QY, WBs
 2DRS 4PAH 4JYB 4KZJ 9AVY, 11ER, VE7BAF;
 (20 phone) Ws 3HNK 4YOK 6YRA 8YGR 9LNQ, Ks
 4TWJ 6RF 8PYD, WAs 1FHU 1HA4 1JMR 2BCT 2BHI
 2HDZ 3GVP 3IHR 4Z2U 6RQW, WB4s JYB KZG; (15
 cw) Ws 1BV 4ZYT 5BZK 8YGR 9LNQ, K5MHG/6,
 WAs 1FHU 1IRY 1KJZ 1JMR 2BCT 2BHI 2DFD 2HDZ
 2KEA 2YWR 3GVP 3IGY 5UAX 5YMW 5ZEH 98QY
 9PXT, WBs 2DRS 4KZG 5YMW 9AVY 9CJS, WN3s
 2INA 2KKA 3OFO 9UDR, 11ER, VEs 3GHO 7BAF; (15
 phone) Ws 3HNK 4YOK 5G 5KKW 6KAY 8YGR 9LNQ, Ks
 4TWJ 8PYD, WAs 1FHU 331B, WBs 4KZG 9AVY; (10
 cw) WRYGR, K5MHG/6, WAs 1FHU 2HRZ 2KEA
 5YMW, 11ER; (10 phone) Ws 3HNK 4YOK 5G 5KKW
 8YGR 9LNQ, WAs 1FHU 5YMW; (40 cw) Ws 1BV 1BAH
 4YOK 5G 5KKW 7YTN 8YGR 9BY, K5TRF, WAs
 1FHU 1IRY 1KJZ 1JMR 2BCT 2HDZ 2YWR 3GVP
 4CZM 5UAX 98QY, WB4GAH, 11ER, VE3GHO;
 (40 phone) WAs 1FHU 4KZ JMR; (80 cw) Ws 18WX
 8YGR 9BY, WAs 1FHU 1IRY 2YWR 4CZM; (75 phone)
 Ws 8MR WQJ, WAs 1FHU JMR and VE3GHO. The
 bands are grand!

Where:

ASIA — ARRL secretary VU2CZ writes W1VQ, "Cards
 are received for VU1, VU3, VU5, etc. We have reason
 to believe that most probably the prefix 4U is wrongly
 read as VU. India has only one call prefix whether it be
 mainland, Laccadives or Andamans, and that is VU2.
 VU2 existed only for two months in 1969. All other numerals
 are pirate stations or incorrect reception." Chogyal
 of Sikkim AC3PT writes VU2CZ, "I am returning cards
 for AC2, AC4 and AC5. As far as I am aware there are no
 such stations on the air. The only AC5s that were working
 were 8Q and PN apart from a temporary station run by an

VR1O (G3NRA) expects to remain active from Tarawa
 into 1971. David has dispensed more than 3000 delicious
 DX QSOs on 14 through 28 MHz with a KW2000A,
 FTDX-400, 15-meter quad and dipoles. VR1O's Bello
 neighbor VR1Q has departed but VR1L keeps workable
 from Ocean island.



YV4s UA and QQ, OM and XYL, are a popular DX two-some down San Mateo way. When not busy in contests and Five-Band DXCC pursuits Nick and Mary hold out near 14,170 kHz, especially in the Caribbean net Sundays around 1200 GMT.

American for about a month. All have been off the air for at least three years. AC3PT, myself, is the only AC3 and has just come back on the air after being off for several years. . . . Geoff Watt's *DX News-Sheet* relays AP5-HQ's promise of 100-per-cent QSLing. The same organ says Asiatic Russia's new club-station prefix pattern goes (UD6) UK6C-D-K, (UP6) UK6F-G-Y, (UG6) UK6G, (UI17) UK7, (UI8) UK8A-C-D-E-G-I-L-O-T-U-Z, (UIH8) UK8H, (UIB8) UK8I-R, (UIM8) UK8M-L, (UIA9) UK9, and (UA0) UK0. . . . Y42HWI tells W9MSG he intends to clear up QSL problems upon his return to Uncle Sugar in September. . . . WA2JFW appraises, "I am QSL manager for Rañ. 4X44E, and will have all logs from February 27, 1970. S.a.s.e. self-addressed stamped envelopes are required from W/Ks, s.a.s.e. plus one IRC (International Reply Coupon) from others. . . . "The eleven 9V8s I QSO'd last August came through with QSLs 100 per cent," applauds W6YRA. . . . Try to beat this for speed: W5ZXS says WA5YMW had UM8PZ's QSL on the wall four minutes after QSO. . . . TC9 calls were to be signed by Istanbul TAs during a commemorative fete May 29th through 31st. QSL TC9DS to TA11DS or via TRAC, for example, says W5QPX. . . . W3DWG awaits his EP2 call c/o Melpar, Inc., USA Stra/Coast Field Off. (Iran), P.O. Box 2800, APO, New York, N.Y., 09205.

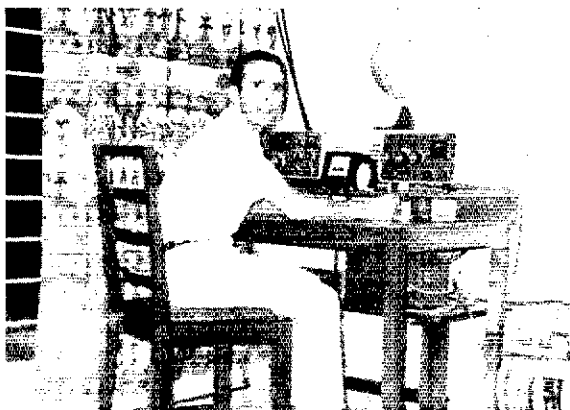
AFRICA — In *Radio Communications* RSCB's QSL Bureau proprietor G2MI disclaims access to CT3AS logs although he does relay QSLs direct to Hal. "He does his own QSLing 100 per cent. . . . Roving W4KIL, in receipt of unwarranted QSLs, declares, "To the best of my knowledge my licenses U57AL, TY6ATF, TTRAP and TL8AL are current, in my name only, and have not been reassigned to others. . . . Remember that W2MZV now holds the Gus mailbox for imminent W4BPD DXpeditionary doings. . . . "I left Ghana nearly a year ago after requesting a friend to forward QSLs by company mail," explains ex-9G1GL. "Hardly any reached me, however, and I know there must be several hundred OMs waiting for replies." Martin invites inquiry at the address in the listings to follow, stressing the need for accurate QSO information to facilitate careful log check. . . . W4JUK advises, "5N2AAX-TY5ATD-HB9XEF, now WA0LHL/L, has plenty of QSLs for his foreign calls and will be delighted to respond to anyone who did not receive his due card. Sid has always QSL'd 100 per cent before receipt, so any cards still needed have been lost in the mail." . . . Ex-7Q7WW now signs W8DTZ in Michigan and welcomes QSL inquiries at the address to follow. . . . "I'm still QSL manager for ZD5R," emphasizes VE4OX. "Archie does not want QSLs direct because he has no time to answer them. I have his logs for the past few years." VE4OX cshews bureau routes so send Sid s.a.e. and unaffixed postage.

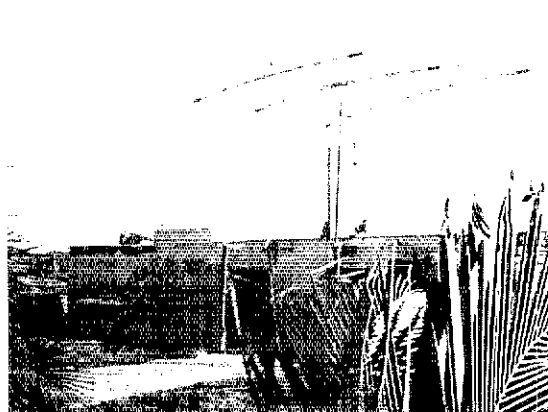
5H3KJ rolled up ten kiloQSOs in five years at Dar-es-Salaam, capping this performance by teaming up with 5H3LV for a 1500-QSO DXpedition to Zanzibar's Latham island in February. He's back home at LA6GF by now. (Photo via W7VRO)

EUROPE — UY5AD writes plaintively to W9MSG: "I have about 800 QSOs with U.S.A. stations but have received only 350 QSLs. The others keep stubbornly silent. It is too bad they all said 'QSL sure.' Confirmation of QSO is the law for every ham. Such a low percentage of confirmations prevents me from getting many awards for working W/Ks. UY5AD always QSLs 100 per cent." Alim forwarded a list of Yanks who still owe him cards. We notice a number of prominent DXers in arrears, many of whom squawk loudly about DX owing them QSLs. Amends can be made to UY5AD through his bureau or via the address in the catalog to follow. . . . The revised sequence of club-station prefixes for European Russia courtesy *DX News-Sheet* and VERON's *DXpress*: (UA1-3-4-6) UK1-3-4 and UK6A-E-H-I-J-L-P-U-W-X-Y, (UA2) UK2F, (UB5) UK5 except UK5Q, (BC2) UK2A-C-I-L-Q-S-W, (UN1) UK1N, (UO5) UK5Q, (IP2) UK2B-P, (UQ2) UK2G-Q, (UR2) UK2R-T. The pattern isn't crystal clear so we may have to review it later. . . . The 8X0 prefix evidently is employed by SV1 hams for celebratory purposes. . . . VERON's *DXpress* notes that OK1-2-3s are regular Czech prefixes, OK8s are reciprocal-operating labels, and OLS are novices in call areas 1 through 9. OK4 has been used afloat, and OK5s are special-event installations. . . . G2MI, in *Radio Communications*, names P. E. Cheesman, 10 Nursery rd., Hook End, Brentwood, Essex, as QSL submanager for G3Z-series stations. Oversized cards, undersized envelopes and sloppy penwork bother the British bureau as much as ours. . . . SV8s WBB and W11, returning Statesward to the addresses in the roster to follow, vow 100-per-cent QSL for all their QSOs from Greece. . . . "DL7FT will act as my QSL manager starting April 1, 1970," affirms EA6BJ. . . . "TF2WKJ was multiplexed on five bands in the 70 ARRL DX Contest," says TF2WLW. "QSLs for TF2WKJ cw QSOs go via WA0GQI, my home call, while those for sbb contacts go to TF2WKJ or via the TF2 bureau." . . . "The DL1-DL5 QSL Bureau has changed hands again," reports DL4ER (WA9HY8). "Its address now is 14th Avn. Co. (ATC), APO, New York, N. Y., 09025. QSLs for direct response from DL4ERM should go to my address, Box 88, APO, New York, N. Y., 09057. Also note that HB0XFW cards should go to DJ28XJ, those for HB0XFW to WA9HY8." . . . WA3K8Q informs, "SV1CF logs now are on hand for QSOs from December 13, 1969, through March 14, 1970."

HEREABOUTS — KZ5KN admonishes, "U.S. amateur desiring direct QSLs from me are advised that U.S. postage cannot be used in the Canal Zone. Enclose s.a.e. with one IRC or loose U.S. postage. KZ5KN QSLs 100 per cent on receipt." And don't forget that VE7VOs don't want glued-down Yankee stamps, either. . . . W9DAK isn't complaining. "After two brief years of DX chasing I conclude that the foreign response to my measly W/Ks has been excellent." . . . Chief J. Cuntje of Netherlands Antilles Government Radio & Telegraph Administration, Curacao, brands P177R a ligma. . . . VE1EY operated VE2BYJ/mobile-YO2 aboard a train in January through May, 1969, and states, "It was my intent to QSL all contacts but sudden departure and continuous travel made this impossible." Wayne is now prepared to answer mail at 59 Montgomery Crescent, St. John, N.B., Canada. . . . W9MSG decries the number of overly ambitious QSL managers who seem to burn out halfway through their obligations. At the other end are too many DX stations whose log shipments dwindle to nil. . . . "I'd like to QSL all my ARRL DX Contest contacts," avers G4X5BL. Richards' QSL route follows. . . . The VP2AP in our QTH list is a brand new one that doesn't jibe with your *Callbook*. Fred signed ZD8FT, VP8 2LU and 5PP in years past. . . . Numerous QSLers of the Month are landed for quickie card comebacks: C7S 2RM 8AE, C7S 3KJ, HC3 6A1 8AF, EP2DX, FB8XX, FL8MB, FY7YR, HC1E, HL9s UU VY, HDYAR, K4A/KC4, KC6CT, KG4AN, KH6NR, KL7S FWA GDU, KP4AUF, KR6DZ, M11, OH6NU, OX8RD, PJ7JC, SM8BDS, SV1AN, TA28C, TG48H, UM8PZ, VP2GBR, VQ8CR, Y42HWI, YB8AAC, ZB2BS

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XF4s EB J and KS were Revillagigedos calls signed by XEs 3EB 1J 1KS and 1GGW last December. The group picture includes (front, left to right) Commander and Mrs. Juan Trujillo, with XE3EB; (rear) XE1s KS GGW and J. The Trujillos, permanently stationed on Socorro with a detachment of 200 Mexican Navy personnel, were generous hosts to the DX-pedition. Two stations were operative, this one in the Trujillo home and another in the island's official radio shack. (Photos via WICW)

ZD9BML, ZL3JC, ZM1AAT/K, ZP4 5GS 9AC, ZS2OB, 3V8NC, 5A4TY, 5N2AAP, 5T5BG, 5VZDB, 7X8WV, 9N1RA, 9V0s CN HD JG, 1G NO NR OF OH OI PC PD, 9K6AA and 9Y4RP, plus QSL managers Ws 1YRC 2*TN 2DF 2GHK 2SPX 4ZXI 7VRO, K4AIQG, WAs 3HUP 4W1P 5EPL, VE3s BYN EOU, F2MO, GH2SM, 11BNZ and ZL2AFZ. Your kudos committee includes Ws 18WX 5YDK 5ZXS 6YRA 7JAC 8BJ 8YGR 9CRQ 9DAK, WAs 2HIU 2KBA 3JHB 4MSU 5UHR 5YMW 5TNJ 6VKE, WB9s ACR CJS and WN9CGR. Any commendables in your recent receipts? Ah! These italicized QMs require leads toward QSLs from holdouts mentioned: H5KA/W, CRs 7CH 9411, EP5X 1BQ, 1H1E, YK6EZ, VP8FQ, W8RA, GC3SHZ, p, L21s AZ K8Z, VP2s VI VL, VR6D, W9DT, XT2AA; K4BBK, K66IF, K463I, VQ1R 767; H48TN, FK8AG, ZD7SE 67; PY2AZD, G4LL, MP4BCC, TU2s AA AN, XZ2TZ, ZB2AM, 3A6AF, 5A3TX, 5N2JAB and TQ7LC. WAs 2DFD 8TNJ and WB2HEO are available for possible QSL, managerial arrangements with hurried DX ops.

SOUTH AMERICA — "Still have a large supply of 50A4DX QSLs," notices K40D from his same ex-W4TKN address. Cards collected at the RCP bureau also are forwarded to Carl QSLs for ZV ZW ZX ZY and ZZ fellows go to the PY equivalents; e.g., ZZ4AP equals PY4AP. Other entities reported include XQ3ZN (CE3ZN) and HU20EN (YS20EN), with WF3IEC, WE48UN, W82JRA, etc., bustlin' 'em from our end WA6PVW says E. Chilvers, ISWL QSL Bureau, 1 Grove rd., Lydney, Glos., GL15 5LE, England, is the QSL route to VP8s PL, JG JH JI JQ JW KN and KO. IRCs are the thing K4BBK's QSL from PY8RLR, clearly postmarked December 14, 1968, arrived only thirteen months later PY2AZD welcomes further QSL inquiries concerning his September-October '68 QSOs from Trinidad isle as PY2BZD/0. "I'll reply immediately by airmail as soon as I check my log."

OCEANIA — K86DH signed W6VRN/K86 from last September into November and can confirm these QSOs through his current K86DH address "The latest alphabetical-order call assigned here as of March 10, 1970, was K86GM," points out KW6GI (W72ET) serving as Wake QSL bureau tender. Merle gets occasional undeliverable QSLs for sporadic work by out-of-sequence KW6s probably located elsewhere Now let's see what individual items tumble forth from the month's bag, bearing in mind that each datum is necessarily neither "official," complete nor accurate.

- G31GT (via W4W1YS or D18RH)
- GR6AJ, P.O. Box 59, 14th, Portuguese Timor
- DL4GE, c/o WARS Radio Stn., Hq. 93rd Sig. Bn., APO, New York, N. Y., 09175
- DL4WJ, J. Wilson (W4IVV), 1D8A, APO, New York, N. Y., 09058
- DHAT, P.O. Box 4083, Manila, P. I.
- E48HB, P.O. Box 547, Las Palmas, Canary Islands
- E48HE, P.O. Box 215, Tenerife, Canary Islands
- E48HP, P.O. Box 547, Las Palmas, Canary Islands
- EL1B, P.O. Box 69, Monrovia, Liberia
- EL2CA, U.S. Embassy, APO, New York, N. Y., 09155
- FL8SR, Box 25, Djibouti, French Somaliland
- FR7ZX, A. Delmarie, Bras Pagan, Riviere-des-Roches, Reunion Island
- ex-HB9XKJ-5N2AAX-TY5ATD, S. Bedford, Jr., WA9-111/1, P.O. Box 1208, Greensboro, N. C., 27402
- HC2SO, P.O. Box 184, Guayaquil, Ecuador
- H17RC, Box 476, San Pedro, Dominican Republic
- HL9VX (to W44MSU or via W4ZXD)
- HS1ABC, P.O. Box 2008, Bangkok, Thailand
- HTs 1FP 1RTS 2JS (to YNs 1FP 1RTS 2JS)
- JD1AAZ (via J4RL, attn. JA5BTY)
- JV1, King Hussain, Box 1055, Amman, Jordan
- K66WS, Box 185, Yau, APO, San Francisco, Calif., 96943
- K66SY, Box 209L, Capital Hill, Saipan, Marianas

OKIKTL, Box 414, Praha 1, Czechoslovakia
 OX5BL, R. Riddel, 2412 S. Bowen rd., Arlington, Texas,
 76010
 PY2AZD, J. Rocha, jr., Ford Co. Research Ctr., P.O. Box
 8610, Sao Paulo, Brazil
 PY7AWD/B, C. de Araujo, P.O. Box 2, Fernando de
 Noronha, Brazil
 SV0WBB, T. Johnson, 914 Long Meadow Ln., Glenview,
 Ill., 60025
 SV0WII, K. Pletz, 924 Liberty st., Allentown, Penna.,
 18102
 TA1s HL OS WB XYL (via TRAC)
 TA1HY, H. Yetkin, P.O. Box 23, Bakirkoy, Istanbul,
 Turkey
 TA1s MT NF WR (via TRAC or DK1BH)
 TA1SY (via TA1HY or W5QPX)
 TA2AE, A. Erteun, P.O. Box 122, Karakoy, Istanbul,
 Turkey (or via DL7FT)
 TA2QR, E. Ertekin, P.O. Box 589, Karakoy, Istanbul,
 Turkey
 TA3HD, P.O. Box 23, Bakirkoy, Istanbul, Turkey (or to
 KZ3PU)
 UY5AD, A. Hatrak, P.O. Box 533, Kiev 4, U.S.S.R.
 VE2BYJ/M/YO2 (to V01EY; see text)
 VK9NI, A. McCullagh, Hibiscus Flats, Norfolk Island,
 Aus.
 VP1BJ, P.O. Box 3, Corozal, Br. Honduras
 VP2AP, F. Perkins (W1TBS), Antigua AS, Box 4187,
 Patrick AFB, Fla., 32925 (see text)
 VQ8CZ, 43 Hillcrest, Curepipe, Mauritius
 VR4CG, Technical Institute, Honiara, Guadalcanal,
 Solomons
 VR4EZ, B. Strong, P.O. Box 9, Honiara, Guadalcanal,
 Solomons
 W0DAD/KH6, J. Peters, Box 416, Aiea, Hawaii, 96701
 WA6HWB/HJ2, H. Smith, Aptdo, 5808, Guayaquil,
 Ecuador
 WA9RAT/JR2 (to WA9HAT)
 YB2AG, Box 88, Semarang, Java, Indonesia
 YB3DG, Box 27, Surabaya, Java, Indonesia
 YB6IA, P.O. Box 464, Medan, Sumatra, Indonesia
 YC3GH, P.O. Box 27, Surabaya, Java, Indonesia
 YV6s AI BBU BPJ CIY EL LA PP (via W2GHK)
 ZD5R (via VE4OX; see text)
 5U7AW, P.O. Box 1001, Niamey, Niger
 5V4JS, J. Schmitz, P.O. Box 33, Atakpanne, Togo
 6W8BA, Box 3013, Dakar, Senegal
 7Q7BC, Box 41, Zomba, Malawi
 ex-7Q7WW, W. Wierzbicki, WSDTZ, 801 Tarleton, E.
 Lansing, Mich., 48823
 7X0LOU, L. Scherr, CJB, 18 Boulevard des 3 Freres
 Bouadoun, Birmandreis, Alger, Algeria
 9G1FQ, Box 194, Accra, Ghana
 ex-9G1GL, M. Schreiber, 1601 Letitia st., Baton Rouge
 La., 70808
 ex-9L1JP (via VERON, attn. PAMOR)
 9X5WJ, Box 28, Kigali, Rwanda

A2CAZ (via 9J2BC)
 AX9AC (via G3NOF)
 GE9AA (via CE3RR)
 GT3AS (see text)
 DM6AO (via DM2ATD)
 DX1HMI (via VE4OX)
 EA6BJ (via DL7FT)
 EI6AO (via EI5BX)
 EL1ED (via DL7FT)
 EL6H (via LA8EM)
 EP2TW (via G13HXV)
 FO8GA (to F2RS)
 GB3FON (to G3EKW)
 HB0XFY (via WA9HY8)
 HB0XGR (to DL4CE)
 HK1BOR/4 (via WA5-
 UHR)
 HO9FC/mm (via VE1-
 ACD)
 HR2HHP (via WA9RAT)
 HS1ABF (via HS1ABC)
 HS4ABS (via W7FNY)
 JW7HH (via NRRL)
 KC4USN (via K2BPP)
 LA1H (via W2CTN)
 OA4DX (see text)
 OA4LM (via K9KGV)
 OASV (via W9GFF)
 O13NY (to OH3NY)
 OX3BE (via O28KW)

PA9TK (to DJ6TK)
 PJ9JR (to W3ZKH)
 SV6WDD (via WA3HUP)
 SX0DX (to SV1DB)
 TAING (via DJ0EJ)
 TA2EA (via W2FPI)
 TA3X (via WA7GQA)
 TG3ZA (via W2JXH)
 TH2WKF (see text)
 TJ1AW (via K4ZCP)
 VK6HM (via W7PHO)
 VP8LK (via G3NOM)
 VQ8CSR (to VQ8CS)
 VQ9CD (to VQ8CD)
 VR5LT (via YK6WT)
 W2EGV/4X (via WA4-
 WTG)
 W6VRN/KS6 (to KS6DH)
 WS2JRA (to K2AA)
 YA2HWI (see text)
 YB6AAF (via DL1SU)
 ZV7AWD (to PY7AWD)
 ZW2BJH (to PY2BJH)
 ZX2ASO (to PY2SO)
 ZZ2ERS (via WB9BWU)
 ZZ4AP (to PY4AP)
 4X4AE (via WA2FJW)
 9H1GD (via 9H1E)
 9Q5JV (via DL8MZ)

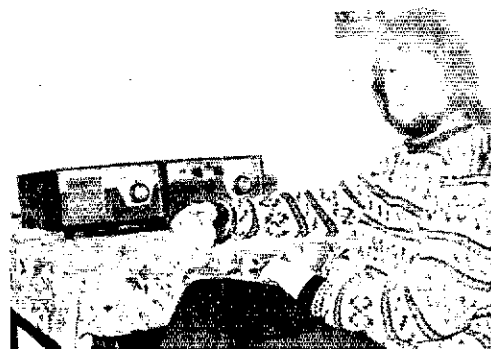
(KAZLL), Florida DX Club DX Report (W4FRO), International Short Wave League Monitor (A. Miller, 62 Wardward In., Selly Oak, Birmingham 20, England), Japan DX Radio Club Bulletin (JASUI), Long Island DX Association DX Bulletin (W2GKZ), Newark News Radio Club Bulletin (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association DX Bulletin (K11MP), Northern California DX Club DXer (Box 608, Menlo Park, Calif., 94025), Southern California DX Club Bulletin (WA6GLD), UBA's On the Air (ONS 4AD 5VA), VERON's DXpress (PA8s FX LOU TO VDV WWP), Utah DX Association Bulletin (K7DFQ) and West Coast DX Bulletin (WA6AUD). Good show, chaps.

Whence:

HEREABOUTS -- VP9s BY and GD of RSB (Bermuda) invite U.S., Canadian and United Kingdom amateurs to frolic in their 1970 Bermuda Amateur Radio Contest, a single-op shindig, using phone from 0001 GMT June 20th to 0200 the 21st, and cw July 18th-19th, same times. W/K/YE/YOs give RS or RST report plus states to VP9 and U.K. stations, and the latter respond with RS or RST plus parish or county names. Scoring for non-VP9s: Each station worked per band counts 3 points, this total to be multiplied by the number of VP9 band-parishes contacted. To be eligible for certificate awards of merit, plus a grand trophy guaranteed to get you a tan, GMT-only logs must be postmarked no later than August 15, 1970, and mailed to RSB Contest Committee, P.O. Box 275, Hamilton, Bermuda, together with a signed statement that all rules and regulations have been observed. This is No. 11 in the series -- good luck! You're also invited by RCV to partake of the phone-only Venezuela Independence Contest from zero GMT July 4th to 2400 on the 5th, 3.5 through 28 MHz. Quick s.a.e. to Radio Club Venezolano, Aptdo. 2285, Caracas, will get you entry particulars. You can tune up your *Español* in this one Dominican Republic's UDRR society sponsored a DX test in February and March but details arrived too late for "How's" QSP. Activities managers far and wide are advised to mail announcements at least two months in advance of such events W8HNK and KV4EY may emit DX-peditionary signals from F67 FM7 F87 VP2K and VP2V bailiwicks this summer. Joe and Les will have plenty of local QRM from fellow island-hoppers now boxing their transceivers. WB4MKU and W4ZRX got an early start by scoring some 5000 multiband contacts as VP2FX, catching the last part of the ARRL DX Test. They're planning on Aves isle for October and are thinking about Clipperton as well "Reading through your pages I was surprised to note the amount of DX being worked by Novices." writes WN9CDD. "So I decided to give 15 a try myself. Twenty-one countries in a couple of weeks!" VP2AP (W1TBS) likes phone and cw on 10 through 80 with his 270 and 14AVQ. "I'll possibly make side trips to neighboring islands," hints Fred Localisms via literature of clubs, groups and individuals aforementioned: VP8LK is due for two years in Antarctica. W9F1U/KS4 made 6.5 kiloQSOs with 120 countries from Serrana bank. CE3ZN's San Felix target date is in August. WB2VAE & Co. threaten Clipperton doings this month or next.

ASIA -- Turkish Radio Amateur Club, via W5QPX, offers a TA-10 certification to amateurs who hook ten of a certain group of 33 TAs. The same station can be

GD5APJ [F5QQ-3V8AA) plans to radiate from the Isle of Man into July, then move to north Africa for two years. Like so many of the DX gang, Ron found conditions in this year's ARRL DX Contest fine for code, poor to fair for voice. You'll run into GD5APJ mostly on 15 and 20.



For the preceding glossary our thanks and yours go to Ws 1BV 1FTX 1N3M 18WX 4JUK 4YOK 5BZK 5QPX 5ZX8 8YGR 91Y 9LNQ 0DAK, Ks 4BBK 4TJW 8PYD, WAs 1FHU 2HZR 3JHB 3JGY 5YMW 9ZCP, WBS 2MUK 4GAH 8ABN 9CJS, VE3GHO, DM2ATD, EI4BK, LU3EDQ, Columbus Amateur Radio Association CARA-scope (W8ZCQ), DARC's DX-MB (DL3RK), DX News-Sheet (G. Watts, 62 Bellmore rd., Norwich, Nor. 72 T, England), Far East Auxiliary Radio League (M. News

worked on more than one band for credit as different. Check details with TRAC, P.O. Box 699, Karsuky, Istanbul.

W4YOK learns that Camel Drivers Radio Club of Kabul can deliver an ARA diploma to North American stations who work Afghanistan on two bands, a different VA on each. For full Afghanistan Radio Award scoop consult YA9CDRC. Ex-YA2HWI is returning to Illinois tentatively via Europe. . . . W3DWDG, hoping to sign EP2IDV shortly, is told by EP2DX that the latter waited eight months for his own permit. "No test and no cost," says Ron. "Just collect the fifteen official documents required."

Motohiro Higazawa, 3-23-27, Umeda, Adachi-ku, Tokyo 120, and friend Mamoru Watanabe, 1736 Mitsugi, Miyayama-machi, Kitatama-gun, Tokyo, 190-12, are Japanese s.w.s. who seek correspondence with U.S. hams-to-be. Which reminds us to correct the caption on JA7DBG's picture in our March pages. Mike is JA7DBG/WZ in a postal sense only, and the photo is of his back-home station. We understand that U.S. Ambassador to Japan W3ACH is investigating reciprocity possibilities. . . . W4ZFDC hopes to operate from 4Z4HH this summer, and W5JZJ returns to Vietnam in a military role to see what 3W8 prospects might be. . . .

HS8ACV works 10 and 15 meters on even-numbered days of the month at 1630 GMT and earlier," hnds WA3JGY. . . . "GN1RA is leaving Nepal for New Delhi," learns WB2WUQ who joined 9N1AM, VU2A BEQ OJK ST and others in dedicating Bombay school station VU2BES this spring. "The 10-meter band was wide open at VU2OLK. QRM from stations calling us wore out the fifteen operators present at an impromptu hamfest." 9N1RA, by the way, was runner-up to Miss California in the 1958 Miss America pageant. . . . W2NSD visited Amman and King Hussein in April for some regal QSOs from JY1. The royal layout features a TX1R-H4B-L4 combo and a vertical dale for beam replacement. . . . JA3XPO and 8J0EXPO radiate from the Japan world's fair. . . . PEARL's KA network now meets week ends at 1000 and 2400 GMT on 14.204 kHz.

AFRICA — "I've been on Chazou since December and have recently been licensed here as VQ9CD," writes VQ8GD. "Tried to get on the air in February but my DX-40 plate transformer burned up and my VFO stopped functioning. I'm trying a transformer replacement which gets terribly hot and have the VFO working again but I would appreciate assistance and advice." Anand is reachable via his VQ8GD address. . . . "ZS58Y hunts Idaho, Nevada, New Mexico, Utah and Wyoming for WAB," says K9EUZ. . . . "My Advanced ticket ran out before I went to Africa," explains ex-9G1GL. "I'm striving to make Extra but this will take time." . . . 5T5BG, making many 8DXXC friends, is the subject of comment by W4JUK. "George is F2DE, formerly FB8CJ, FK8AO, FQ8AE, TN8BG and 5R8CJ. He arrived in Mauritania in mid-January and became active on 20 cv with 30 watts and a dipole. After 5P6BG gets on s85 with a new SB-300-400 I hope he doesn't forget his cv friends." . . . African oddments via the clubs press: FB8WW uses HB9TL's wandering transceiver effectively on 20 s85. . . . 9J2ED and colleagues grow more DXpedition-minded after their A2 go. . . . TJ1AW should be multimoding on several bands for another year. . . . Former 9G1GJ signs TQ7BB on skels with PA0VO Thursdays at 1600 GMT around 21.300 kHz.

OCEANIA — "My location on Betio Island, Tarawa, is just 82 miles north of the equator," describes VR1O (GNRA). "Betio is all coral sand with a water level six to eight feet below the surface. My bungalow is about 40 feet from the south beach so my station is nearly maritime. I'm hoping for another few thousand QSOs on 14, 21 and 28 MHz before I leave the Gilberts at year's end." . . . "We've been living in Australia about two years," recounts WA9GGI, whose OM K9QZ is widely worked on 20 as VK6CB. . . . "VK0HA1 had some two thousand contacts from Heard Island," figures W7PHO. . . . Pacific pointers courtesy club newshawks: VR5LT (VK6LT) expects a two-year Tonga tour. . . . Ex-PK1RK of the late '40s is back at it as YH1KW. . . . Timor is all a-flimmer with CR88 AG and AI on sideband. AI occasionally on cv. . . . KA9RC may join JY1AAH's Marcus Isle fun as KA1B early next month on 10 through 20 meters.

EUROPE — "OX3FD (OZ5FD) goes QRT on the 15th of this month," warns WB8ABN. "In July Finn plans operation in Andorra, France and possibly Spain, later maybe in Nigeria. I'm scheduling OX3FD Sundays at 1900 GMT on 21,050 kHz." . . . Notes from the Germans: DMs 2ATD 2BOG and 6MAO pool talents for DX contest work as DA1RAQ now and then. . . . DL7DC says the DJ-DK-DL gang will be hunting fast DX QSOs during DARC's summer field day on the 6th-7th of this month. So will amateurs in other European countries. . . . DJ5WO's time is collecting different U.S. counties, according to WA9TEK. Helmut likes 14,040-14,060 kHz plus or minus zero GMT. . . . DL1WJ

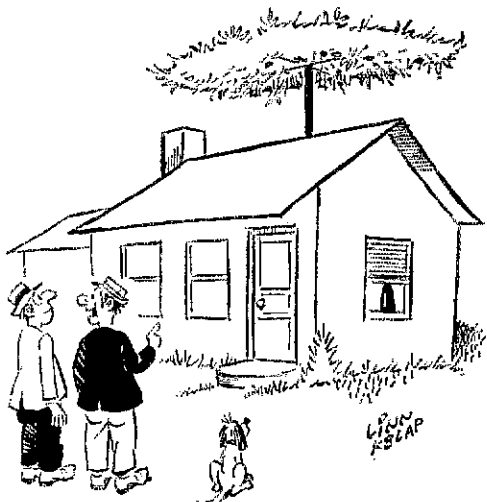
(W4YV) wants to operate from Monaco the first week of next month on 10, 15 and 20 with his 500C and dipole. . . . QSOs with Munich stations between January 1, 1970, and the official closing date of the 1972 Olympics there will count toward MOE, the Munich Olympic Diploma, announced DJ8ZU of DARC. Write Engelbert for certificate specs. . . . F16AO was the annual DXcentenary lark of Limerick Radio Club on 10 through 160, sideband and code, May 30th through June 1st. This year F14BK and cohorts invaded tiny Here Isle of Ireland's southwest coast. . . . SK1-SL-SM1 activity will soar July 1st through 7th during Gotland Activity Week. SM1CKB says cw action will center forty kHz above all band edges, s8b work around 3750, 7050, 14,150, 14,250, 21,250 and 28,250 kHz. . . . OJ8M1, operated on Market reef by OH1 28GD 2ER and 8RJ, scored 2700 QSOs February 25th through March 2nd. OH2NB tells W1CW the party riskily swung in by plane, landing on back ice. . . . "All the great guys we worked from Greece made our stay there most enjoyable," chorus SV6B and W1I, heading homeward. . . . K8ONV relays word of the passing of SP6FZ, a builder and operator par excellence. Jan helped pioneer ham radio in Poland as far back as 1924 under the call TP4R. . . . 83VVU warns that Nottingham ARC will have GB3FON on several bands and modes over the middle two weeks of July to help celebrate the Festival of Nottingham. The infamous Sheriff is due to get bested by Robin Hood again in Sherwood Forest. . . . W1FHU discovers that LUDN0, OKT4GI, WA5 2YQS 4MUB and WB2VHD are once members of his ex-Hungarian ham club. . . . England's *Burando Bulletin* mentions 3590, 3740, 7030, 7090, 14,090, 14,290, 21,140, 21,360, 28,190 and 28,990 kHz as frequencies used by Boy Scout hams in Europe. [QST]

Strays

Any U.S. amateur formerly from Malta please contact W1IKE.

Feedback

A photo caption on page 79 of March 1970 QST indicated that JA7DBG was using reciprocal operating privileges in the United States. This, of course, was an error since there is currently no licensing reciprocity between the U.S. and Japan.



"THE NICE THING ABOUT THAT CAMOUFLAGED ANTENNA IS THAT THE NEIGHBORS DON'T KNOW WE HAVE A 20-METER BEAM!"

Operating News

GEORGE HART, WINJM
Communications Manager

ELLEN WHITE, WIYYM,
Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE

DXCC: ROBERT L. WHITE, WICW

Training Aids: GERALD PINARD

Contests: ALBERT M. NOONE, WAIKQM

Public Service: WILLIAM O. REICHERT, WA9HHH

Section QSO Parties. Every month the "Station Activities" part of this column contains at least one announcement of a Section QSO Party of one kind or another, usually sponsored by an affiliated club. These are squeezed into each issue on a "space available" basis. That is, they are not charged against the SCM's quota of space, which is determined roughly by the number of ARRL members in his section. Nevertheless, what appears in Station Activities is largely the SCM's bailiwick. Oh, we have some editorial rules to help make the content of each column more readable, but other than this the SCM is the sole judge of what appears in his monthly *QST* column.

Section QSO Parties are good activities. Every section should sponsor one once in a while; it helps put your section on the map, and it gives an often-needed boost to section morale and spirit. If you or your club are interested in an activity of this nature, it would also help publicize your club throughout the section. However, it is necessary to clear this matter with your SCM before it can be put into *QST*. Then, it would be appreciated if you make the announcement as brief and to the point as possible. If that issue happens to be cramped for space, it may be necessary to chop it to fit whatever space is available. (Incidentally, this comes under the heading of editorial prerogative, not censorship.) The simpler the rules, the more participants you will get, but be sure the rules are complete, so that the prospective participant will know what he is supposed to do.

One thing is especially basic - be sure the SCM gets the copy in time to coincide at least with the issue of the month of the activity, and preferably (we hope the postal service will improve, but better not count on it) the issue *before* it. For example: this month's (June *QST*) copy was prepared by the SCM on or about the tenth of April, covering March activities in his section. If copy for a proposed early June QSO Party is included, many

will miss it if their issue arrives late, so it would be advisable to plan it for the May issue. This means the SCM should have it before March 10, and you should be planning and finalizing the details in February.

What, almost five months ahead? That's right, to be on the safe side this is what it takes; otherwise, you may be faced with a last-minute rush, and that's where errors both of commission and omission occur.

IL Cleanup. In all the fretting and fuming about incentive licensing, one amateur (sorry, lost his identity in the pileup, but thanks, OM) suggested that perhaps one of the benefits overlooked is the necessity for cleaning up signals and reducing power to the minimum needed to complete a contact. Both clean signals and minimum power are required by the regs, but you wouldn't know it listening to the bands, any more than you would know that the speed limit on the freeway is 65 by watching the cars whiz by when you hold to that speed. If those of us restricted to the general bands would all undertake a "cleanup" program and turn down the power to the amount needed to complete the contact, there would be quite a bit more room for everybody. Of course it goes without saying that this applies to the unrestricted licensees too! After all, they're supposed to set the example.

WIAW Morning Qualifying Runs. In December of 1969, for the first time, WIAW transmitted a morning qualifying run. This was so well received that a second one was scheduled for Mar. 24, 1970. Again the participation made it worthwhile, so three more morning runs are being scheduled this year - June 17, Sept. 18 and Dec. 17. Mark your calendars, you swing-shifters, and get that CPC!

Extra CW Practice. Good cw practice is getting hard to come by outside the amateur bands now; all you hear is a lot of beadle-beadle stuff.

OPERATING EVENTS (Dates in GMT)

JUNE	JULY	AUGUST	
3 W6OWP Qual. Run 6 Minn. QSO Pty., p. 97 May 6-7 EU FD, How's DX 10 WIAW Qual. Run	2 W6OWP Qual. Run 4-5 YV Contest, How's DX 11-12 Open CD Pty., cw, this issue	5 W6OWP Qual. Run 8-9 Ohio QSO Pty. 14 WIAW Qual. Run.	
13-14 VHF QSO Pty., p. 63 May Ore. QSO Pty., Sta. Act.	16 W1AW Qual. Run	SEPTEMBER	
14-20 Mass. Contest, p. 112 May 17 WIAW Morning Qual. Run 20-21 Bermuda Contest, How's DX	18-19 Open CD Pty., phone, this issue HK Contest, IARU News Bermuda Contest, How's DX	3 W6OWP Qual. Run 11 WIAW Qual. Run 12 FMT 12-13 VHF QSO Pty. 18 WIAW Morning Qual. Run	

WA3LKH advises us, however, that NSS, in Annapolis, Md., is still banging away on 5870, 8090, 12,135, 16,180 and 20,225 kHz at 0300, 0700, 0900, 1000, 1100, 1400, 1500, 1830, 2000 and 2100 GMT, speed of 22 wpm; also at 0030, 0430, 0600, 1230, 1700 and 1830 GMT at 18 wpm. Just the thing for you general and extra class prospects, and what a range of frequencies and selection of times. Remember, use it for code practice only! — WINJM.

CLUB COUNCILS AND FEDERATIONS

British Columbia Amateur Radio Association, Mr. Dave Gilmore, VE7YG, Secy., 1180 Comox St., Vancouver, S. B. C., Canada.

Canadian Amateur Radio Federation, Mr. K. E. Rolison, VE3RL, Secy., 83 Westglen Cres., Inlington, Ontario, Canada.
Council of Connecticut Amateur Radio Clubs, Mr. James W. Parker, K1VIL, Secy., 17 West Main Street, Niantic, Conn. 06357.

Federation of Eastern Massachusetts Amateur Radio Associations, Mr. Eugene Hastings, W1VRK, Secy., 28 Forest Avenue, Swampscott, Mass. 01907.

Michigan Council of Amateur Radio Clubs, Mr. Merton A. Henry, K8ETU, Pres., 4026 Stillwell Ave., Lansing, Michigan 48910.

Ohio Council of Amateur Radio Clubs, Mr. James W. Benson, W8OUU, Secy., 2463 Kingspath Drive, Cincinnati, Ohio 45231.

Puget Sound Council of Amateur Radio Clubs, Mr. Jerry Seligman, W7BUN, Secy., 12306-80th. Avenue East, Puyallup, Wash. 98371.

San Diego County Amateur Radio Council, Inc., Louise Davis, W6NSR, Secy., 152 So. Anza, #103, El Cajon, Calif. 92020.

Tennessee Council of Amateur Radio Clubs, Mr. William Grigsby, K4MQI, Secy., Mohawk Drive, Cleveland, Tenn. 37311.

Tulsa Council of Amateur Radio Clubs, Mr. Larry Russell, K5ZCM, Secy., 11714 East 17th. Place, Tulsa, Oklahoma 74128.

ARRL AFFILIATED CLUB HONOR ROLL

In these days of raising requirements in one place and lowering them in another, the affiliated club that can maintain its ARRL membership at 100% deserves some special recognition. Headquarters bestows such recognition twice a year in the form of an honorary listing in *QST* and a special certificate.

Each year, as annual affiliated club questionnaires are received, those showing that all their members are also ARRL members are noted and put aside for this special honor. The list below are those clubs who are 100% ARRL according to questionnaires so far received. If your club is 100% ARRL, and is not listed below, it means we do not have your questionnaire form yet; fill it out and send it in, so you will make the next listing of 100% ARRL Clubs in December *QST*. Ladies and gentlemen, our Affiliated Club Honor Roll!

Aeronautical Center Amateur Radio Club, Oklahoma City, Okla.
Anderson Radio Club, Anderson, S. C.
Athens Amateur Radio Club, Athens, Ga.
Binghamton Amateur Radio Assn., Inc., Binghamton, N. Y.
Canal Zone Amateur Radio Association, Balboa, Canal Zone
Central Kentucky Amateur Radio Club, Inc., Campbellsville, Ky.
Connecticut Wireless Association, Inc., Newington, Conn.
Davenport Radio Amateur Club, Davenport, Iowa
Florida DX Club, Lake Placid, Fla.
Florissant Valley Comm. Coll. ARC, Ferguson, Mo.
Foundation for Amateur Radio, Ethel Smith, K4LMB, Secy., 2012 Rockingham Street, McLean, Virginia 22101.
Fountain City Radio Club, Fountain City, Tenn.
Golden Triangle DX Club, Seminole, Fla.
Goldfield Radio Club, Goldfield, Iowa
Haddonfield Teen Hams Association, Haddonfield, N. J.
Inglewood Amateur Radio Club, Inc., Inglewood, Calif.
IRC Amateur Radio Club, Philadelphia, Pa.
Laurentian DX Club, Dunford Isles-Ormeaux, P. Q., Canada
Limestone Amateur Radio Club, Athens, Ala.
Lockheed Amateur Radio Club, Burbank, Calif.
Long Island DX Association, Middle Village, N. Y.
Loudon County Amateur Radio Club, Lenoir City, Tenn.
Louisville Gas & Electric Co. ARC, Louisville, Ky.
Lower Columbia Amateur Radio Association, Longview, Wash.
Mason County Radio Club, Ludington, Mich.
Massillon Amateur Radio Club, Massillon, Ohio
Miami Valley Amateur Radio Contest Society, Centerville, Ohio
Mid-Island Radio Club, Freeport, N. Y.
Mike and Key Radio Amateur Club, Camarillo, Calif.
Norfolk County Radio Association, Norwood, Mass.
Norfolk Radio Club, Norfolk, Nebraska
North Augusta-Belvidere Radio Club, Belvidere, S. C.
Northeast Nebraska Radio Club, Pender, Nebraska
O. B. P. 1 Radio Club, St. Louis, Mo.
128 Contest Club, Chelmsford, Mass.

Orange Amateur Radio Club, Inc., Orange, Texas
Order of Boiled Owls, Columbus Ohio Chap., Columbus, Ohio
Potomac Valley Radio Club, Arlington, Virginia
QRP Amateur Radio Club, NYC Chapter 11, Brooklyn, N. Y.
Radio Amateur Transmitting Society, Nashville, Tenn.
Radio Operators Association of New Bedford, New Bedford, Mass.
Radions, Lancaster, N. Y.
Rome Radio Club, Inc., Rome, N. Y.
St. Louis Amateur Radio Club, Inc., St. Louis, Mo.
Santa Fe Trail VHF Club, Inc., Gardner, Kansas
Sarasota Amateur Radio Assn., Inc., Sarasota, Fla.
Scarboro Amateur Radio Club, Toronto, Ont., Canada
Skagit Amateur Radio Club, Inc., Skagit County, Wash.
Southern California VHF Radio Club, Inc., Norwalk, Calif.
Springfield Amateur Radio Club, Inc., Springfield, Ohio
T-9 Club, Beverly, Mass.
Town of Barnstable Radio Club, Hyannis, Mass.
Victor Valley Amateur Radio Club, Victorville, Calif.
Walton Radio Association, Walton, N. Y.
Wichita Amateur Radio Club, Inc., Wichita, Kans.
Windblowers VHF Society, Inc., Paterson, N. J.

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, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must meet the following requirements prior to deadline date listed below: (1) Holder of amateur Conditional Class license or higher. (2) A licensed amateur for at least two years immediately prior to nomination. (3) An ARRL full member for at least two years immediately prior to nomination. Petitions must be received on or before 4:30 PM 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 and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, with notice to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of the membership status, etc.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters to full members will list in alphabetical sequence names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code.)

Communications Manager, ARRL (Place and date)
225 Main St., Newington, Conn. 06111
We, the undersigned full members of the ARRL Section of the Division, hereby nominate as candidate for Section Communications Manager for this Section for the next two-year term of office.

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

George Hart, WINJM, Communications Manager

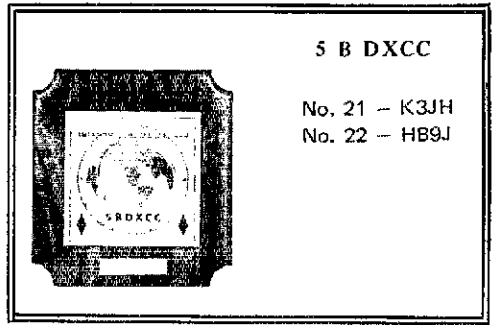
Section	Closing Date	SCM	Present Term Ends
Arizona	June 10, 1970	G. M. Hamman	Aug. 9, 1970
W.N.Y.	June 10, 1970	R. M. Pitzeruse	Aug. 17, 1970
Iowa	June 10, 1970	W. L. Johnson	Aug. 17, 1970
Idaho	June 10, 1970	D. A. Crisp	Aug. 17, 1970
S.J.V.	June 10, 1970	K. Saroyan	Aug. 20, 1970
Quebec	July 10, 1970	J. A. D'Arcy	June 11, 1970
Montana	July 10, 1970	J. A. D'Arcy	Sept. 9, 1970
N. Texas	July 10, 1970	L. E. Harrison	Sept. 12, 1970
Nevada	Aug. 10, 1970	L. M. Norman	Oct. 11, 1970
Kentucky	Sept. 10, 1970	G. S. Wilson III	Nov. 12, 1970

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

S.F. Conn.	K. S. McTaggart, K6SRM	Mar. 10, 1970
Neb.	John J. McNassor, W1GVT	April 11, 1970
E.N.Y.	V. A. Cashon, K6OAL	May 29, 1970
E. Mass.	Graham G. Berry, K2SJJ	June 10, 1970
Wyo.	Frank L. Baker, Jr., W1ALP	June 15, 1970
	Wayne M. Moore, W7CQL	June 25, 1970

In the Ohio Section of the Great Lakes Division, Mr. Richard A. Egbert, W8ETJ, and Mr. Harry A. Tummonds, W8BAH, were nominated, Mr. Egbert received 1260 votes and Mr. Tummonds received 614 votes. Mr. Egbert's term of office began March 28, 1970.



DXCC Notes

Due to the postal strike which occurred during the month of March, the Honor Roll which would normally appear in June will appear in the July issue.

DX CENTURY CLUB AWARDS

From March 1, 1970 through March 31, 1970, DXCC certificates based on contacts which 100-or-more countries have been issued by the ARRL Headquarters to the amateurs listed. The three columns at the right show issuances for radiotelephone operation.

New Members

PY3APH	261	VE4FG	110	W4LXJ	102	PY1NBF	269	DK2MO	126	DJ8IU	103
XE1KS	244	JA7BW	108	W4MGL	102	W6QJW	202	WB9HGS	126	VE2DJR	103
W4DDQ	185	OH3YR	108	G3WZ	101	K2OLE	161	W8LH/VF6	123	WA7DCM	103
K2DLG	162	WA2HN	108	K1ACL	101	FA2CX	158		123	CT7UD	101
K4LE	162	W4FN	108	K3FPQ	101	W1XK	152	K5BHA	121	K7GYA	101
W6SO	161	DL7KB	107	K7GYA	101	E2YS	149	W6YRA	120	WA1KYW	101
W8SSAM	152	K3AC	107	K9MMH	101	LA6RL	144	WA5AUZ	119	F2YS/W2	101
K4FJK	147	WA2CFE	107	W4VVG	101	PY7ASQ	139	W7BRK	110	WA6JKO	101
K4UEE/6	129	WA9YZN	107	W9IVB	103	W8NSAM	138	PA0GG	109	G5AHX	100
W2NYU	125	OE3FW	105	E7PJR	100	K4EJK	134	VV4WT	109	K8RRQ	100
DJ4PI	122	W1EW	104	K9JDF	100	F9IS	132	W9DKL	107	W3PT	100
OK3CU	122	WB2RWY	104	K0BFA	100	OE3ARW	131	W3NNK	106	WA0RZD	100
KH6GPM	118	WA5UCT	104	W1DH	100	PY4AP	129	W6BWM	105	ZL1BDW	100
VE3CLX	116	JA8AQX	103	WA2LAH	100						
WB2DJM	116	K8LGY	103	WA2EBJ	100						
EA8TF	113	PA0AAC	103	WA2ELO	100						
Y03TJ	110	WA2HDF	103	WA0ELO	100						

Endorsements

345	325	270	K2ZRO	W8RNU
CE3AG	W6RLH	K9WEH	OZ7X	W8SABN
OE1LR	ZS6LW	OH2BR	FY7GV	140
PY2CK	320	W2MZV	W6QJW	K4ARP
W2WZ	K6YRA	WA3HUP	K7AHO	K9HUY
W4ATT	K2ALD	W4HD	SMSAWD	WH2GQK
W4QM	K0LZH	W8DCH	H89TE	W3DNT
W8BI	LJ5AQ		K3CHP	W3NJK
W9LNM	W1DGT	260	E6GAK	W3YT
W9BW	W5QKZ	HP1BR	K0ARS	W4DMS
340	W8AKH	PY1DH	K0RYS	W5DRW
DL1N	315	SMSFC	K0RTH	W6YXA
DL7AA	W2ZTV	SM6CKS	PY1NPW	W7EXM
K2BZT	WB2CKS	SP6AAT	WA2BEX	W7GSP
LA7Y	W1ETX	W4RF7	WA9OVU	W7VSL
VE2NV	310	W4HGO	WA8WMH	W9GHO
W6PT	JA1ADN	W4RF7	180	
W7PHO	K8DYZ	W8LEF	KH6SP	
	PY7YS	250	PY5UG	
335	W4UKA	K2QOU	W3UC	120
CR6HX	305	W1TKD	WB4GMR	K5BBA
DJ2BW	K6GOT	WB2VAE	W7ZHZ	K0EKR
G13VJ	W4HA	W4ZSH	W8CH	E0UYO
K6EC	300	W8NPF	W8AFA	K02XE
W6NJU	ESLDL	W9KXF	WA00FS	OK1IQ
W6QOV	K6HIV	240	VE6VV	
W7AQB	K6QH	11R	K2JFE	W1AG-A
W8ZCQ	W2MUM	K2SGE	K6EVI	WA2VVV
W9GL	290	K4EKK	PA9VER	W8ZDY
W0BFB	W0KCF	K3RTA	W1ESN	W1NXE
W0KCF	G2F5T	K6ZIF	WA1LHQ	W4PGW
330	K4FT	OH2RAD	W2BRK	WA4UW
G6TA	W0PAH	W1HGA	W3BRD	W5LNL
K4PDV	280	WA0GF	W3GID	W7DVQ
W1HH	H89MD	W0DYG	W3WM	WA8GDR
W2MJ	K4HJE	WA9JDT	W4RXT	W9EYD
W2PT	W1DEP	220	YB4FLO	W9YTF
W6CAE	W9BGX	HB9TI	W6QEU	WA0VYI
W0GKL	W0IDW			

Endorsements issued for confirmations credited from March 1, 1970 through March 31, 1970 are listed below. Endorsement listings from the 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. The columns below cover radiotelephone.

345	250	W2OFF
W8BF	W5KUC	W4TIO
335	SMSFC	180
W1JFG	V86DR	HB9MD
W2HTI	PY7YS	WB2VAL
W4QM	W6EUF	WB9TE
W8QJR	W8ARH	K2EHR
W8UAS	W8GMF	K3SHU
	W0LIL	K0RTH
	W0PGI	240
		K4RFA
		PY3APH
		W4HTO
		WB2MWW
		W3CM
		W4DDQ
		W8KRS
		160
		W44WTG
		220
		K4ELK
		WA1HQ
		W2GA
		W8OAR
		140
		OH2BD
		OH2BR
		E32CV
		K5QKW
		W60MR
		WA8REB
		W8TJG
		W9XFE
		W9KRU
		200
		6Y5AH
		120
		DK2BI
		F9IE
		D13HC
		I1KRV
		JA1DR
		T22H
		VE1ARN

ARRL QUALIFYING RUNS

Any person can apply for an ARRL code proficiency award. Neither League membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted (10-35 wpm) you will receive a certificate. If your initial qualification is for a speed below 35 wpm, you may try later for endorsement stickers. Each month the ARRL Activities Calendar notes the qualifying run dates for WIAW and W6OWP (W6ZRJ, alternate) for the coming 3-month period.

WIAW will simultaneously transmit a qualifying run on 1.805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz at 0130 GMT June 10. (In converting, 0130 GMT June 10 becomes 2130 EDT June 9.)

WIAW will transmit a qualifying run on the frequencies shown above at 1300 GMT June 17. (In converting, 1300 GMT June 17 becomes 0900 EDT/0600 PDST June 17.)

W6OWP (W6ZRJ, alternate) will transmit a qualifying run on 3590 and 7129 kHz, 0400 GMT June 3. (In converting, 0400 GMT June 3 becomes 2100 PDST June 2.)

WIAW Code Practice

WIAW transmits daily code practice according to the following schedule, showing speeds, local times/days and GMT times/days. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. (Each tape carries a checking reference.)

Speeds	Local times/days	GMT times/days
10,13,15	7:30 P.M. EDST daily 4:30 P.M. PDST	2330 daily
5,7.5,10, 13,20,25	9:30 P.M. EDST (Sat) 6:30 P.M. PDST (Sat)	0130 MWFSa
"	9:00 A.M. EDST MWF 6:00 A.M. PDST	1300 MWf
35,30,25, 20,15	9:30 P.M. EDST MWF 6:30 P.M. PDST	0130 TThSa
"	9:00 A.M. EDST TTh 6:00 A.M. PDST	1300 TTh

The 0130 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving 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 GMT dates and April QST practice text to be sent in the 0130 GMT practice on the following dates.

June 12: It Seems to Us, p. 9 June 18: The Mainline Demodulator, p. 11 June 24: Let's Talk Transistors, p. 26 June 30: Amateur Radio Public Service, p. 76

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition

July 6: On Kit Wiring, p. 131 July 8: Equipment, p. 132

QST

WIAW SCHEDULE, JUNE

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.-1 A.M. EDST, Saturday 7 P.M.-1:00 A.M. EDST and Sunday 3 P.M.-11:00 P.M. EDST. 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.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000							
0020-0030 ⁴			3.700 ⁶	14.020	14.020	7.150 ⁶	14.020
0030			3.700 ⁶	14.100	14.100	7.150 ⁶	14.100
0100							
0105-0130 ⁴			3.820	50.120	145.600	1.820	21.270
0130							
0230-0300 ⁴			3.555		1.805		3.555
0300							
0310-0330 ⁴			3.625	14.095	7.095	14.095	3.625
0330							
0335-0400 ⁴			7.220	3.820		3.820	7.220
0400							
0420-0430			3.700 ⁶	7.020	3.945	7.150 ⁶	3.520
0430-0500			3.700 ⁶	7.080	3.945	7.150 ⁶	3.555
1300							
1700-1800			21/28 ⁶	21/28 ⁶	21/28 ⁶	21/28 ⁶	
1900-2000			14.280	7.255	7.255	14.280	
2000-2100			14.100	14.280	14.095	7.080	
2200-2300			21/28 ⁶	21/28 ⁶	7.255	14.280	
2300-2330							
2330							

¹ CW OBS (bulletins, 18 wpm) and the code practice on 1.805, 3.52, 7.02, 14.02, 21.02, 28.02, 50.02, and 145.6 MHz.

² Phone OBS (bulletins) 1.82, 3.82, 7.22, 14.22, 21.27, 28.52, 50.12, and 145.6 MHz.

³ RTTY OBS (bulletins) 3.625, 7.095, 14.095, 21.095 and 28.095 MHz.

⁴ Starting time approximate. Operating period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

⁶ WIAW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

⁷ Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff: W1s Q18 WPR. * Times-days in GMT. Operating frequencies are approximate.

EIMAC's new family of outstanding power tetrodes offers 13 impressive features:-



- (1) High linearity, 3d order products -40 dB or better.
- (2) Low input capacitance. Typically, 45 pF.
- (3) Over 600 watts measured output at 865 MHz.
- (4) Very high gain-bandwidth product. Over 125 MHz.
- (5) Low grid interception in linear amplifier service.
- (6) Low drive. Typically 40 volts for class AB-1 service. Easily driven at 150 MHz with 5 watt solid state device.
- (7) Plate dissipation up to 800 watts. Both air and liquid cooling available.
- (8) Coaxial base adapter available.
- (9) Shock-resistant design for rugged service.
- (10) 20 kW pulse output at 430 MHz.
- (11) Very low cathode lead inductance.
- (12) 5-pin base adapted for heat-sink cooling.
- (13) High grid and screen dissipation ratings.

The unique 4CX600 family is an exciting result of EIMAC's CAD (computer-aided-design) program for ceramic/metal tetrodes. Closely controlled parameters permit intermodulation distortion limits to be included as a defining tube characteristic, establishing new criteria of performance.

EIMAC's advanced segmented cathode and electron focussing combine with an unusually high figure of merit in this family, providing you with tubes useful in widely diversified services: linear amplification, high reliability aircraft-to-ground communication, wideband

distributed amplifier service in airborne ECM gear, and r-f pulse application.

Another example of EIMAC's ability to provide tomorrow's tube today! Here are the numbers to prove it:

TUBE TYPE	FIL. VOLTS	RATED TO: (MHz)	BASE	COOLING	MAX. RATINGS		TYPICAL POWER OUTPUT (150 MHz)	USEFUL FOR:
					Plate Volts	Plate Amperes		
4CX600B	6.0	890	5-PIN SPEC.	Air	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CX600F	26.5							
4CW800B	6.0	890	5-PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800F	26.5							
4CX600J 8809	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE

More? Our Application Engineering Department's ability to design tube into circuit means less engineering time for you. For all-around capability, talk to EIMAC. For circuit and application information on these new power tetrodes, write to EIMAC for our new, free application bulletin #14, *Using the 4CX600 Family Tetrodes*. Or contact your nearest Varian/Eimac Electron Tube and Device Group Office. They are located in:

- | | | |
|--------------------|------------------------|----------------------|
| Albuquerque, N. M. | Dayton, Ohio | Santa Monica, Calif. |
| Alexandria, Va. | Los Altos, Calif. | Scottsdale, Ariz. |
| Atlanta, Ga. | Melville, L. I., N. Y. | Springfield, N. J. |
| Cherry Hill, N. J. | Park Ridge, Ill. | Syracuse, N. Y. |
| Clearwater, Fla. | Richardson, Texas | Waltham, Mass. |

International Sales Offices are located in:

Australia	Italy
Benelux	Japan
Brazil	Scandinavia
Canada	Switzerland
France	United Kingdom and Ireland
Germany	





Here's the exciting new Heath SB-220 2 kW Linear Amplifier. Running maximum legal power on amateur bands between 80 and 10 meters, this compact powerhouse features two

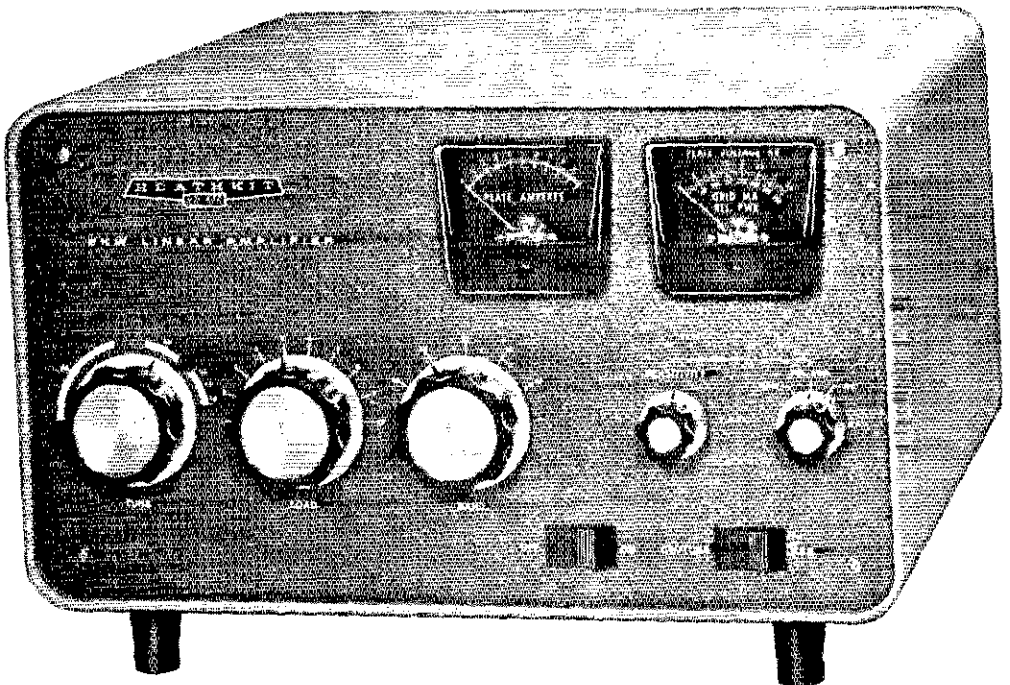
rugged EIMAC 3-500Z zero bias triodes in proven grounded grid circuitry. Note the modern desktop styling and the heavy duty components. And note the use of the reliable 3-500Zs. Heath chose EIMAC because these dependable tubes are ideal for heavy-duty operation, around the clock, around the world. And the two tubes have a total plate dissipation rating of 1000 watts.

Heath's choice is your choice. Go EIMAC. Look for the equipment featuring EIMAC power tubes.

The 3-500Z is one of EIMAC's family of zero bias power triodes: from 400 watts to 50 kW. Contact your distributor or a Varian/Eimac Field Office for further information. Offices are located in 16 major cities. Ask information for Varian Electron Tube and Device Group. Or write Amateur Services Department, Eimac Division of Varian, San Carlos, Calif. 94070.



EIMAC 3-500Zs are Heath's Choice.



SCM — AREC — ORS — CP — SEC — OBS — TCC — OO — NTS — MAG
Station Activities
 OVS — AIOPR — EC — DXCG — CLUBS — RM — OPS — RCC

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

DELAWARE — SCM, John L. Penrod, K3NYG — SEC/PAM: W3DKX. RM: W3EEB. A big welcome to the newly-formed Maverick ARC. Officers of the club are W3ZNF, moderator; K3RUJ, recorder; WN3NTC, custodian. WA3GSM is building a new ham shack. W3DEO is taking out a little time to do some camping. WA3DUM would appreciate if more of the Delaware hams would try making the MDD more often. W3EEB has a new trap dipole and is waiting for the old one to blow down so that he can put it up. The big wind of Apr. 2 wiped out the complete antenna system of K3JLY and K3NYG. W3TRC has a new job teaching. W3CZS has the world's smallest transmitter for the 3905 Net. The ARRL Annual Director's report stated that K3GKF ranked No. 2 as top OO in the nation. Traffic: W3EEB 81, W3DKX 28, WA3DUM 10, W3TRC 10, WA3GSM 4, K3NYG 4.

EASTERN PENNSYLVANIA — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3ICC. RMs: W3EML, K3MVO, W3MPX. PAMs: K3PSO, WA3GLI, VHF PAM: W3FGO. OO reports were received from WA3EEC, K3RDT, K3HNP; OBS reports from WA3IHV, WA3AFI, W3CBH, WA3EEC, W3ID, K3RDM, WA3JKO, WA3FMI; OVS reports from WA3JWL, WA3NVO, WA3EEC, W3CL, K3WEU, WA3FMI, WA3MCK. RPLers this month: W3EML, W3MPX, K3NSN, WA3FMI, W3HK, WA3HBT, PSHR: W3EML, W3MPX, K3MVO, WA3CKA, WA3FMI. The FMT brought out the same good results: W3YQ 1.1 ppm, W3NNC 0.3 ppm, W3KEK 16.5 ppm, K3EMA 15.3 ppm and as usual W3BFF 0.0!

Net	Freq.	Operates	QNI	QTC	RM/PAM
EPA	3610	6 45 P Dy	392	381	W3MPX
PTTN	3610	6:00 P Dy	248	136	W3MPX
EPAEP&TN	3917	6:00 P Dy	402	199	WA3GLI

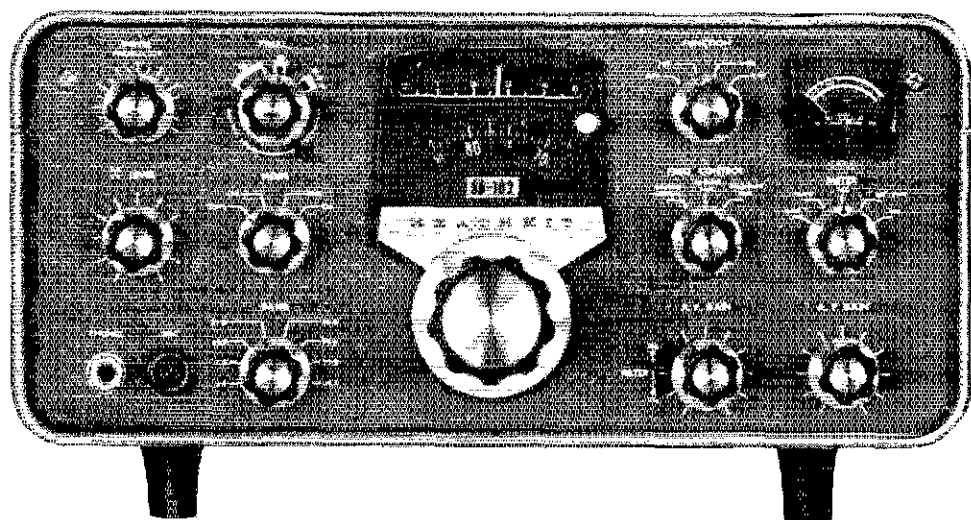
Nets not listed did not get reports in in time. Lancaster Radio Transmitting Society's new officers are K3HEC, pres.; W3KKW, vice-pres.; K3OEN, sec'y.; K3MAW, treas.; W3DYT and K3EFV, dir. Refer any would-be ham to K3ALV, W3PNL or W3IMW of RF Hill ARC. They are running full-scale training programs for all classes of licenses. WA3EBX is trying to get AREC moving in his area. K3HTZ must have a female and male antenna on his farm — they are beginning to multiply. WN3FTL passed the General Class exam, says its heavy on transistors, ssb, antennas and interference problems. If you missed the EPA Dinner Meeting you missed a good one. W3MPX now has a new HW-12 going. K3MVO as retired but is as busy with traffic as ever. The Penn Jersey YLs are a club will provide radio communications for gals in the Powder Puff Derby which will terminate in Bristol, Pa. Date July 3-6. WA3CKA says traffic business is good. WA3AFI was able to have a 30-minute QSO with Barry Goldwater at W3USS as a demonstration for would-be hams at the Phelps School. It was very effective! WA3CFU is building a quad as a school project. JYC Am. Radio Assn. is looking for 2&6 gear. Contact WA3MCK. RF Hill ARC reports record turnout at its annual banquet. WA3NVO added 220 Mhz to his shack. K3NPC had a ball as K3NPC/KV4 for a week. Frankford Radio Club really is piling up scores on DX. Any DX ops interested, contact K3JLI for information. Traffic: W3EML 684, W3MPX 511, WA3EXW 251, K3NSN 243, K3MVO 201, WA3FMI 172, K3PIE 163, WA3HBT 162, WA3LMO 142, W3HK 117, WA3ATQ 89, WA3CKA 83, W3AIZ 66, WA3GLI 64, WA3JWL 63, WA3LVC 61, K3PSO 53, WA3AFT 47, WA3IHV 43, WA3JZB 40, K3OIO 36, WA3EEC 32, W3OY 25, K3YVG 24, W3ADE 21, WA3CFU 20, W3VA 19, W3CBH 15, WA3MCK 15, WA3YIC 13, W3BNR 12, W3PFC 12, W3BUR 10, WA3MCD 6, W3CL 5, K3NPC 5, WA3BSV 4, WA3NVO 4, WA3BJQ 3, WA3AIZ 2, W3ICC 2, W3PVY 2, W3ID 1,

WA3JKO 1, K3JLI 1, WA3KFT 1, K3PDM 1, K3WEU 1, W3YPF 1, WA3LAK 108.

MARYLAND-DISTRICT OF COLUMBIA — SCM, John Munholland, K3LFD — SEC: W3LOY. PSHR: W3EZT. Appointments: W3FDU as EC Anne Arundel County and Acting EC Howard County; W3FCS as OPS. Endorsements: W3CSZ as OO, W3ECP as ORS, W3DYA as ORS, W3EOV as OPS, W3PYW as OO, WA3IYS as OBS. WA3IJR qualified for his Extra Class ticket. W3EOV has a message for all OMs and YLs on his new auto license plates — the tag number is 7388. K3STU/OO had a busy month taking part in ARRL's FMT, chasing call-letter "bootleggers" on the 6-meter band, working the CD Party and writing articles for CQ and 73 magazines. AMSAT is busy working out details for Oscar 6. W3JPT has installed 80-meter traps in his antenna so he can join the MEPN gang on the air. WA3IAQ has put up new dipoles for 80 and 40 meters at W3EAX. WA3GVP will resume OBS schedules after he clears up some rig troubles. K3GPN, K3FSY and W3FGE are active on MDD. W3FCS has joined the ever-growing list of MEPN-MDCTN-MDD shuttlemen. W3CSZ/OO is a busy Intruder Watchman. W3ADO had a ball running up some-kind-of-score in the DX Test and Beat Army in the Sweepstakes Contest. Advance Class operators WA7ETN/3, WA3NGL/3, WB2PHJ/3 and WA5NO/3 are teaming with a growing crop of Novice operators to keep W3ADO transmitters logging lots of on-the-air time. W3GKP had lots of visitors at "Moonbounce Laboratories," among them WA3NUJ, W4ZM, VE3CRA, G3HRH, W3AHT, WA3FTN, WA3LSL, W3AIR, W3TFA, K4SUM and W4APL. W3FA vows to complete all the antenna work this summer that he planned to complete last summer. W3ECP is back from his annual trip to Georgia and Florida. W3FU/OO continues his activity in the Intruder Watch program. WB4JTT and the Tidewater ARC invites all MDC amateurs to a hamfest on June 20 at Lakewood Park, Norfolk, Va. 23505. For details on tickets and program, write WA4SPE, P.O. Box 9701. W3MVB has been busy DXing, building new 4-1000 final and antennas for all bands, "OOing" and giving instruction to newcomer operators. W3LDD has 100 confirmed contacts for 5HWAS but finds the 20-meter gang a bit slow QSLing. W3CBG has reserved Shelter 301 in Patapsco State Park near the Route 40 exit for the MDC Traffic Nets Picnic July 26. Traffic: WA3IJR 279, W3TN 244, W3ADO 101, W3EZT 101, W3FA 71, W3FCS 54, K3LFD 54, W3EOV 47, W3LOY 31, WA3GXN 28, W3EAX 25, K3ORW 17, WA3ERL 16, W3ECP 15, WA3HV 12, W3ZNV 12, WA3LWT 11, WA3LKJ 10, K3GZK 8, K3ODC 8, W3CRE 2, WA3GVP 2.

SOUTHERN NEW JERSEY — SCM, Charles E. Travers, W2YPZ — SEC: W2LVV. RMs: WA2KIP, WA2BLV. PAMs: W2ZI, WA2UVB. South Jersey Radio Assn. put on a very fine program recently in commemoration of its fifty years of ARRL affiliation. Speech-making, including one by ARRL Director W3EPC, was well received by a large audience, as was the ARRL Movie "The Ham's Wide World." Because of the pressure of business, it was necessary for WB2WAK, Gloucester County ARC pres, to resign. W2FBF is the new pres. and WB2FJE, vice-pres. Ken Newman, our OO, has been doing an excellent piece of work in conducting programs and explaining the importance of the "OO" to the ham fraternity. W2PEV, net mgr. of the NEPT Net, informs me that the recent interference experienced on the net frequency has been resolved for the present and reports 31 sessions of the net for Mar. with 555 QNIs and a traffic total of 395. These NCSs are to be commended on a job well done: W2ZQ, WA2FRZ, W2FJE, WA2TAF, WA2BAN, W2PEV, WA2DRH. The Southern N.J. section is represented in the Public Service Honor Roll by WB2DRG, placing him in this group for three consecutive months. Randy has had hospital confinement but bounces right back to do a fine job. The DVRA of Trenton will make a tour of the Lawrenceville, N.J., overseas radiotelephone station of the American T and T Co. The station and vast antenna system cover about 300 acres and handles traffic for all parts of the world. W2ZI made arrangements. Traffic: (Mar.) WB2VEJ 203, W2PU 66, WB2DRG 45, WB2GDY 38, W2BLM 33, K2RXB 29, W2YPZ 28, W2ORS 9, W2IU 4, WB2SFX 3, W2ZQ 2. (Feb.) WB2DRG 55.

WESTERN NEW YORK — SCM, Richard M. Pitzeruse, K2KTK — Asst. SCM: Rudy W. Ehrhardt, W2PVI. SEC: W2RUF. Appointment renewals are WB2ZDP as OVS, W2FXA as OO and



Want to start a pile-up?

The New Heathkit® SB-102

Direct descendent of the most popular sideband rigs ever produced — the famous "100" & "101" Series. With an ancestry of top performance, high reliability and unbeatable value, you expect the new "102" to be a better rig . . . and it is.

The frequency stability and linearity of the "101" were second to none. The "102" is even better. An all solid-state Linear Master Oscillator cuts stabilization time in half; offers far greater tracking accuracy.

Hot new receiver circuitry delivers improved sensitivity . . . now less than 0.35 μV for 10 dB signal plus noise to noise. This increase gives you solid copy longer when the band is on the way out.

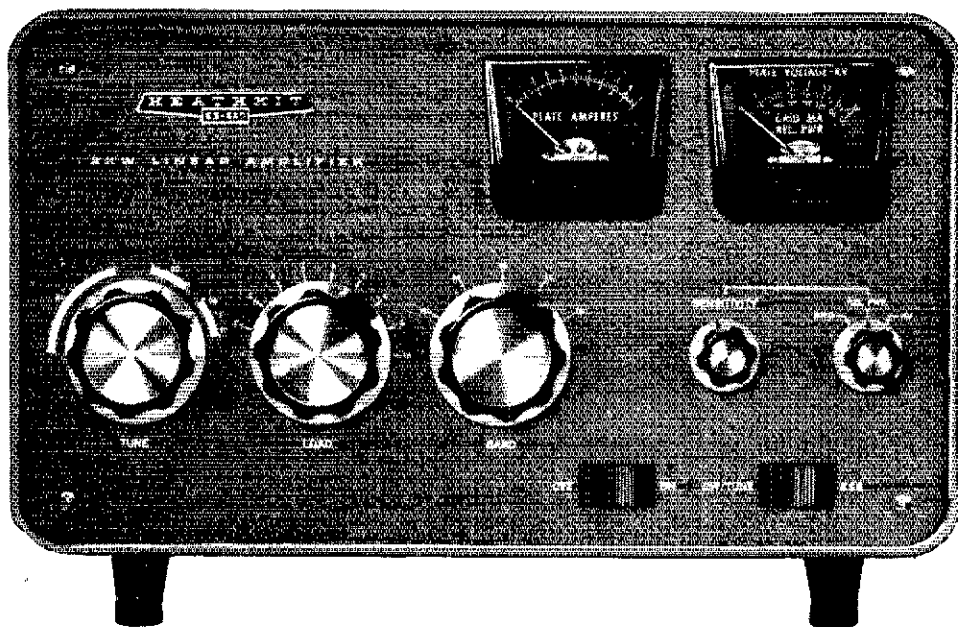
The new "102" brings you all the flexibility and performance that made the "101" the standard of comparison on the air, plus important new features. Start your Maxi-Rig now . . . with the SB-102 — from the Hams at Heath, of course.

SB-102 SPECIFICATIONS — RECEIVER SECTION: Sensitivity: Better than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. **SSB selectivity:** 2:1 kHz minimum at 6 dB down, 3 kHz maximum at 60 dB down — 2:1 nominal shape factor — 6:60 dB. **CW Selectivity:** (With optional CW filter SBA-301-2 installed) 400 Hz minimum at 6 dB down, 2.0 kHz maximum at 60 dB down. **Input impedance:** Low impedance for unbalanced coaxial input. **Output impedance:** Unbalanced 8 and 600 ohm speaker, and high impedance headphone. **Power output:** 2 watts with less than 10% distortion. **Spurious response:** Image and IF rejection better than 50 dB. Internal spurious signals below equivalent antenna input of 1 microvolt. **TRANSMITTER SECTION:** **DC power input:** 180 watts P.E.P. continuous voice. **CW:** 170 watts — 50% duty cycle. **RF power output:** 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). **Output impedance:** 50 ohms to 75 ohms with less than 2:1 SWR. **Oscillator feedthrough or mixer products:** 55 dB below rated output. **Harmonic radiation:** 45 dB below rated output. **Transmit-receive operation:** **SSB:** Push-to-talk or VOX. **CW:** Provided by operating VOX from a keyed tone, using grid-block keying. **CW side-tone:** Internally switched to speaker in CW mode. Approx. 1000 Hz tone. **Microphone input impedance:** High impedance. **Carrier suppression:** 50 dB down from single-tone output. **Unwanted sideband suppression:** 55 dB down from single-tone output at 1000 Hz reference. **Third order distortion:** 30 dB down from two-tone output. **Noise level:** At least 40 dB below single-tone carrier. **RF compression**

• New all solid-state Linear Master Oscillator features 1 kHz dial calibration • Bandspread equal to 10 feet per Megahertz • Less than 100 Hz per hour drift after 10 minute warm up • Dial resettable to 200 Hz • New receiver circuitry provides sensitivity of better than 0.35 μV for 10 dB S+N/N • 180 watts PEP SSB input — 170 watts CW input • 80 through 10 meter coverage • Switch-selection of USB, LSB or CW • Built-in CW sidetone • Built-in 100 kHz crystal calibrator • Triple Action Level Control™ reduces clipping and distortion • Front panel switch selection of built-in 2.1 kHz SSB or optional 400 Hz CW crystal filters • Operate with built-in VOX or PTT • Fast, easy circuit board-wiring harness construction • Run fixed or mobile with appropriate low cost power supplies

SB-102, 23 lbs. \$380.00*
 SB-600, Communications Speaker, 6 lbs. \$19.95*
 HP-23A, AC Power Supply, 19 lbs. \$51.95*
 HP-13A, DC Power Supply, 7 lbs. \$69.95*
 SBA-301-2, 400 Hz CW Crystal Filter, 1 lb. \$21.95*
 SBA-100-1, Mobile Mounting Kit, 6 lbs. \$14.95*

(TALC): 10 dB or greater at 1 ma final grid current. **GENERAL:** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). Frequency stability: Less than 100 Hz per hour after 10 minutes warm-up from normal ambient conditions. Less than 100 Hz for $\pm 10\%$ line voltage variations. **Modes of operation:** Selectable upper or lower sideband (suppressed carrier) and CW. **Visual Dial Accuracy — "rossetability":** Within 200 Hz on all bands. **Electrical dial accuracy:** Within 400 Hz after calibration at nearest 100 kHz point. **Dial mechanism backlash:** Less than 50 Hz. **Calibration:** 100 kHz crystal. **Audie frequency response:** 350 to 2450 Hz ± 3 dB. **Phone patch impedance:** 8 ohm receiver output to phone patch; high impedance phone patch input to transmitter. **Front panel controls:** Main (LMO) tuning dial; Driver tuning and Preselector; Final tuning; Final loading; Mic and CW Level Control; Mode switch; Band switch; Function switch; Freq. Control switch; Meter switch; RF gain control; SSB-CW filter switch; Audio Gain control. **Internal controls:** VOX Sensitivity; VOX Delay; Anti-Trip; Carrier Null (control and capacitor); Meter Zero control; CW Side-Tone Gain control; Relative Power Meter Adjust control; P.A. — Bias; Phone Vol (headphone-volume); Neutralizing. **Rear Apron Connections:** CW Key jack; 8 ohm output; Spare A; Spare B; Phone patch input; ALC input; Power and accessory plug; RF output; Antenna switch; Receiver Antenna. **Power requirements:** 700 to 800 volts at 250 ma; 300 volts at 150 ma; —115 volts of 10 ma; 12 volts at 4.76 amps. **Cabinet dimensions:** 14 $\frac{1}{2}$ " W x 6 $\frac{1}{2}$ " H x 13 $\frac{3}{4}$ " D.



Turn on your Benton Harbor maxi-rig!

The New Heathkit® SB-220

Business end of the Maxi-Rig! Gives your signal the authority it takes to punch through those pile-ups (or start one yourself). And keeps you operating under conditions that drive the other guys QRT.

A pair of conservatively rated Eimac 3-500Z's provide up to 2000 watts PEP SSB input ... 1000 watts on CW and RTTY. Requires only 100 watts PEP drive. Pretuned broad band pi-input coils deliver maximum efficiency and low distortion on the 80-10 meter bands.

The built-in solid-state power supply can be wired for either 120 or 240 VAC and switched back again in minutes if your power requirements change. Circuit breakers provide added protection and eliminate costly fuse changing. And for cooler operation and extended tube life, idling plate current is reduced by Zener diode regulated bias.

The layout of the new "220" is designed for fast, high volume air flow with a husky, quiet fan in the PA compartment doing the job. Result: the "220" actually runs cooler than most excitors.

Other features include two front panel meters for continuous monitoring of Ip plus switch-selected monitoring of Rel. Pwr., Ep & Ig ... ALC output to reduce overdriving and distortion ... safety interlocked cover ... easy 15-hour assembly and handsome Heathkit SB-Series styling.

Tired of stumbling barefoot through the QRM? Order the shoes for your Maxi-Rig now ... the new "220" ... another hot one from the Hams at Heath.

- Full 2 kW PEP input on SSB ... 1 kW on CW and RTTY
- Boardband pi-input on 80 through 10 meters
- Two Eimac 3-500Z tubes • 120 or 240 VAC wiring options
- Zener diode regulated operating bias for reduced idling plate current, longer tube life, cooler operation
- Double shielded to reduce stray radiation
- Solid-state power supply
- Two front panel meters for continuous monitoring of plate current, plus switch selected monitoring of Rel. Pwr., plate high voltage and grid current
- Quiet, high volume fan for cool running
- ALC output
- Easy 15 hour assembly.

Kit SB-220, 55 lbs. \$349.95*

SB-220 SPECIFICATIONS — Band coverage: 80, 40, 20, 15 and 10 meter amateur bands. **Driving power required:** 100 watts. **Maximum power input:** SSB: 2000 watts P.E.P. CW: 1000 watts. RTTY: 1000 watts. **Duty cycle:** SSB: Continuous voice modulation. CW: Continuous (maximum key-down 10 minutes). RTTY: 50% (maximum transmit time 10 minutes). **Third order distortion:** —30 dB or better. **Input impedance:** 52 ohm unbalanced. **Output impedance:** 50 ohm to 75 ohm unbalanced; SWR 2:1 or less. **Front panel controls:** Tune, Load, Band, Sensitivity, Meter switch, Power CW/Tune — SSB, Plate meter, Multi-meter (Grid mA, Relative Power, and High Voltage). **Rear Panel:** Line cord, Circuit breakers (two 10 A), Antenna Relay (phone), ALC (phone), RF Input (SO-239). Ground post. RF output (SO-239). **Tubes:** Two Eimac 3-500Z. **Power required:** 120 VAC, 50/60 cycles, at 20 amperes maximum. 240 VAC, 50/60 cycles at 10 amperes. **Cabinet size:** 14 3/4" W x 8 1/4" H x 14 1/2" D. **Net weight:** 48 lbs.



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AM-234R

K2AYQ as EC. The response to the bulletin I mailed in late Mar. has been more than I would have imagined. If you did not receive a copy, let me know and I will get one to you. The RAGS Hamfest was a real success with an unusual auction being the highlight of the event. K2AYQ holds title to a new Swan 270. Wayne reports his AREC group is handling communications for the White Water Derby at Crown Creek. WN2MBN is looking for a Novice traffic net in which to wet his feet. WA2MDF is pleading for QSOs between 145 and 147 MHz. Anyone interested in a skeed with Lyon Mountain might drop him a card. WB2FPT meanwhile is looking for RTTY nets. WB2ZDP is literally raising the roof at his shack - adding dormers. The Elmira Amateur Radio Assn. has a class of 22 prospective Novices. W2PIY has a new Amateur Extra license. WA2URW has the solution to family arguments caused by too much hamming - he operates from work! NCARC held its Annual Banquet Apr. 18. WA2LH is the new Chautauque County RACES Radio Officer. NYS cleared 341 messages with 13 different NCSs and 13 liaison stations to 2RN. WA2AIV easily qualified for OO Class 1 with an accuracy of 45.1 ppm in the recent FMT. WA2ICB has just introduced himself to net operation and reports he is having a ball. W2CFP now has the complete S/Line on from home and has a Swan rig on from his office (W2QGG) at Stellar Industries. WB2WGF lost his 15-meter beam in a late winter storm. Ex-WA2BSN returns to ham radio as WB2YKY. W2EMW worked 45 Asians in Mar. K2PVN got hitched. WB2YQH participated in the ARRL DX Test. W2FXA says the Niagara Frontier DX Assn. is going for real in Field Day. W2WS has a new T4X/R4B combination and is operating on sb and cw. W2DXZ, W2WRR, K2JI and K2KAM have been elected to the RAWNY board of directors. WR2BXL does a nice job as NCS on NYSPTEN. Sorry to report the loss of W2BKC. Elected officers of the NYSPT&EN are WR2VJB, WA2LLE, WA2YJB and K2VCZ. W2OE made the BPL. W2s MTA, FR, QC, RUF, K2s KIR, KTK, WA2s DHS, CAL and ICU made the PSHR. Traffic: (Mar.) W2FR 416, WA2CAL 365, W2OE 195, W2RUF 189, K2RYH 183, W2QC 178, WB2VND 115, W2MTA 106, W2HYM 101, WA2ICU 82, WA2DHS 74, WA2AWK 54, W2RQF 52, W2FEB 44, W2MSM 44, WA2BEX 35, K2KIR 29, WA2HJY 24, W2DBU 22, K2DNN 21, K2KTK 21, WB2HLI 20, WB2YKY 20, WA2ICB 17, K2IMI 17, WA2LE 16, WB2WGF 16, W2WGF 15, WA2JZZ 15, K2UIR 15, K2OFV 13, WB2YEF 13, W2PVI 12, WA2AIV 11, WA2IYB 10, K2RTO 7, WB2YEM 7, W2CFP 6, W2PNW 6, WA2GLA 4, WA2ANF 3, WR2FFG 3, W2EMW 1, (Feb.) K2RYH 101, WA2ANE 7. Total 2705.

WESTERN PENNSYLVANIA - Acting SCM, G.R. Stoneburner, WA3AKH - SEC: W3KJP, PAMs: W3WFR, K3ZNP, RMs: WA3AKH, W3KUN, W3LOS, W3NEM. Traffic nets: WPA. 0000 GMT 3585 kHz; WPP, 0300 GMT 3955 kHz daily. The Keystone Slow Speed Traffic net will resume operation Oct. 5 after the usual summer vacation. The Uniontown ARC officers are K3OQP, pres.; K3RLB, vice-pres.; W3YNI, treas.; W3IUZ, secy. They announce the Gafest date has been set for Sat., Sept. 5. Talk-in station W3LWV/3 will be in operation on 3.955 MHz and 51.40 MHz for the Foothills RC Hamfest June 14 at Wendell, Pa. WA3IPU has renewed his participation in Navy MARS. WA3BGE, a student at Case Western Reserve U., operates club station W8EDU. WA3JBN, able NCS of WPP Net, has a new remote vfo for his Galaxy 5MK3. Doug says it's great for QNI two nets simultaneously! WA3JPB and WN3MBY will enter Carnegie Mellon U. as freshmen as WA3AWR is awarded his PhD from the same university. License upgrading: W3NMP to Extra Class and new call W3WZ; WA3NOM and WA3MST to General Class. The Radio Assn. of Erie DXpedition planned for this summer has been rescheduled for Jan. 1971 because of weather conditions which prevail in the Serrana Bank region from May through Nov. K3OUK recently returned from military service and is becoming active in Erie amateur radio activities. K3SJD won the hidden transmitter hunt sponsored by the Western Pennsylvania mobileers. W3CFC has a new home-brew final (3100Z) going but reports that he has only had to use it once! WA3BLE's major activity is attending the University of Pittsburgh, but he still has time to work on five-band WAS. Traffic: WA3IPU 280, W3NEM 215, K3ZNP 130, K3HKK 121, W3LOS 115, WA3AKH 105, W3KUN 101, K3HCT 52, K3SMB 38, WA3JBN 36, WA3BLE 26, WA3EXX 18, K3SOH 11, W3UT 10, K3SIN 8, W3IDO 7, W3LOD 2.

CENTRAL DIVISION

ILLINOIS - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. PAMs: WA9CCP and WA9PDI (vhf). RM: WA9ZUE, Cook County EC: W9HPG.

Net	Freq.	Times/Days	Tfc.
IEN	3640	1400Z Su	7

ILN	3760	0000Z Dy	181
NCPN	3915	1300Z M-Sa	
NCPN	3915	1800Z M-Sa	
III PON	3915	2345Z M-F	845
III PON	3915	1430Z M-F	
III PON	145.5	0200Z M.W.F.	24
III PON	50.28	0200Z M	9
Gt. Lakes	3932	0230Z Dy	69

The Ninth Region Net had a traffic count of 707 during Feb., according to W9HRY. W9SKL is trying to build up his C & A railroad antiques and would like to communicate with anyone who has some to give him. W9INQ reports that the Mar. snow storm damaged his antenna systems. W8FAW and WA9SDC are now working for Motorola in Schaumburg. WA9ZFR has dropped the "N" from his call. W9IPH is recovering from a serious hospital siege and doing fine at home. WN9DKX is a new Novice in the Chester area. WA9LHU has been appointed Chief Radio Officer in DeWitt County Civil Defense. WN9WFA and WN9URC (now WB9DEF) have moved to Belleville. K9WMP gave a talk on "Motorola's part in Two Way Communication" at a recent York Radio Club meeting. Our sympathy to the family and friends of K9RIC, W9MRH and W9PEZ, who recently passed away. WA9ZLN passed the Advanced Class exam. W9HSD and W9KFO participated in the ARRL Frequency Measuring Test. WA9AH and his XYL WA9AI have just finished building an SB-200 linear to chase the DX stations. The Moultrie Amateur Radio Klub held its 9th Annual Hamfest at Sullivan and many an eyeball QSO was held by the gang. WB9ARZ is now General Class. The Starved Rock Radio Club will hold its Annual Hamfest Sun., June 7 at the 4H clubgrounds (the same place as previous years). The Six Meter Club's Annual Picnic will be held Sun., Aug. 27 at Frankfort, Ill. The Hamfesters get-together will be held Sun., Aug. 9, at the Santa Fe Park near Chicago. W9AZP is recuperating in the hospital after surgery. W9EUN is the only BPL recipient this month. Traffic: K9AVQ 310, W9EUN 301, WA9WNH/9 173, W9NXXG 144, W9EVJ 121, W9HOT 121, W9ELF 114, WA9ZUE 70, WA9MLE-WB9DPU 66, W9HJ 65, WA9ZPL 62, WA9NZF 58, WA9LDC 44, WA9BRO 41, W9LNO 36, WA9OBP 10, W9HJM 9, WA9LH 8, WB9AJB 7, W9PRN 7, W9LMI 6, W8FAW/9 6, K9HKS 3.

INDIANA - SCM, William C. Johnson, W9BUQ - SEC: W9FC, RM: W9FC, W9HRY. PAMs: K9CRS, WA9OHX. (vhf) W9PMT.

Nets	Freq.	Time(Z)/Days	Mar. Tfc.	Mgr.
IFN	3910	1330 Dy	230	WA9OHX
		2330 M-F		
ISN	3910	0000 Dy	440	K9CRS
		2130 M-S		
		2330 S-S		
QIN	3686	0000 Dy	383	WA9WMT
ITN	3740	0000 Dy	17	WA9WHD
PON	3910	1245 Su.	318	WA9YXA
POINVFH	50.7	0200 M-Thu	505	WB9AMB
Hossier			92	W9PMT
VHF				

With deep regret I report WA9HJ, of Logansport and W9HSP, of Mooresville as Silent Keys. All Novices, take note that the Indiana Teenage Net is on 3740 kc. at 0000Z daily: WA9WHD is the net mgr. WA9OTL has been named Asst. Civil Defense Director for Griffith. WA9WCE and K9JQY have upgraded their licenses. K9CEG will be mobile until early fall. SEC W9FC would like more ECs to send in reports. W9LUC reports that the Fort Wayne Radio Club is giving code classes two nights a week on 50.2 mc. IPON nets have two net in the net column, 3918 daily, 50.175 M-T and Th. QIN Honor Roll: W9DDP 25, W9IBO 25, K9VHY 24, K9HYV 23, WA9WMT 21, WA9KAG 19, WA9WHD 18, WA9ZKX 18, W9QLW 15. Amateur radio exists because of the service it renders. BPL certificates went to K9FZX, W9IBO, W9IYO, W9EQO, WA9YXA and WB9AMB. Traffic: (Mar. K9FZX 940, W9IBO 802, W9IYO 719, WA9QOQ 489, WA9WMT 406, W9EQO 366, WA9YXA 329, W9FWH 289, WB9AMB 285, W9HRY 256, W9ICU 184, WA9TIS 184, WA9WMT 161, WA9ZKX 124, W9BUQ 109, K9CIB 106, WA9UMI 92, WA9OHX 81, WA9WJA 64, K9YBM 57, K9VHY 46, K9CRS 43, WA9BHG 36, K9RWU 33, W9LG 31, WA9GJZ 27, WA9WHD 26, W9QLW 25, W9DZC 24, W9PMT 23, W9SNO 21, K9JQY 19, W9MZB 19, WIDRN/9 18, WA9CHY 17, WA9AXS 15, W9DDP 12, K9RPZ 12, WA9WSX 11, W9HWR 10, K9ILK 8, WA9QEQ 7, W9FC 6, WA9VBG 6, WN9ZXS 2, WA9AQW 1. (Feb.) WA9BVL 7.

WISCONSIN - SCM, S.M. Pokorny, W9NRP - SEC: W9NGT. PAMs: WA9EZL, WA9ZK, WA9QAY, WA9QKP, WA9QNI, RMs: K9KSA, WA9TXN.

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SPECIFICATIONS	PM 3 / PM 3A	PM 2 / PM 1
Frequency range	(Band) 40 meters (Range) 7.0-7.4 MHz 20 meters 14.0-14.8 MHz	(Band) 40 meters (Range) 7.0-7.3 MHz 80 meters 3.5-4.0 MHz
Finish	Baked enamel. End panels, walnut wood grain.	(same)
Power Required	12 volts DC 30 ma. to receive 450 ma. to transmit	12 V. DC. 20 ma. to receive 200 ma. to transmit
Semi-conductor Devices	1 dual-gate MOSFET, 1 integrated circuit, 8 silicon transistors	1 dual-gate MOSFET, 1 integrated circuit, 4 silicon transistors
Types of Reception	CW-SSB-AM	CW-SSB-AM
Selectivity	2 KHz at 6 db down points	(same)
Sensitivity	Less than 1 uv	(same)
Antenna output impedance	PI Network	50-75 ohms. Fixed Link
Audio	Output impedance 1000 ohms. Frequency response \pm 3 db 200-2500 Hz	(same)
Frequency Stability	Less than 100 Hz drift. No warm up	(same)
Power Input	Approximately 5 watts	Approximately 2 watts.
Front panel controls	On-off, 40-20 band switches (3), transmit-receive, volume, receiver peak, tune-operate, tune, load. Metered amplifier. Head phone tip jacks.	On-off, 40-80 band switches (3), transmit-receive, volume, VFO/crystal, receiver peak, oscillator tuning and amplifier tuning. Metered amplifier. Head phone tip jacks.
Tuning	Slide-rule dial. Flywheel tuning	(same)
Size	HWD 4 1/2", 10 3/4", 8 3/4"	(same)
Shipping weight	3 pounds	2 3/4 pounds

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Net	Freq.	Time(7)Days	QNI	QTC	Mgr.
BWN	3985	*1245 M-Sa	400	214	WA9OAY
BEN	3985	*1800 Dy	721	88	WA9QPK
WI-PON	3925	*1801 M-F			W9VCM
WSBN	3985	*2300 Dy	1388	239	WA9QNI
WSSN	3780	*0030 TT-Sa	94	14	K9KSA
WIN	3662	*0115 Dy	379	122	WA9TXN
WRN	3620	*0130 Sun	43	8	K9GSC
SW6RN	50.4	*0300 M.-Sa	152	4	WA9E7T
5W2RN	145.35	*0230 Dy	191	14	WA91ZK
WI-RACES	3993.5	*1400 Su	70		

*All nets are one hour earlier during the Daylight Saving time period. Net certificates went to W9WYL for BEN; WB9BIF for BWN; WB9BRF for WIN; WB9ABF, WB9BRF, WA0VKI/9 and WA9YHF for WSSN; WB9BIF, WA9TXN and W9WYL for WSBN. New appointment: K9FHI as OPS. Renewed appointments: W9ESJ and W9ODD as OPSs, W9ODD as ORS, W9A9QI, WB9AZE and WB9BXQ are now Advanced Class. WA9SVE is now Extra. AREC applications were received from WN9BXJ and WN9DMT. The WNA Hamfest Picnic will be held Sun., July 12, at Harabog, Wis. For further details contact K9FHI, Roy Pedersen, 510 Park, Juneau, Wis. 53039. Net mngs., when requesting certificates for new members please give names and addresses as many are not listed in the Call Book and it takes several months of inquiring before certificates can be mailed out. We still want listings of club officers from club secretaries. Traffic: (Mar.) W9CXV 405, K9CPM 299, W9DND 164, WA0VKI/9 155, WA9TXN 106, WA9ONI 93, K9FHI 64, K9TBY 61, W9ESJ 44, W9KRO 44, W9NRP 42, WN9BJR 39, K9JPS 37, WA9OAY 35, W9IHW 32, W9RTP 31, W9DXV 29, WB9ABF 25, K9KSA 22, WA9PKM 22, WB9BAH 19, WA9NBU 15, WA9THF 15, WB9BIF 9, W91RZ 9, W9ZBD 9, K9UTO 8, WA9SAB 5, K9GSC 4, WA9E7U 1. (Feb.) WA9RAK 159, W9ODD 7, K9GSC 3.

DAKOTA DIVISION

MINNESOTA - SCM, Larry J. Shima, W0PAN - SEC: WA0MZV. PAMs: K0GYO, WA0EJ, WA0HRM, WA0MMV. RMs: WA0URW, W0AAU, WA0LAW. VHF PAM: WA0DWM.

Section Nets	MHz	GMT	Days
MSPN (noon)	3.945	1705	M-S
MSPN (eve)	3.940	2245	Dy
MSPN (noon)	3.945	1400	Sun., Hol
MSN	3.685	2330	Dy
MJN	5.685	0000	Tu-Su
MSTN	50.400	0330	Dy
MINN RTTY	3.620	0100	Su
MINN AREC	3.912	2200	Su
PICONET	3.925	1800	Su
MPON	3.910	1730	Su
MINN 40 CW	7.060	2200	M-WF

W0KLG was the recipient of the MSN Operator of the Year Award for 1969. New Extras in Minn.: WA0RRA, WA0TSV, K7BOY/0 (now W0NFU). The severe weather season has now arrived. In case of a severe weather warning, please monitor 3.912. If requested, your report may be extremely helpful to the Weather Bureau. Don't transmit unless requested to do so. Mar. appointments: EC renewals - WA0PMM Wasca, WA0LAC Swift, W0BUC Crow Wing, W0FIT Freeborn, W0AZR Mower, WA0NQH Chippewa and W0LW Wilkin. W0UJI is the new EC for Washington County. K0CNC renewed as ORS. WA0IAW, RM for MJN and over-all RM, renewed. Traffic: (Mar.) WA0VAS 3235, W0BUC 362, WA0TQI 227, WA0VYV 204, WA0MMV 198, WA0EJ 191, WA0TGM 180, K0ZRD 179, WA0IAW 153, W0ZHN 152, WA0NQH 108, W0AAU 87, WA0TFC 75, K0MVE 71, W0FHH 65, WA0URW 58, W0PAN 52, WA0VTZ 52, W0YC 48, WA0RKY 46, K0GYO 41, W0WFA 41, WA0WFB 40, WA0VIS 37, W0WAS 36, W0PET 31, WA0YMU 30, W0ATO 28, WA0HRM 27, WA0ZND 27, WA0RUJ 26, WA0EZO 25, K0FLT 23, WA0VPK 22, WA0UAH 21, W0PYAH 19, W0KNR 16, WA0JPR 14, W0KLG 12, W0EQU 11, W0S2J 11, WA0RKF 9, K7BOY/0 8, K0ORK 8, WA0YJB 8, W0UMX 7, W0IYP 6, W0YVT 6, K0ZBI 6, W0FDK 5, WA0VFN 5, WA0MNE 4, WA0TSA 4, WA0IXG 3, K0CNC 2, K0IKU 2, WA0EF 2, WA0WEZ 2, K0JL 1. (Feb.) WA0EPX 158, W0AAU 69, WA0VIS 48, K0GYO 34, WA0SDR 29, WA0LAC 11, WA0YJB 6.

NORTH DAKOTA - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. OBS: K0SPH. PAM: W0CAQ. RM: WA0RSR. OU: W0BF. W0EXO and XYL have returned with the birds from Florida. K0ITP is back from California. WA0RWM spent some time at the hospital at Fargo. The International Hamfest will be held at the Peace Garden July 11-12. W0ECC says there is to be picnic at Kindred Sunday, June 28. The University of North Dakota Sioux Amateur Radio Club has received its license from the FCC with the

call WB0BCZ. W0OGZ is the trustee of the station which is to be housed in the Student Center. WA0AYL is the adviser. There should be five more additional Novice licensees in the Grand Forks now that W0DM's class at Valley Jr. has applied for exams. Have you noticed how the NDN CW net is picking up? Listen down there around 3645 kHz and copy those nice fists. Congrats to WA0RSR, the RM, and you fellows who are helping him out, WA0HUD and W0NMV are still the top-notch traffic movers. W0MXF has an SB-101 on now and is putting out a good signal from Bismarck.

Net	kHz	CST	Days	Seas.	QNI	QTC
Goose R.	1990			5		
PON	3996.5	1730	Sa.	14	343	19
		0900-1730	Su.			
ND CW	3645	2100	M-F	25	176	32
RACES	3996.5	1730	M-F	41	1249	305
		1830				
YL WX	3995	0730	M-S	30	1074	999

Traffic: (Mar.) WA0HUD 189, W0NMV 159, WA0TBR 67, W0WYL 47, WA0RSR 46, W0DM 40, W0CDD 35, K0SPH 22, WA0VMA 17, WA0ELO 14, WA0SJB 13, WA0MSJ 11, WA0DPT 4, WA0MND 4, WA0IRT/0 7. (Feb.) WA0SJB 10.

SOUTH DAKOTA - SCM, Ed Gray, WA0CPX - Martha Shirley's WX net closed Apr. 18 after another year of outstanding service with WX information. W0ZWL was awarded a medal from WX Bureau. WA0UEN reports there are 22 AREC members signed up in Pennington County. W0HOJ opened the Morning Net on Apr. 20. WA0YAK is planning to improve his antenna system with a new tower to support his low-band antennas and quad. WA0WNI has also installed a tower and beam. Net reports: Morning, QNI 366 and traffic 233; NJQ-NOON, QNI 445 and traffic 43; Early Evening, QNI 705 and traffic 25; Late Evening, QNI 1439 and traffic 53; AREC Net, QNI 67 and traffic 2. Traffic: W0AWL/0 319, WA0PNB 118, WA0SKA 106, W0IG 54, W0CAS 29, WA0LLG 28, WA0UEN 28, K0AIE 26, WA0SHA 14, WA0FUZ 41.

DELTA DIVISION

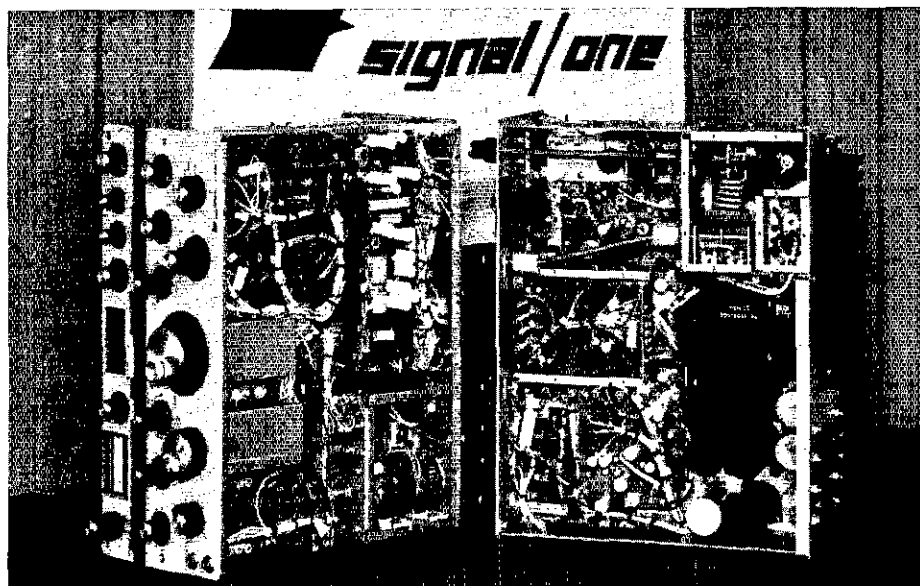
ARKANSAS - SCM, Robert D. Schaefer, WA5HS - SEC: W5PBZ. RM: W5NND. PAM: WA5KIT. On Mar. 14 Director W4WHN met with about 20 Asst. Directors in Little Rock. On Mar. 15 Max met with some of the local Arkansas hams. We enjoyed having Max visit in Arkansas, and hope this will lead to a greater involvement by our hams in ARRL affairs. WASGPO made BPL for the second time in a row. K5TNN is now 524PZ in Kenya. The ADXA meets on 3.860 at 0045Z Mon. Most of our top DXers are there, so this is an excellent place to get information on the rare ones. W5KIT has been working good DX with a Cb rig converted to 10 meters. Net reports for Mar.:

Net	Time/Day	Freq.	Tfc	QNI	Mins.	Mgr.
GZK	0000Z Dy.	3790	36	192	584	W54TLS
RN	2330Z Dy.	3995	43	722	650	W5ASKJ
APN	1100Z M-F	3937	5	502	1395	W5VFW
PON	2130Z M-F	3825	57	377	657	W5TJB
Teenage	2230Z Dy.	3995	4	89	202	W5QMO
FC Net	2300Z Su.	3995				W5FBZ

Traffic: WASGPO 875, W54TLS 44, W5VFW 38, W5TJB 37, W5YM 25.

LOUISIANA SCM, J. Allen Swanson, Jr., W5PM - SEC: W5OB. RM: K5ANS. VHF PAMs: W5UQR, W5DXA. The Central Louisiana Amateur Radio Club has announced that a hamfest will be held in the Alexandria area Aug. 23. W5NSUK is a new ORS. It may seem strange to hear yours truly announce he will not be a candidate for SCM again and then have his name announced by HQ, as in the running! However, I was prevailed upon by three clubs and many friends to keep the nose to the grindstone! The Lafayette ARC has announced the trophy winner in the recent LA. QSO Party. W5TVH was first, W5NSUK second. The Ozark ARC has donated a light for the Bayou Liberty Civic Club's playground. W5FDD and his XYL, W5NMR, have upgraded their licenses to Advance and General, respectively. The Ozark ARC has prepared a plan for presentation to the Police Jury showing what service amateur radio will play in an emergency affecting the area. The Rapides Emergency Net now meets on 3912 kHz Sun. at 1400 GMT. Asst. Directors W5EXI, W5PM and W5OB attended a Director-called meeting in Little Rock. For your information the following in Louisiana are Asst. Directors: W5RU, W5LHZ, K5YMM, W5PM, W5EXI, W5BSR, W5LDH, W5OB. Let them know your feelings about various problems or suggestions affecting ham radio. The GNOARC recently held its Annual Dinner which, according to W5KSI, was a huge success. K5AGI, W5SCOT, K5MOV and K5OEV are very active on 50 MHz. Incidentally, the W5UK repeater has been put back on the air. W5DXA is urgently in need of an

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NCS for the ARCC Net on 50.25. The net meets Wed. at 0200 GMT. W5EA still is working on his RITY project! W5CEZ is again operating from Toledo Bend as W5CEZ/5. W5W5BZ had rig trouble and was off the air for nearly a month. See you in Alex Aug. 23! Traffic: W5ML 180, W5MBC 85, W5CEZ 54, W5V0E 31, W5W5BZ 5, W5PM 4.

MISSISSIPPI - SCM, Clifton C. Comfort, W5KEY - The Mar. Division Director's Meeting in Little Rock was a big success. The personal contact with the Division Director, Vice-Director and Asst. Directors is a definite aid in making the Delta Division a closer working organization. W4WHN and W4WBK are definitely trying to represent us at Headquarters, W4WHN will be on between 3985 and 3990 kHz from 1400 to 1600 each Sun. that he can meet the schedule for personal contacts. The Slow Speed CW Net got started on Mar. 31 with W5SBM as net mgr., 3665 kHz, 0045Z. Check in even with the old "pump handle," W5SKK, a housewife, mother of 2, an OO and an intruder watcher, graduated in May with her MA in math! W5BW has been back in the hospital again. I regret to report that W5IGW has joined Silent Keys. W5SPTF has transferred to the Philippine Islands. We welcome WB6J5W/5 to Mississippi. Check into nets.

MTTN	3665	0045Z	Daily
GCSBN	3925	0030Z	Daily
CGCHN	3935	0100Z	Daily
MSBN	3990	0015Z	Daily

Traffic: W5SBM 194, W5JWD 32, W5TMC 21, W5KEY 12, W5YJA.

TENNESSEE - SCM, Harry A. Phillips, K4RCT -

Net	Freq.	Time	Sess.	QNI	QTC	Mgr.
TSSR	3980	2330 Tu-Sa	26	1613	75	K4MQI
FPN	3980	1145 M-Sa 1300 Su	30	1134	32	W4PEP
FPFN	3980	1040 M-F	22	611	31	WA4EWW
FPON	3980	2330 M	5	219	21	K4RTA
TTN	2270	2100 Dy	28	164	16	WR4HHH
TN	3635	0600 Dy	31	210	100	K4AMC
RTVHF	145		1	78		WB410 B
FTVHF	50.4		13	207	3	WB4IOB
ToMSN	50.1	Th&Su	7	61		K4LQC
ETTMN	28.8	0130 W&F	8	63	7	WA4YON

WA4YFG reports the Humboldt ARC has purchased 30 commercial high-band transceivers and all are to be converted to 2-meter fm. WA4GJN reports the Middle Tenn. 10M Net meets at 2000 CST Mon. and Thurs. OVS W4HHK, of Collierville, is still running moonbounce and tropo-scatter tests with W3GKP, Spencerville, Md., and WA4HGN, Muscle Shoals, Ala. Paul has attempted a special test with DJ8QJ, in Germany. He also ran tests during the solar eclipse. The TN (cw) is doing very well with good participation and traffic. Vice-Director W4WBK reports that the Director-called meeting in Little Rock, Ark., was a success. Traffic: K4AT 213, W4OGG 158, WA4UAZ 83, W4WBK 50, WB4HMA 48, WB4LIE 33, K4AMC 32, WA4ANX 29, K4SXD 29, WA4YFG 28, WB4FEC 15, WB4HH 14, WB4JTS 14, WA4YEM 14, WB4HSS 13, K4LOO 13, WB4NDX 13, WA4ZXZ 13, W4SGI 10, WB4GTW 9, WA4CGK 8, WA4GLS 8, W4TYV 8, W4DYJ 7, WB4MDA 7, WA4EWW 6, K4PUZ 5, W4VJ 2.

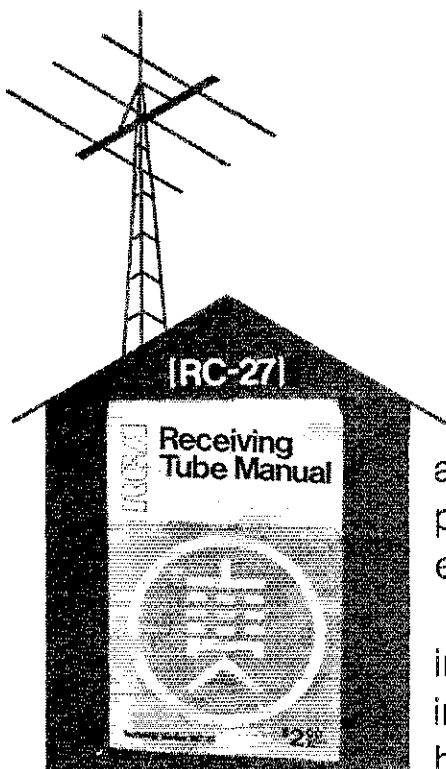
GREAT LAKES DIVISION

KENTUCKY - SCM, George S. Wilson, III, W4OYL, SEC: K4YZU. Appointed: K4YZU as SEC, WB4LFZ as ORS. Endorsed: WB4HQW, WB4KPL as ORSs, W4CMP as OO, BPL: WA4MKH.

Net	QNI	QTC	Net	QNI	QTC
KRN	383	32*	KYN	425*	190
MKPN	532*	123*	FCATN	174*	332*
KTN	990*	136	(L. Ky.)	669*	2*

WA4AGH is home from the hospital. Congratulations to new SEC, K4YZU. Bill has some fine ARCC ideas and is fully capable of putting them into effect. Everyone pitch in, and we'll show these big sections how an ARCC really works. W4VYS did an exemplary job and deserves a real vote of thanks. Murray State's Club is a going organization and will be a big boost to all of us in the west end. The members are putting together what will be a fine station. Owensboro remodelled K4HY and got some fine surplus test gear; also tracked down a spurious from a commercial that was - at all places - on the repeater input frequency. Big doings are scheduled for the annual Scout Canoe Derby and hydroplane regatta. Traffic: (Mar.) WA4MKH 465, WA4VZZ 282, WB4KPF 273, W4BAZ 172, WB4FDK 88, WA4DYI 76, W4OYT 68, W4ADO 67, K4MAN 58.

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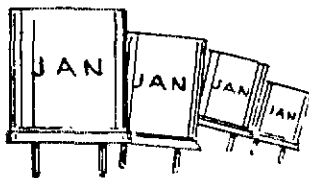
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K4AVX 52, WA4AGH 48, K4TRT 46, WB4EOR 41, WB4FLA 41, W4OTP 38, W4UK 35, WA4WWT 35, WA4UAZ 31, K4UMN 28, K4FPW 27, WB4ILF 21, K4VDO 20, WB4EY 19, WB4LKP 18, WA4GHO 17, E4UNW 17, WA4FAF 16, W4KJP 9, WR4HTN 8, K4HDE 7, WB4LIL 4, K4YCB 4, WB4GCV 3, WB4MOR 2. (Feb.) WB4IQW 51. (Reports 37, traffic 2136).

MICHIGAN - SCM, Joseph L. Pontek, K8HKM - Asst. SCMs: Howard A. Walker, WB1TQ; Rodger C. Phillips, WA8LWK. SEC: W8MPD. RMs: WA8PIM, W8RTN, W8WVL, K8KMQ, WB8DUT, PAMs: K8GOU, W8ZBT. VHF PAMs: W8CVO, K8AEM. Silent Key: WA8NYZ.

Net	Freq.	Time	Days	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	1153	493	93	WA8PIM
WSSB	3935	0000	Dy	760	136	12	WB0BE
OPEN	3920	2230	Dy	398	35	21	WA8LHC
PON-DAY	3950	1600	Dy	941	547	31	K8LNE
GLETN	3932	0230	Dy	782	73	30	K8HLL
PON-CW	3645	2400	M-Sa.	249	74	26	VE3DPO
M6MTN	50.7	2400	M-Sa.	1023	82	27	WA8LRC
BR/MEN	3930	2230	M-F.	322	15	26	K8LJS

New officers of the SRARS are W8LJP, pres.; WA8WMT, vice-pres.; WA8UIJ, secy.; WA8WJX, treas.; W8LNL, trustee. WA8IAP is also KH6HDR with the Navy, enjoying being chased rather than chasing. Congrats to WA8LAY on receiving the C/MARC's Annual Ziegenhien Award. Well deserved. The new call for the Twin Soo ARC is W8JXA. Mark down July 18 on your calendar as the date of the BR, Wolverine and GLETN Annual Picnic. Ex-W8IV shows up now and then as W7PG, W8ITQ is on the road to recovery, and also off to Florida for a while. Congrats to W8TZD and W8LNL on becoming great-grandfathers. WA8OXL no longer has her "beam" in the living room. WA8OXS now has Advanced Class. Heard some issues of the SRARS Bulletin made it down to KC4USN at the South Pole. How's that for circulation? K8SWJ is keeping busy converting fm rigs. WA8WMS is taking full advantage of 2-meter RTTY. K8UDJ put in a fine multi-multi effort in the AKRL CW DX Test, coming up with over 4 meg. Traffic: WA8WZF 617, K8LNE 511, WA8YVR 474, K8KMQ 325, W8NOH 237, WB8DIT 176, WA8PIM 176, WA8LXY 08, WB1YA 73, WA8SQC 68, W8TZ 67, W8MO 60, K8NET 58, WA8WCZ 50, W8BEZ 39, W8IUC 36, W8RTN 35, WA8ZAV 35, K8JED 29, W8WFX 25, WA8ENW 24, W8CUP 18, WA8IAQ 18, W8SCW 13, W8BANR 12, W8MPD 12, K8CKD 11, W8AGQ 10, W8TBP 7, K8AEM 6, WA8TBL 5, WA8TDY 5.

OHIO - SCM, Richard A. Egbert, W8FTU - SEC: W8OUU, RM: W8IMI. PAM: K8UBK, VHF PAM: WA8ADU. Mar. section net reports:

Net	QNI	QTC	Sess.	Freq.	Time(Z)	Mgr.
OSSBN	2160	1228	64	3972.5	14.30	K8UBK
					1245	
BN	682	388	62	3580	2300	W8IMI
					0200	
O6MtrN	606	60	54	50.61	2300	WA8ADU
				50.16	0100	
USN	254	90	51	3580	2225	WA8VNU

RPL certificates went to WA8ETX, WA8UPI, W8UPH, K8ONA, WB8IXV and WA8DWL for Mar. traffic. Buckeye Net certificates were earned by W8GQD and WA8FQW. Buckeye Net Bulletin would like to include news of other Ohio nets in each issue. Contact editor W8GOE, Columbus ARA has taken over the W8 QSL Bureau from WA8CKY, who is to be commended for his long and excellent service on behalf of our DXers. EC K8ONV reports a successful Red Cross Emergency Communications Mock Disaster exercise involving Huron, Erie and Sandusky Counties. The Seneca RC sponsored a "Work the Alphabet" Contest during Apr. Object was to work stations alphabetically, in order, A to Z. Apricot Net and Queen City Emergency Net report participation in St. Patrick's Day Parades. Q8EN has had to vacate its "breezy" location of long standing to make way for a freeway. Club station W8VND is in business on a temporary basis from the new trailer location on 6 and 2 with portable power. W8FKI gave a talk on mobile noise to the Toledo Mobile Radio Assn. in Feb. The Toledo RC started an Extra Class license "teach-in" in Mar. We regret to report that K8GBR and WA8FHC joined Silent Keys. March appointments: W8QXQ as OQ, W8GRG and WA8RUO as OFSs, W8EDU and W8CHW as ORSs, WB8ALU as ORS. WA8WIR has moved to sunny Florida. The Massillon ARC Novice class has 16 members going strong. ORS W8LZE should have more time for brasspounding now that he's retired. W8OCU reports that the Post Office nets operating on 40 and 80 will move one hour earlier (GMT) in time for daylight saving. Congratulations to new Extra Class K8WOL and new Advanced WA8ZYT. W8GQD reports working three Florida stations on 160

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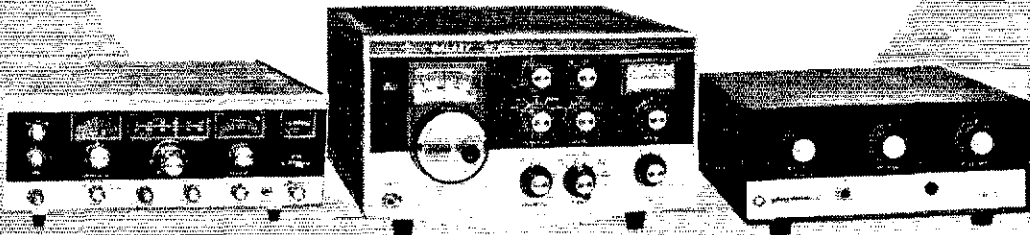


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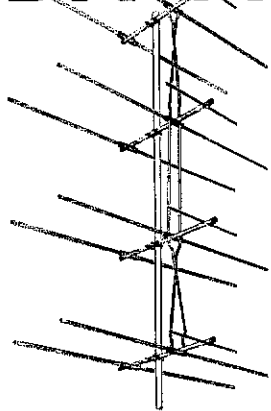


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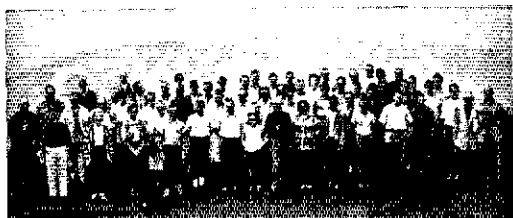
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during the Mar. 7 eclipse, W4SMCR tells us that an fm repeater net, for the purpose of exchanging technical and operational data on repeaters, has been formed. Sessions are on Tue. and Fri., 0100Z on 7280 and 14,280, respectively. I attended the spring meeting of the Ohio Council of Amateur Radio Clubs. New OACRC officers: K8EHU, pres.; K8WGJ, vice-pres. The Intercity (Mansfield) RC held its annual ARKL Night in Mar. I joined with W8WC, W8OUU and EC W8MH0 in participating in this enjoyable event. I attended the Mar. Sunday-Dinner meeting of the Buckeye Belles in Delaware along with about a dozen other OMs. OO W8GRG scored an average error of 0.04 ppm in the Feb. Frequency Measuring Test. Traffic: W4K1TX 832, W4RUPI 829, W8UHP 765, K8ONA 563, W88DSV 482, W8RALU 337, W4BFTW 335, W8GRG 270, W4BPOW 249, W8IMI 224, W8GVX 217, W4WAK 199, W48SXI 187, W48DWL 180, W8JH 168, W8OZK 144, W48CXY 138, W4TVE 128, W8PMI 125, K8LGA 117, K8UBK 116, W48UCG 110, W8JD 104, W48NOO 101, W8QUC 101, W48VNU 91, W48SLD 85, W8MOK 81, W48UYQ 80, W48VKE 76, K8ZBL 71, W88BLH 64, W48ULI 64, W8ETU 63, K8DHJ 56, W48FCQ 54, K8DHD 52, W8CHT 50, K8ELU 50, W88BZX 47, W8LT 45, W8LIX 42, W48RUO 41, W48YJB 40, W8LUDG 37, W48QEK 30, W48AJC 29, W88CKG 29, W8GML 29, W8DAE 26, W48YUB 26, W48ZNC 26, K8ONV 25, W48LAM 24, W48ORQ 23, W48AJZ 22, W8FGD 22, W48ADU 21, K8BHH 19, W48SHP 19, K8BYR 18, W0AVS/B 18, W8CWD 17, W8JBP 16, W48VVB 16, W48FSX 14, W48TKM 14, W8BU 13, W48MH0 13, W8OF 13, K8QYR 12, W8GOL 11, K8LH 11, W8GOD 10, W8BPH 9, W8OUU 9, K8PBF 9, W48JWR, W48RW 8, W8EWI 8, W8LKY 8, W8WEG 8, W48FBS 7, W48MCR 6, W48WJR 6, W8WZJ 6, W8WZJ 5, W48YHN 5, W48JUS 4, W8MGC 4, W8YGR 4, K8FKG 3, W8IO 3, W8LZF 3, K8CKY 2, W8BDHY 2, W8BEH 2, W8CHT/M 1, W8DYT 1.

HUDSON DIVISION

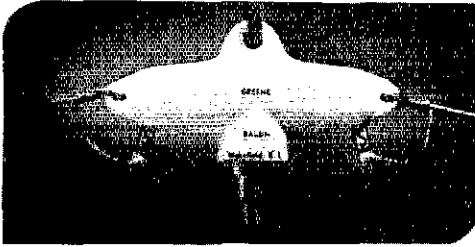
EASTERN NEW YORK - SCM, Graham G. Berry, K2SIN - SEC: W4KGC. RM: W42VYS. PAM: W82VJB. VHF PAM: W82YQU. Section Nets: NYS nightly 3675 at 2300Z; ESS nightly 3590 at 2300Z; NYSPT&EN nightly 3925 at 2300Z. We regret to report the resignation as Asst. SCM of W42VYS, whose help has been very much appreciated for past two years. Club News: Schenectady heard Emil Steich of NYTel on "Laser Communications." Westchester AKA heard W2LH/W2CYK give his demo on antenna performance. Harmonic Hills invaded in force in Mar. - W2TUK, Director; K2SJO, Vice-Director; K2SIN and W42VYS from SCM staff. New Rochelle heard W2TUK and saw "Hams Wide World" before a capacity group including 25 students from the current class for Novices. Individual station activities: W82SH worked Kentucky via Aurora on 2 meters. W42FDG will be operating 4X4 this summer and looking for ENY contacts. W42FIO and W42FBI are custodians of Rockland Co WARC award. Ask for Details. W42MDF is looking for scheds on 145-157 with new HB an-w-c ng. Area reps. on NY County Net (3677 kHz) are W2ANV, W2HUM, W2THF, W2DAW, W2FUV, W2HGB, W42BHN, W82VYS, W2ITX, W42VJK, W2GTI and W2IFN. New member of ESS is W82IXW. W42JLV is on the air with new HW-100 and wants to start up a 75-meter debating net. Write him for details. VHF PAM W82YQU reports the Poughkeepsie area fm repeater covering 75 miles regularly, with recent contacts K2CBA, W4IDMX, W42GAW and K2GTX for E. Conn. to NNJ span, freqs. 146.73 and 146.76. Feb BPL listing for W42FIU should have been EIO. Sorry for the slip. Area members of the Policy Committee for NYSPT&EN include K2SIN and W42RTZ. Your SCM thanks all for the club news letters, individual station reports, etc., that makes this column possible. Plan now to attend the Hudson Council Convention in Tarrytown in Oct. Nice to have seen so many ENYers at the sbw show in N.Y.C. during IREX week. Traffic: W42EAF 175, W42VYT 120, W42FBI 109, W42VYS 98, W82VJB 55, W2URP 46, W42VLS 39, W82FUV 37, W82MWZ 34, K2SIN 21, W42GOW 20, W42JXR 16, W82BXL 10, W42DFI 9, W2ANV 6, W42HGB 6.

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2DGI - SEC: K2QVN. RM: K2UAT. PAM: W2EW. W82ROF. All times in the following table are local. The first three listings are section nets.

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All Sec.	3925 kHz	1300 Sun.	K2UAS Mgr
NYSPT&EN	3925 kHz	1800 Daily	W82VJB Mgr

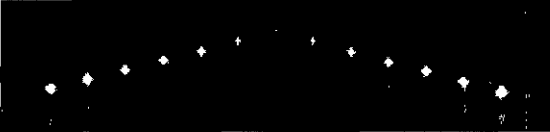
This report may appear a little thin in the activities area this month because of a more prominent deadline for filing a report around

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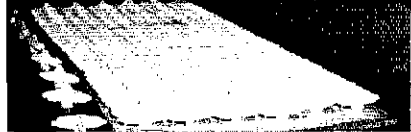


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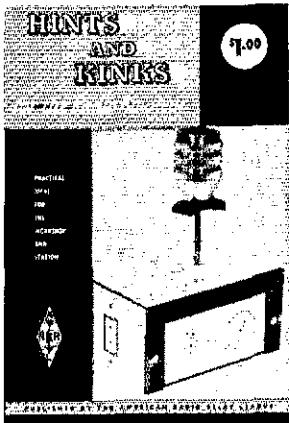
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THE AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

Apr. 15. As thin perhaps as our wallets! But, fear not, for this provides an opportunity to pass along some tidbits of information that might be hard to sneak in at another time. First, I would like to thank W2EW for his unending devotion to the vhf traffic nets throughout these many years. Hank has requested that we retire him at the end of his present term as VHF PAM. He tried getting away a few times in the past, but we were able to twist his arm and he stayed on. There is not enough to space in this column to describe the great contribution W2EW has given to this section these past years, so a big THANKS from all of us, Hank. WB2ROF has accepted the appointment as PAM as per the recommendation of W2FW. Jim has assisted W2EW for many years, so I know we will continue to have one of the best traffic systems in the country. Welcome aboard, WB2ROF. K2JFE reports heavy fm 2-meter activity on Staten Island. During the recent postal strike, W2BCB was busy working as a telephone mailman in order to get traffic delivered, WB2DZZ is out locking horns with five-band WAS, he's wondering where everybody disappeared to, though, on 80 meters. WB2DRW says he will be mountain-topping in the June VHF Test from Mt. Greylock, Mass. Contact W2SZ for QSOs on 220, 432 or 1296 during this operation. WA2GLR reports the Wagner College ARC is QRT. Seems somebody borrowed their gear and forgot to return it? WA2DFD planned to take down the beam during Easter week end, but the trusty snow shovel came down instead. WA2BRF says that he is now "Foot Mobile" complete from antenna to battery. I'd bet he's cheating with a walkie-talkie! The Massapequa ARC is looking for new members in the Massapequa area, reports WB2NLM. Drop in the first Wed. of every month at CD Hdqtrs, 1027 Lake Shore Drive, Massapequa Park. The Suffolk County RC meets every third Fri. of the month at the Hauppauge Community Hall, Veterans Hwy. and Smithtown Bypass, at 8:30 P.M. How about your club! Looking for members? Pass along the info! I know there are hams looking for a club in their area, but if they don't know where to go, you won't get them as members, so turn on the linear and point the antenna in my direction; sock it to me. W2HJM is heading for the sunny climate of Florida where he will be exchanging the W2 call for a W4. Let's face it, some have it some don't, luck that is! Traffic: WA2HMO 464, K2UBG 143, W2GKZ 105, W2DSC 88, W2AEE 85, K2AAS 44, W2BCB 28, WB2DZZ 27, WA2DFD 22, W2EW 22, W2LGG 16, W2DBQ 12, W2PF 9, K2JFE 8, WA2LIS 8, WB2DRW 6, WB2WFH 5, WA2BRF 4, WA2GLR 2, WA2QJU 1.

NORTHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC: K2KQD, RM: WA2TAF, PAMS: W2PEV, K2KQD, WA2KZF, WA2TBS.

ARPS Section Net Schedules

Net	kHz	P.M. Days	Sess.	QNI	T/c.	Mgr.
NJTTYN	3625	7:30 MWF				
NJN	3695	7:30 Dy	31	431	250	WA2BLV
NJN	3695	10:00 Dy	29	217	99	WA2BLV
NJNS	3740	8:00 Dy	16	38	15	WB2FEH
NJEPIN	3950	6:00 M-Sa	31	555	395	W2PEV
NIPON	3930	6:00 Sun	5	104	14	WA2TBS
NJAN	50425	8:00 M-F	22	264	71	WA2KZF
PVETN	145710	7:30 Dy	31	349	208	K2KQD
ECTN	145800	8:30 M-Sa	26	168	68	WA2TBS
	146700	8:30 Sun				

New appointments: WB2JCI as EC for Wayne and vicinity; W2FFQ as OO, WA2RIN as OO and OBS; WB2VPR as ORS; WA2EPI as OPS. Endorsements: WB2FEH and W2EWZ as ORSs. WN2JIM and WN2KJD passed the General Class exam, WA2DMF passed the Extra. WA2ACP rebuilt his shack, WA2HEL has a new Fico keyer. WA2WNZ is on 2 meters with a Communicator 3. WN2JHT joined AF MARS. WB2VFX is also WB4PYA. WB2RJI added a TX-62 to his shack, WA2KZF has a new six-element wide-spaced 6-meter beam. WA2EUX will attend Rensselaer Polytech. Inst. in Sept. W2PEV is putting up a 15-meter Delta Loop antenna. WA2DRH was in W6-Land for a visit. W2CVW scored over 43BK in the ARRL DX Test. WA2GOC has a new phone patch. W2DRV received his Extra First Class license and joined OOTC. K2IEH is at 160 confirmed and WA2CCF at 217 in DXCC totals. K2BMI reports a claimed score of

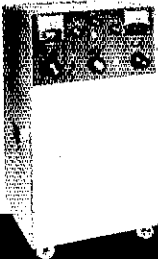
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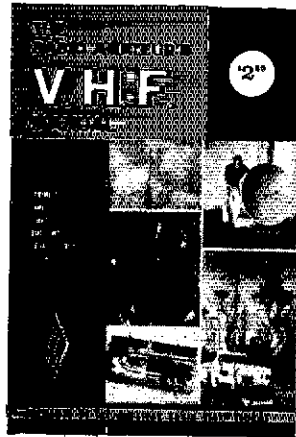
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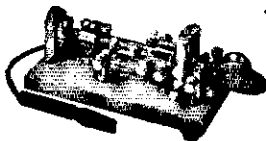
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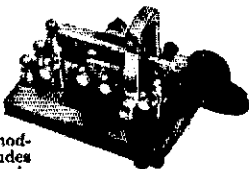


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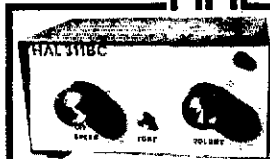
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550K in the DX Test with his new 3-element Tri-Bander Murphy was the 2nd op for W2ZZ during the DX test. Wait 'til next year WA2DPT is planning a trip to VU-Land in Aug. with the Peace Corps and is taking his S/Line. K2VVV has 2-meter fm mobile WB2HXR is active on 2 meters, W2IYC is looking for a beam for his new tower. W2CZY recently retired after 44 years with W1WB21WV has a Pawnee and an eight-element 2-meter beam. Please note the change in Field Day rules. The Novice station could be the clubs membership. Good luck to all and Safety First, OM Traffic: (Mar.) K2DEL 574, WA2BAN 421, WA2FRZ 408, K2KD 394, WA2DRH 265, WB2FFH 242, WB2DDQ 217, WB2BCS 184, WA2EPI 110, WB2VPR 95, WA2LDX 79, WB2WNZ 76, W2PEV 61, WA2TBS 50, K2OQJ 49, W2EUX 45, WA2HEL 37, WB2BXX 34, WA2TAF 34, WB2FUI 33, K2DOT 32, WA2BCT 26, WA2JXE 21, WA2GLJ 24, WA2CCF 23, WA2ACP 20, K2CFI 19, W2ZZ 19, W2DRV 15, WB4PYA/2 13, WB2GTV 12, W2CU 11, WA2KZF 11, WB2LTW 11, WA2JMR 10, WB2SEZ 10, W2CVW 8, W2EWZ 7, WA2NJB 5, WA2DMF 4, WB2GCQ 4, (Feb.) WN2JHT 87, WA2GFI 16, WA2GOC 10, W2ARL 2.

MIDWEST DIVISION

IOWA - Acting SCM, Allan Culbert, K0YVU - SEC: K0LV PAM: K0OKD, OBS: W0LCX, W0JAO, W0LR, WA0MIT, K0MM has found it necessary to resign as your SCM because of a change in his postal assignment. Wayne has done a fine job and should be commended. Two new Advanced Class licensees are K0JZY and WA0YDO (grandfather and grandson). W0NEF has his WAS for 10 meters. Congratulations, Jim, Waterloo and Des Moines both have their repeaters in operation, and the Cedar Rapids gang expects to have its going before long, also. All units are set up for 146.34 MHz in and 146.94 MHz out. The Field Day and picnic season is upon us. The 160-Meter Picnic will be held June 21 at the Fairgrounds, Webster City, and the Southeastern VHFers Picnic July 12 at McMillen Park in Mount Pleasant; pot luck and rain or shine for both events. A hearty thanks to all who worked to make the "Pop Express Riders," crippled children's fund drive, a success. A special note to WA0AUX, WA0VZH, and WA0VRI for their organizational efforts in the above fund drive. Public Service Honor Roll: K0LV 80, WA0OTO 34, Nets: Iowa 75, QNI 1512, QTC 232, Iowa SS QNI 1241, QTC 54, TLGN, QNI 199, QTC 62, PON (cw), QNI 3 QTC 2, PON (phone), QNI 97, QTC 5. Traffic: W0LCX 108, K0AZI 150, K0JGH 89, W0LGG 67, K0OKD 51, WA0VVG WA0OTO 31, W0MOQ 24, WA0OZL 21, W0JPJ 19, WA0AUX WA0MIT 13, WA0EPN 12, WA0EYG 11, K0EVC 8, W0BW W0DMX 7, WA0PPW 7, K0ISA 4, WA0RJZ 4, K0CNM 2, WA0P 2.

KANSAS - SCM, Robert M. Summers, K0BXF - SEC: K0FM PAM: K0JME, RM: K0MRI, VHF PAM: WA0CCW, KWN (Mar) QNI 675, QTC 17; KPON, QNI 1656, QTC 519; HBN, QNI 69; QTC 223; KSRN, QNI 873, QTC 93; KPJ, QNI 251, QTC 34, QNI had another fine month, QNI 532, QTC 212 in 62 sessions. The Kansas Novice Net, OKN, has resumed operation on a daily basis 3735 kHz at 0200Z. WA0TZK, accepted the net mgr. position. WA0LLC traveled to S.E. Asia, Australia and New Zealand during Apr. Recent snow storms caused equipment damage to several hams in the state. K0GZP says that all his phone band antennas have no stretched to the cw bands because of the added weight at times. C yes, if you don't take a vacation for a while you can purchase NCL 2000 amp. like WA0KDC now has on the air. Sister Mary Schetz, WA0YEE, will soon be on the air operating Collins 68 (KW2M and 30L-1) recently removed from the St. Marys College the Mother House on the south side of the campus at the Sisters Charity of Leavenworth, Xavier. Her fellow operator will be Sister Mary Eberweh, WA0VJH. On Mar. 22 W0GO, our Midwest Division Director, called a Division Meeting of the League leaders in the Kansas area. SCMs, SECs, Vice-Director K0NPL and Asst. Directors were represented. Traffic: W0HI 362, WA0LBB 279, K0JME 19, W0INH 188, WA0LLC 128, K0BXF 111, K0MRI 103, W0GCJ K0LPE 71, WA0TZK 71, W0MA 68, W0CHJ 63, WA0UTT WA0OWH 23, W0LYC 16, WA0OZP 16, WA0JCP 16, WA0SEV WA0SRO 6, W0ICV 4, W0PB 4, WA0JOG 3, WA0KDC 1, WN0Y 1.

MISSOURI - SCM, Robert J. Beaver, W0BV - Appointment renewed: W0GCL as ORS. With deep regret I report that WN0YTS a Silent Key. Net reports:

Net	Freq.	Time(Z)/Days	Sess.	QNT	QTC	M
MEN	3905	2330 M-W-F	13	198	12	K0KUL
MON	3885	0100 Dy	27	143	85	K0AE
MOSSB	3963	2400 M-Sa	25	1302	81	W0RT
MOPON	3933	2300 M-Sa	25	518	55	WA0PT

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SWAN 250C 6m Transceiver (\$50 Bonus)	450.00
NS-1 6m Noise Silencer	36.00
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FBTN meets at 1000Z on 3940 kHz. Most nets will meet one hour earlier GMT with the shift to DST. Two new nets have started: Missouri Mountain Net (MMN) meets at 2330Z on 3715 kHz Mon.-Fri. with WNØZLP as manager; WAØYYR has reactivated the Missouri Teenage Traffic Net (MTTN), which meets at 2330Z on 3905 kHz T-T-Sat. Congratulations to WNØYRB, who passed the General and Advanced Class tests. New Novices: WNØATD in New Bloomfield and WNØBBD in Jefferson City. WAØYCN needs South Dakota for WAS. The KARC is ready to put a 400-MHz repeater on the air. Traffic: (Mar.) KØUNK 1558, KØAEM 346, WAØPOL 171, WAØRVR 116, WAØHTN 87, KØRPH 61, WAØTAA 58, WØBV 54, WØLOUD 51, WAØWOA 45, WAØVRI 28, WAØEMS 25, WØJKE 24, WAØKUH 14, WØBVL 17, WØRTO 9, WØGBJ 2, WAØYCN 2. (Feb.) WAØVRI 96, WAØTXP 19.

NEBRASKA -- SCM, V.A. Cashon, KØOAL -- SEC: KØODF. The Smoke Signal Senders Pow-Wow is scheduled for June 6-7 and the Pine Ridge ARC Picnic June 7 at Chadron State Park. Congrats to WNØAXA, a new Novice in Gordon, Nebr. WØOWR received a letter of appreciation from the N.M. SCM for the emergency communications he provided during a heavy snow storm Mar. 27 from his mobile station in Cronra, N.M. Nebr. C.W. Net is showing greater activity, thanks to RM WAØHWR and net participants. 30 points are now required for PSHR. New appointment: WAØQGM as EC. Renewed appointments: WØBM as OBS; WAØOQX, WØHOP, WAØKGD as OPSs; KØJFN as OO; WØAGK as ORS. Mar. net reports:

Net	Freq.	GMT/Days	QNI	QTC	Mgr.
NSN I	3982	0630 Dy	1137	54	WAØLOY
NSN II	3982	0130 Dy	938	16	WAØLOY
Nebr 160	1985	0130 Dy	75	5	WAØCBI
NEB	3590	0400 Dy	144	30	WAØHWR
EBSN	3982	1230 1st M	8	0	WAØSOP
NMN	3982	1330 Dy	1072	29	WAØJUF
WNN	3950	1400 M-Sa	684	21	WØNIK
AREC	3982	1430 Su	237	4	WØIRZ
CHN	3982	1830 Dy	960	63	WAØGHZ
DEN	3982	2200 Dy	325	22	WØFBY (Jan.)
DEN	3982	2200 Dy	327	69	WØFBY (Feb.)

Traffic: WAØZOR 213, KØUWK 205, WAØDOU 156, WØLOD 142, KØJFN 63, WAØJH 37, KØKJP 36, WAØEGV/Ø 32, WØBFV 30, WAØGHZ 26, WAØBOK 27, WAØHWR 21, KØODF 21, WAØTMG 20, WAØSOP 19, WAØDMX 15, KØJET 15, WAØJAV 12, KØJTW 10, WAØITM 9, WAØJUF 8, WAØKGD 8, WØRIA 8, KØDGW 7, WØNIK 7, WAØEH 6, KØMUF 6, WAØVML 6, WØVEA 5, KØFRU 4, WØHTA 4, WAØLOY 4, WØSWG 4, WØFHF 3, WØGEQ 3, WØAGK 2, WØATU 2, KØOAL 2, WAØPF 2, WØRAM 2, WAØVI 2, WØWZR 2, WØYFR 2, WØHOP 1, WAØPCC 1, KØSFA 1.

NEW ENGLAND DIVISION

CONNECTICUT SCM, John McNassar, WIGVT -- SEC: WIIHR. RM: WAIHSN, PAM: KIYGS, VHF PAM: KISXF. Mar. rept.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1845 Dy	31	384	454
CPN	3965	1800 M-S 1000 Su	31	484	164
VHF 2	145.98	2200 M-S	21	71	5
VHF 6	50.6	2100 M-S	22	137	5

High QNI: CN -- WAIGFH, WAIHOL, WAIJZC. CPN: WIGVT 29, KIYGS 28, WAILB 27, KISXF 26, WAIJZC 25. SEC WIIHR has generated considerable interest in EC work and has a growing group assisting him. Activity is increasing and your help is requested. Be sure your local group is active and contact WIIHR for further information. Navy MARS is very cooperative and appreciated in this work. Director WIQV sends newsletters to all clubs -- he is working very hard to represent our interests, so please communicate with him. [V] problems? Support CARA in its drive encouraging manufacturers to include adequate shielding in all new TV sets. Contact WIADW for details. *Nutmeg Net News* de WAIHSN features WIEH in a recent issue -- very interesting! Meriden ARC via WIWEE and Danbury CARA via WIENL are continuing Novice/General classes. With regret we add WIRFJ to the list of Silent Keys. WIFBY and WAIHOL are co-editors of the *Murphy Meszger*. WICUH is recovering from an automobile accident. Congratulations to: K4CSYI for Mar. BPL; WAIJLK for General Class; WIQV for accuracy in FMT; WAIJYU for National Merit Scholarship and KLHX as new Assistant ARRL Director! Field Day plans should be set now. Check rule changes and be careful of frequency allocations re/class of operator license! CU

Field Day! Traffic: WIEFW 296, WAIHOI 233, K4CSY/1 214, WA1HSN 211, WA1LB 208, W1FH 174, WA1GFH 151, WA3JSU/1 151, WA1JZC 150, W1AW 58, WA1JV 58, K1YGS 50, WA1MO 48, W1KUD 40, W1GVT 33, W1QB 28, W1MPW 25, K1SXF 23, WA1KRG 18, WA1KXS 17, W1BNB 16, W1CTI 15, W1HHR 15, W1BDI 14, W1YBH 12, WBCWE/1 11, W1DQJ 10, WA1JGA 7, W1BEL 6, WA1JQC 3, W1KAM 2.

EASTERN MASSACHUSETTS - SCM, Frank L. Baker, Jr., W1ALP - W1AOG, our SEC, received reports from ECs: W1s IAU, L.E., UJF, WA1s IRY, DXI, K1DZG. W1s ATP, IN and JWC are Silent Keys. WA1KWA is on many bands. Harvey Fitzgerald is Radio Officer from Tewksbury. WA1DFL worked some 2s 3s, and 8s on Aurora on 6, K1ZYZ is home from Fla. K1OIK is helping students at Dennis Yarmouth HS getting their licenses. WA1MID is ex-WA1KOR in Natick. W1GDY/GE is in the hospital. WA1MOP is on 20 cw. W1AQE has 2503 counties and HW-100. WA1DPX worked DX on Aurora on 6. W1ELU repeater group on fm has the call WA1KFY, input 146.220, output 146.940. W1PZ is on 10. W1AFC Club has code and theory class with WA1CRA, LVG, K1s YOK, TVY. W1s LE and AT1 instructing. Somerville ARC. WA1MHN, meets Fri. at 8 P.M. and the net on 50.620 Mhz. W1NLIH is on the air. WA1FNM is on 2 and 15 with a new dipole. Tewksbury Memorial HS ARC has the call WA1MPL, WA1MKE has Tech. and is on 6. W1PD is ex-W1RAM. W1M1PP is on 80, 40, 15 cw. W1ALB is in Fla. W5RX is ex-W1DA in New Mexico. W1PR is on 6, reports WA1DRS, G3TOQ/W1 is living in Quincy. K1LVV got married. W1HZR worked his H.S. principal of 46 years ago. W3DHU, T-9 Radio Club met at W1SXS's. South Shore Club held a meeting with W1s GM and JMA telling some of their experiences. WA1DJC is moving to No. Dartmouth and has new HW-100. K7JRE/1 was in the DX Contest. NEEPN had 5 sessions, 119 QNTs, 14 traffic. says W1AOG, net mgr. New YLs: WA1MOC, W1MPO. W1ALP has his HW-17A on 2. K1SRW is Advanced Class. K1ZLI and W1s AY, RSE, KO and K1GVM are on 2. OO W1NF received several "thank you" letters. W1s OJM, PEX, WA1EY and WA1KZE made the BPL. WA1s JHQ and JYY have a Technical Discussion Net on 7025 at 2000Z. W1M1M1 is new. EM2MN had 22 sessions, 160 QNTs, 175 traffic reports RM WA1FAD. W1JKR reports the Barmyrd Net had 26 sessions, 569 QNTs, 30 traffic. W1BGW is on 10 and 15 cw. W1N1M1CY is in EMNN a few times. W1KSK has the call WA1MPN for his place in Wellfleet; his XYL is

K1TJZ, Framingham RC had a very good auction, K1RAW was auctioneer. WA1JWQ, pres. of Brookline HS RC WA1MEL says the Club will be on 75 and 20 from Larz Anderson Park during Mass. Amateur Radio Week. Middlesex ARC had W1IIC as a speaker. Capeway RC met at K1IPB's. His son, W1NKSF, did well in the Novice Contest. W1ANB showed some movies and slides. W1B6BST, a former member, keeps in touch by mail and on the air. Massachusetts ARC had a talk on "Transistors" by WA1B6B, W6KEM, a former member, checks in on 10. W1RZA is back on shore work. WA1GPU was home for Easter. AA1BMU sends me a copy of QUA, a monthly paper of MARS. Appointments endorsed: W1AOE as RM for 15; K1OKE as PAM for 6; W1s AQL, HMG, FJJ, BB as ORSs; W1s AAK, BB as OPSs; W1s QFN, IPZ, HKA as FCs; W1HGT as OVS; W1ALP as OBS. 6 Meter Cross Band Net had 20 sessions, 80 QNTs, 5 traffic. WA1IFE worked KIAGA in R.I. on 2. Norfolk County RA held its annual banquet in memory of W1AGR. W1QV was the speaker. W1M1JD is on 2. W1s BUF, HKJ, WA1HY made P5HR. Traffic: (Mar.) W1OJM 62R, WA1EY 58R, W1PEX 530, WA1FAD 321, W1QYY 281, WA1KZE 118, K1ESG 112, W1FMG 109, WA1IFE 106, W1HKJ 91, W1BUF 83, WA1JYY 74, K1ZYW 68, WA1HY 62, W1OX 60, WA1JL 51, W1CTR 40, W1DZM 28, WA1DPX 24, WA1KJ 22, W1JPD 18, WA1MFG 16, WA1JHQ 11, W1MKN 8, K1OKE 8, W1N1M1CY 7, K1CLM 2. (Feb.) WA1HY 85, W1EMG 79, K1PRB 73, K1ZYW 68, WA1JK 31.

MAINE - SCM, Peter E. Sterling, K1TEY - SEC: K1CLY. PAM: WA1FLG. RM: W1B1B. WA1HVF has started a 6-meter net. It is on 50.185 at 1900 every evening. I am sorry to report the passing of W1BAV. He will be sadly missed. W1KJU, of Bath, is back on the air with a new SB-101. W1M1H, of Thomaston, was reissued his expired call. New hams in the State of Maine are WA1MOI, W1M1MNB, W1M1MOO, W1M1MPE, W1M1MPR, W1M1MOM. Congratulations, fellows, K1CNC, of Rockland, is now chief engineer of WRKD. W1FZR received his overdue certificate for copying a 1969 Armed Forces Day message. The Me.-N.H.-Vt. Net meets on 3685 at 2330Z; Seagull Net on 3940 Mon, through Sat, at 1700; Pine Tree Net at 1900 on 3596 Mon, through Sun. We are still looking for news for the column. Any news would be muchly appreciated. W1AE is back in his summer QTH at Peaks Island. We are still looking for NCSs for the Pine Tree Net. Anyone interested in helping run the net, please get in touch with W1BJG. Traffic: WA1JFX 73, WA1FCM 28.

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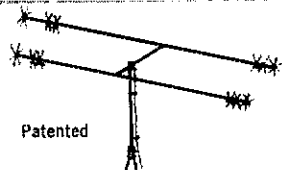
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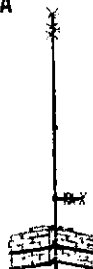
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NEW HAMPSHIRE - SCM, Donald Morgan, K1QES - K1POV is a new RM in the section, Good Luck, Sid. Welcome to club station WA1MNI at N.H. Technical Institute in Farmington. WA1MOP is now Tech., WA1MNZ Cond., WA1MRM and WA1MFM Advanced, WN1s MOC, MNW, MOY, MRO, MOP, MQK, MPV Novices. All are greeted as they join our ranks. VTNNH reports 31 sessions, QNI 173, traffic 178. CSPN reports check-ins 705 and traffic 107. The Manchester Radio Club submits a monthly report and it is noted its code and theory classes are well attended. Also to be commended are W1LUD and K1HRG, who are conducting code and theory classes in Littleton. We can use more active hams in the northern part of our state. W1RCC reports that the Nashua Mike and Key Club will soon have a new 6&2-meter amplifier for the club. W1SWX worked 74 countries on 80 during the DX Contest. W1BUT scored high with 7.1 ppm in the Feb. PMT. VTNNH Feb. report shows QNI 270, traffic 162. Traffic: (Mar.) WA1JTM 533, K1BCS 301, K1POV 148, WA1GCE 64, W1UBG 46, K1QES 10, WA1KTX 7. (Feb.) K1POV 84, WA1GCE 33.

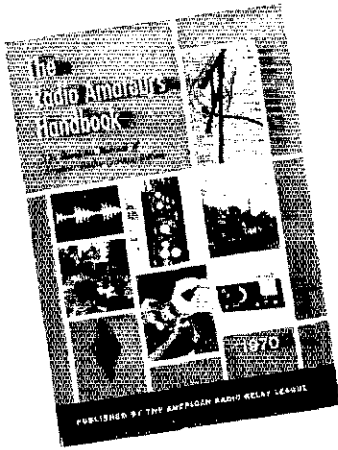
RHODE ISLAND - SCM, John E. Johnson, K1AAV - SEC: W1YNE. RM: W1BTV. PAM: W1TXL. VHF PAM: K1TPK. RISP report: 31 sessions, 629 QNI, 85 traffic. YLs WA1LZH and WA1MCI wish to contact other YLs in the state who are interested in low-band traffic and YL activity in the state. W1YNE, the SEC, would like all ECs to contact him and bring his record up to date. All hams interested in the AREC program are requested to contact the SEC or the SCM for applications. K1CBO has completed a new antenna system for his teletype station. WA1CVF is home from college and joined his fellow hams at W1AQ. Other W1AQ members are working for a Field Day that will surpass all prior Field Days. WA1IYF and his committee have completed most of the club's renovations. In order to meet the deadline it is requested that all information for QST be submitted to the SCM before the fifth of the month. This is necessary so that the records and traffic can be completed to meet the deadline. Your Form I is all that is necessary to send to the SCM. Traffic: W1TXL 175, K1OPD 59, K1VYC 16, WA1JST 5, W1FLN 2.

VERMONT - SCM, E. Reginald Murray, K1MPN -

Net	Freq.	CMT/Days	QNT	QTC	N. Mgr.
Gr. Mt.	3932	2130 M-S	364	27	WA1JLZ
Vt. Pone	3955	1300 Su	96		WA1EDI
MNV	3648	2230 M-F	173	178	
Carrier	3945	1300 M-F	427		W1KKD
VTCB	3990/4	1400 Su	61	12	W1AD
VTPON	3909	2200 Su	92	17	K1BOB
VTSB	3909	2130 M-S	738	124	WA1HSQ
		1230			

All nets are on summer time. Harwood Union Amateur Radio Club now has the call WA1MPI, International Field Day will be Aug. 16 at Green Lantern Inn, Charlotte, Vt. Congrats to WA1IHN (Fair Haven) Vt. winner and W4YWX Macon, Ga., outside winner, in the 1970 Vt. QSO Party. All 14 counties were active and Vt. QSOs averaged 1 every 20 seconds for 28-hr. period. Traffic: K1BOB 194, W1FRT 96, WA1GKS 48, K1MPN 32, WA1GJR 13, K1YGI 13.

WESTERN MASSACHUSETTS - SCM, Percy C. Noble, W1BYR - SEC: WA1DNB, CW RM: W1DWW. With the appointment of WA1HFY as Franklin County EC, West. Mass. now has every county covered. With SEC WA1DNB as control our Sun. Morning Amateur Radio Emergency Corps Net on 3935 kc. at 8:30 A.M. is going fine. Berkshire County has the first county AREC net under the direction of WA1DVE - 6 meters. CW RM W1DWW reports that WMN had 181 QNTs and handled 135 messages. Six highest in attendance were W1BYR, W1DWW, WA1LNF, K1SSH, W1ZPB and K1IJV. WA1LGU is a new ORS. W1FGJ is moving to Mich. K4KH, ex-W1MVF, sends his 73 from N.C. With deep regret we report that W1BPH is now a Silent Key. W1HRC is busy on 4 phone nets; ditto W1JHL. W1MPPG is a new ham in Amherst. WA1JUI passed the Advanced CI exam. WA1LNF is doing some excellent frequency measuring. Valley Amateur Radio Club: K1FNA is the 1970 Field Day chairman. The Hampden County Radio Assn.: W1DHQ spoke on antennas and matching. Check with K1NJC for Field Day information. Central Mass. ARA: W8PEY/1 showed movies at the Mar. meeting. WA1FVY passed the Advanced CI exam and some of his code and theory class now have their Generals. Montachusett ARC: W1PZ has tapes and charts available of the passes of Oscar 3. W1GUI is holding code classes. The SCM would be pleased to receive your PSHR totals. See p.57, Mar. QST. The closing date for receipt of all reports is the 7th of each month. Tfc: (Mar) W1ZPB 201, W1BYR 84, W1DWW 84, K1SSH 82, K1IJV 45, W1PUC 25, W1KK 22, WA1DNB 17, W1JHI 15, K1WZY 15, WA1LGU 14, WA1LNF 14, W1HRC 2. (Feb.) W1FGJ 24, K1WZY 20.



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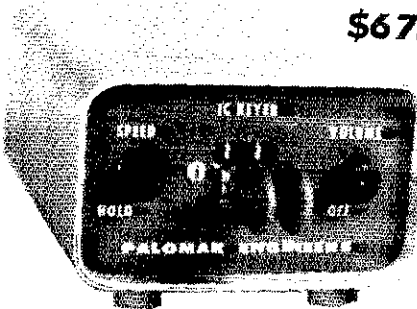


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ALASKA — SCM, Albert F. Weber, KL7AEQ — On his first with newly-installed mobile rig, KL7DIY ran out of gas and he holler for help. Hmmm. Bob is NCC in this area, too. KL7GI Alaska Chapter head of the 10-10 Net. At last report both KL and KL7FI.R were operating from the North Slope oilfields. V KL7FHF bought his mountain-top location, I'll bet he had no how much dynamite it would take just to get up there. KL7FI back in Seward after his White Alice stint on the chain elsewhere. KL7EWO is operating out of Nome, the Grand Mountain White Alice site to be exact, for the information of the county-hunters et al. W7FFN, was in Fairbanks recently. A call heard around town is WB4IRU. Will bet we are going to lots of WSs running portable before long. Recently issued call VL in Tanana is WL7HAG, and I understand this a real affron her. Traffic: KL7CAH 153.

IDAHO — SCM, Donald A. Crisp, W7ZNN — The FARM meets each day at 0200 GMT on 3935 kHz. The Idaho RACES meets week days at 1515 GMT on 3991 kHz. W7GHT qualified the new Honor Roll award for the third month in a row. Orofino Club is planning a 2-meter repeater installation. W7EEC recovering from a bad burn caused when an antenna he installing came in contact with a 13KV power line. WA7FFZ by new 2-meter fm installation. WA7EWW has a new RT installation. K7EBX qualified for a BPL award. W7GHT received ORS endorsement. SCM W7ZNN gave a talk to the Orofino C. W7ZNN is moving to Pullman, Wash. FARM Net report: 31 sessio 1014 check-ins, 191 traffic handled. Traffic: K7KXB 529, W7G 174, WA7BDD 54, W7ZNN 23, K7CSL 18.

MONTANA — SCM, Joseph A. D'Arcy, W7TYN — SE W7RZY, PAM: W7ROB. Appointment: WA7MKY vs Deer Lodge Co. EC. The Butte Club has started a Novice Net on 7156 kHz 9:30 A.M. Sun. W7LNU is on 2-meter fm with a homebrew outfit. W7WYG will spend the summer at West Yellowstone. WA7FWC has been on from the Bozeman area. K7IMZ is finishing up on t hamfest details. K7EGJ is on 2 meters in the Great Falls area. Well, that's all the news for this month. Traffic: W7LKB 6, WA7IZR 44, K7EGJ 29, WA7LXM 3.

OREGON — SCM, Dale T. Justice, K7WWR — SEC: W7HL RM: K7GGQ. PAM: K7ROZ. Net reports: WA7YOM reports for t ARRC Net, sessions 31, traffic 17, check-ins 360, contacts 6 maximum number of counties 15. K7ZQU reports for the BSL sessions 62, traffic 180, check-ins 1395, contacts 227. K7QE reports for the OSN, sessions 22, traffic 76, check-ins 125. K7OL reports for the NSN, sessions 31, traffic 180, check-ins 348. Mo Oregon stations are needed on the NSN, which meets nightly c 3700 kHz. New Novice in Grants Pass is WN7OCX. WA7JQK is on meters. The Saturday Afternoon Net met at WA7JSV's home f the first get-together and conferred certificates on WA7AC WA7AUA, WA7JAW, WA7LMI, WA7JSV, WA7DWR, WA7HY W7ZUL, K7WWR, K7OLO, WA7KDU, WA7LUU, WA7EO WA7MMD. The net meets on 3913 kHz. New appointment WA7KRH as OPS and ORS; WA7LDZ as OPS. WA7FTN repoi 1578 phone patches to S.E. Asia during March. Traffic: WA7J 257, K7KQZ 231, WA7HS 144, K7OUF 140, K7QFG 93, K7ZC 91, WA7KLU 58, W7BNS 30, WA7KRH 30, WA7HKV 2 WA7KDU 28, K7YQM 27, K7WWR 26, WA7JAW 21, W7ZB 1 W7MLI 11, W7HLP 9, W7BLX 8.

OREGON QSO PARTY

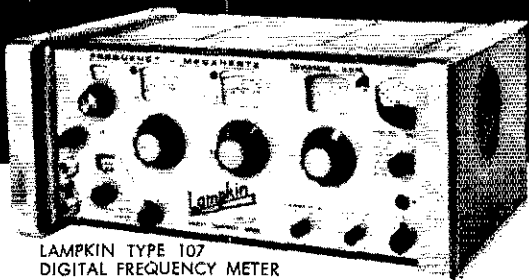
This contest, sponsored by the Portland Amateur Radio Club, w take place from 2000 GMT June 13 to 2400 GMT June 14, 197 (no time or power limits). The call is QZ ORE or de ORE. It is op to all amateurs. Stations may be worked on different bands a different modes (cw, phone, RTTY). The exchange will be CQ number, RS(T) and state/province or country for non-Oreg stations; and QSO number, RS(T) and county for Oregon station. Suggested frequencies: 1975-2000 3560 3900 7060 7260 140 14280 21060 21400 28060 28600 kHz. Also count contacts in t VHF QSO Party that satisfy requirements of this party. Scori system: Completed exchanges count one point, except that RT 1 and 160-meter exchanges count 5 points. Multiply by total differe counties or state/provinces plus countries. Awards: Certificates w be awarded for high scoring single-operator stations outside Oreg and the top three single-operator and top multioperator station Oregon. The postmark deadline for entries is June 30, 1970. Se your log to Marty Kirk, WA7JMA, Contest Committee Chairm; 5209 N. Amherst, Portland, Ore. 97203. Enclose an s.a.s.e. i results.

WASHINGTON — SCM, Harry W. Lewis, W7JWJ — The Spok: Dial Twisters held its Annual Banquet May 9. K7EFB, now pres.

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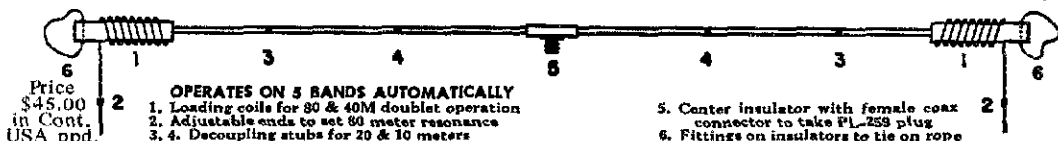
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Spokane Radio Amateur's Club, is working nights and is off some of the usual nets for awhile. The Spokane 6-meter repeater is working FB - even cuts you off the air after 2 1/2 minutes. Ye old phone man of Spokane, WA7TIC (Asst. ARRL Director-NW Division), has been reported winning cw contests. The Walla Walla crew just got together for its annual auction and outing at the Jefferson Field House. The Northwest Tech Net now is entering its 6th year of operation with W7BQ at the helm. WA7KOB has a new home-brew Yagi up in the sky and is working out real well. K7GZI is studying via correspondence to be a substitution operator and is working a rotating shift with Bonneville Power. WA7PVT is now Pvt. Timothy J. Blair, 966-00-1607 COD BN4 BRD 1, USATCA, Fort Knox, Ky. 40121, and looking for news from Washington. The second week end in July marks the Tacoma Hamfest, billed as the big one in the state. W7ZLW reports need for QNB RN7 with W7AXT still bringing in BPL originations from the YMCA in Bremerton. K7NZV now is running the 2-Meter AREC Net while former NCS K7BBO is pre occupied with moon bounce work. Back in Mar. W7CNK of Tacoma was the first 220-MHz moon bounce QSO with WB6NMT/6. W7BA has only 18 months to go and he will have made BPL every repeat every month for 20 years. (Note to W7AXT: BPL cards mailed. Thanks for stamped and addressed envelope). Traffic: W7BA 1436, W7AXT 278, W7PI 258, WA7KOB 181, WA7DZL 150, K7CTP 119, WA7LOQ 104, K7KPC 68, W7BO 66, W7APS 56, W7GYF 54, W7BUN 43, WA7LMO 21, W7USO 20, WA7ACQ 19, K7OKC 16, W7AIB 13, K7WTG 13, W7UWT 8, K7BBO 5.

PACIFIC DIVISION

EAST BAY - SCM, Paul J. Parker, WB6DHH - I would like to request that those of you who send in the Form 1 every month try to get them in to me by the 5th or the 6th of each month, please. Received an interesting letter the other day from WA6FDB telling me of their planned Field Day excursion this year. They will be operating from Kit Carson pass in Alpine County and from his letter it sure sounded like a lot of fun. W6IPW reports that the traffic business has been rather slow these days, as his traffic total this month will confirm. WB6VEV has been checking into NCN recently along with WA9FDU/6. The Northern Calif. Net meets daily on 3630 KHz and is always looking for check-ins at 0300Z and 0430Z. Keep these items in mind; handling traffic can be a very rewarding experience. WA6PKN has been appointed chief engineer at the local KQED educational TV channel. The Annual Division Meeting Apr. 3 and 4 was a very big affair this year with almost 90 people there from the northern part of Calif. and the State of Nevada. Many topics were brought up and the session ran the better part of the day. Congratulations to Doug DeMaw, W1CER, on his appointment to the post of Acting Technical Editor of QST. WB6NMT/6 finally has seen the fruits of the months of labor he put into the 220 FME tests by finally working W7CNK. Traffic: W6IPW 196, WA9FDU/6 103, WB6VEV 27.

HAWAII - SCM, Lee R. Wical, KH6BZF - SEC: KH6GQW, RM: KH6AD, PAM: KH6GJN, QSL Mgr.: KH6DQ, ECs: KH6G PQ, LP, KLHNO/KH6, GLU, BAS, GRV/KR6, X6G/T, KC6EJ and WTUZH/Guam, RACFS Nets coordinate with KH6AIN, Radio Officer.

Nets	MHz	GMT	Days
Friendly	7.240	2030Z	M-F
Boy Scout	21.360	1800Z	Sa.
Pacific Interisland	14.335	0830Z	M-W-F
Micronesia	14.335	0800Z	Tu-Th-Sa-Su
S.E. Asia	14.320	1200Z	All
Confusion (patches)	21.400	0130Z	All
Pacific Typhoon	14.265		
Gecko (KH6)	14.315	1000Z	Th
Marine Corps	21.430	1900Z	M-F

EX-K3DIO/KH6 reports he's now W2PQZ. W7WOX/KH6 is active chasing DX. KH6BAS reports that he's active on the Carcker Barel Net daily at 0900Z on 3977 and quite active on slow-scan 1V. It is with deep regret that we note the passing of G3TRV/ZL2AJW in Feb. Tony was well known as 912NW and in past years was, ZL3GI, ZD2NWW, ZD1NWW, VS9ANW, ST2AZ and VS6FS, reports KH6GQW/ex-KR6UD. Several weeks ago a major earthquake occurred near Kamchatka in W. Siberia. KH6AX, Freeman, began guarding 14,228 MHz to obtain information on wave generation in KL7-Land to determine possible efforts to Hawaii. SEC KH6GQW joined the awareness group with KL7SU, KL7AHH, and others in touch with the Alaska Civil Defense until it was determined no wave was experienced at KM6-Land. The Tsunami Net then secured, KH6GKI really is enjoying his new S/Line. KH6BZF has a new FICO No. 717 electronic keyer. WH6HCE has a new No. 717 keyer, too. The response to KH6BZF taking over

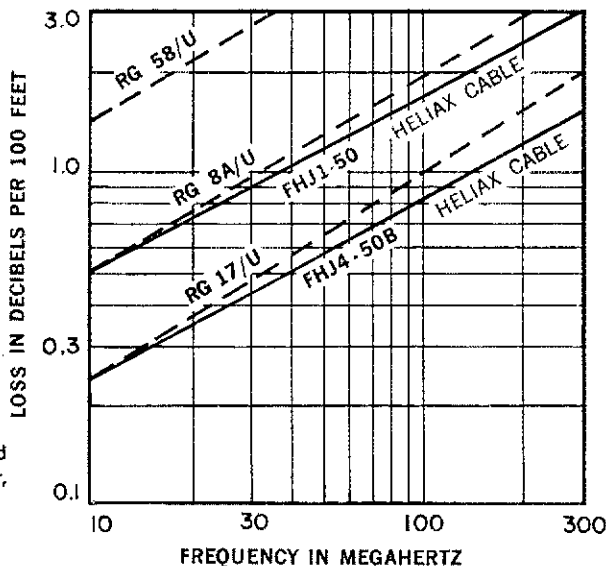
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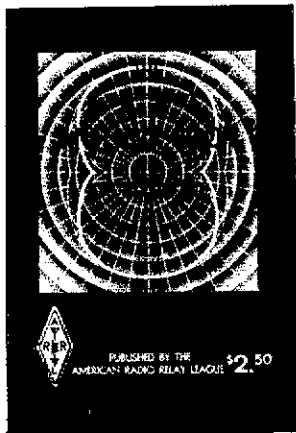
KH6EDY (Kure Island) QSL Managership (1961-1969) has been overwhelming. Keep those SASEs or IRCs with an SAE coming for those Kure Is. confirmations. Mail your ARRL Form 1s to reach your SCM through the 5th of the month. Traffic: KH6GRG 44, KH6LP 33, KH6GOW 21, KH6BZF 16, K1HNO/KH6 10, KH6BAS 7, KH6GPV 4.

NEVADA - SCM, Leonard M. Norman, W7PBV - SEC: Mr. L. L. "Mike" Blain, WA7BEU, 560 Cherry St., Boulder City, Nev. 89005. W7TVF will schedule anyone DX or stateside needing Nevada. K7KHA, WA7CWM, WA7KQS, WB6OOG/7 and K9VER/7 represented the Nevada Sweepstakes. K6ADA/7 worked LUSOCH with 3 watts on 10 meters. Several CB rigs have been returned for 10 meters in the Las Vegas area. The FCC has assigned the call KFWJ to K6ADA, who will be running 500 watts on 980 kHz. K7ZOK and WA7DSP report activity on 6 meters. The FM proposal seems to have created some comments. WA7NHT lost his vertical. The Sierra Hamfest is scheduled for Aug. 22 at Bower's Mansion, between Reno and Carson City. K7ZAU, chairman, promises us another FB program with the committee getting the chuck-wagon grub cooked. K7USR is active on RFTY. W4CJD/7 is being heard from HBØXGR.

SACRAMENTO VALLEY - SCM, John F. Minke, III, W6KYA - SEC: W6SMU. Sacramento Valley was represented at the Pacific Division Director's meeting in San Jose by W6SMU, WB6AUH, K6TWE, K6HTM, W6FRE, W6JON, W6TEL, W6GDO, WB6KZN and W6KYA, who were delegates from the North Hills RC, Sacramento Army Depot RC, Golden Empire ARS, Mt. Vaca ARC, RAMS and the CARC. A special thanks to K6HTM, who came all the way down from Chico to attend. Mark your calendar for the Sierra Hamfest to be held at Bower's Mansion near Carson City Aug. 22. K7ZAU is chairman, and additional details can be had from P.O. Box 2534 in Reno. New officers of the NHRC are W6KKI, pres.; WB6AUH, vice-pres.; WB6CKH, secy.; WA6PAB, treas. WA6RBD, of Red Bluff, traded in his call for K6RW. I received an interesting letter from K4TXK/6 in Shingle Springs, which was written while being airborne at 13,000 complete with the vibrations. Craig says he is interested in fm repeaters and has one at his QTH with an input frequency of 146.070 and output at 147.540. WB6VYZ, formerly from Willows, is now a Silent Key. K6TWE finally made DXCC after many years of trying. Listened to DX recently? Get all those crazy new prefixes! Don't forget the Annual Field Day. Traffic: W5VDA/6 91, K6RW 28, W6KYA 2.

SAN FRANCISCO - SCM, Kenneth S. McTaggart, K6SRM - K6SAA, who has been living in Tahiti, paid a visit to Marin County in Feb. W6CYO and WB6LJO were the Marin Radio Club delegates to the Pacific Division Director's meeting in Apr. W6HVU, of San Francisco, is apparently the first W6 station to work 3079 counties for the County Award. WB6LJO gave a vividly illustrated lecture on "The Art of QSLing" at the Apr. meeting of the Marin Radio Club. Northern Calif. Emergency Net meets at 1800Z, 3920 kHz, Sun. W6FCX, WB6HZZ, WB6KMI and WA6NOZ participated in Armed Forces Day by operating from the Navy's station, NPG, located at Skagg's Island. They report that working with 10-kw transmitters and rhombics is not hard to take. W6HWV reports that WB6GVI left for Florida in early Apr. The Humboldt Amateur Radio Club meets the 1st and 3rd Tue. at the County Courthouse in Eureka. W6PZE advises that the Petaluma Amateur Radio Klub meets the 2nd and 4th Fri. at 8 P.M. at the Petaluma Sky Ranch Airport. WB6FZN seems to get a new license about every four months. He got the Novice in Aug., General in Dec., Advanced in Mar. He keeps his TR-4 busy on NCN/2. The Pacific Division Director's meeting in San Jose was well attended with 84 League officials and club delegates. The minutes are being distributed to all who attended by WA6AUD, our vice-director. WN6POV has his General on the way. W6RO says his OO activity is down because of the cleaner, more stable signals on the air lately. Traffic: (Mar.) WA6BYZ 329, W6BWW 27, WB6FZN 22, (Feb.) W6KVQ 60, W6BWW 32, WA6AUD 19, WB6GVI 10, W6PZE 5.

SAN JOAQUIN VALLEY - SCM, Ralph Saroyan, W6JPU - WA6SCE is very active on NCN and RN6. Anyone interested in handling traffic, check in at 0300Z on 3630 kHz. W6OWL has a free standing (not free) 70-ft. tower for his beams. The Navy MARS repeater received has an FFT preamplifier and it is working better. WA6MLQ has been vhf hill-topping with great success. K6OPF visited EXPO 70 in Japan. Those attending the Pacific Division Director's meeting in San Jose, Apr. 4, were K6SNA, WN6MDN, WB6OSH, W6VSV, W6JPU, WB6DPP, WB6HVA and W6TFU. W6KZK gave a talk to the Delta Amateur Radio Club on antennas. WB6RAG is ex-GMSKR. W6OHT is the TVI chairman in Tulare. WA6WXP is the TVI chairman for Fresno. WB6LCM has a new fm receiver. WA6UMU, K6OER and WB6VSY discussed MARS programs at the FARC. K6VFE, Sister Charlotte, is looking for equipment for the San Joaquin Memorial High School Radio Club. WA6CPP has a super gain antenna on 40 heading east. W6YKS is



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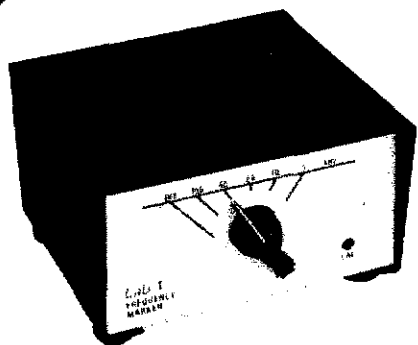
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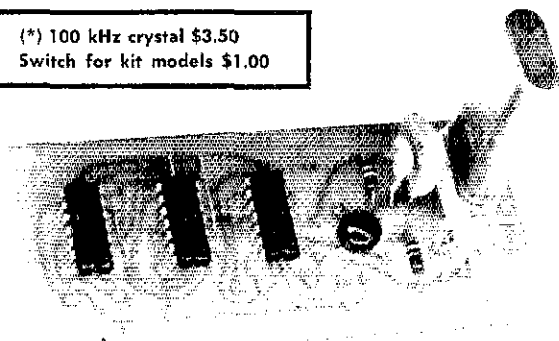
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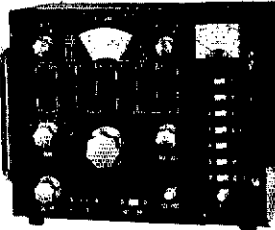
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using RTTY on 6 meters. WB6JIG has moved to Idaho. WA6AUZ and WB6JIG conducted code classes in Lodi, with WA6CPP assisting with theory. Traffic: WA6SCE 197, K6KQI 108, WA6CP 1.

SANTA CLARA VALLEY SCM, Albert F. Gaetano, W6VZT - RM: WA6LFA, K6DYX has been holding regular skeds with his brothers, W8A1U and K4AHE, on 20-meter sub. K2E1U recently moved into the area and has been active on NCN. W6AUC has been quite active lately handling phone patch skeds for servicemen in Okinawa and Guam. W6ZRJ is working on his teletype gear so he can handle traffic the easy way. W6VZT has built up some 2-meter fm gear and has been operating on the WA6YCU repeater. His form of operation was found to be very refreshing. This repeater, belonging to Baycom, a valley club, has no ragchewing but strictly technical talk. There are no round tables, each guy speaks when he has something worthwhile to say. All the members sound like a fine group and are certainly a credit to ham radio. Santa Clara Valley VHF Section Net on 2 meters is gaining in popularity very rapidly and had 91 check-ins in Mar, and handled 21 pieces of traffic. WN6HAD handled his first piece of traffic on 80 meters. Stick with it, Gene. Traffic during Easter week was quite heavy and it was nice to see it flow quite smoothly. Some of the fellows put in a lot of hours to make the smooth flow possible. Thank you, gang. Traffic: W6RSY 774, WA6LFA 237, W6BYV 145, W6BVB 131, K6DYX 121, W6VZT 111, W6DFE 89, W6NW 60, W6BPT 45, W6AUC 43, W6REF 14, K2E1Y/6 10, W6ZRJ 6.

ROANOKE DIVISION

NORTH CAROLINA - SCM, Calvin M. Dempsey, WA4UQC - Asst. SCM: James O. Pultman, W4VTR. SEC: W4EVN, RM: W4IRE, PAM: W4AJT. VHF PAM: W4HJZ, WB4EBW and WA4NUO passed the Advanced Class tests. W4WXZ has a 30LI and it's doing a good job. WN4OED has joined AREC. Since incentive licensing became effective 36 members of the Tarheel Emergency Net have upgraded to Extra or Advanced Class. W4EVN, WB4ICF and WB4GAN made BPL last month. K4CAX participated in the Va., Va. and Wyo. QSO Parties. He also worked the 2nd week end of the ARRL DX Test. K4CIA says he has been busy with convention planning, antenna work and DX.

Net	Freq.	Time/Days	QTC	Mgr.
N.C.SSB	3938	0030Z Daily	12	WA4KWC
CN(E)FEB.	3573	2345Z Daily	128	WB4MLI
CN(E)	3573	2345Z Daily	78	WB4MLI
CN(L)FEB.	3573	0300Z Daily	70	WB4G1HK
CN(L)	3573	0300Z Daily	60	WB4G1HK
THEN	3923	0030Z Daily	80	WA4UQC

Traffic: (Mar.) W4EVN 259, WB4ICF 207, WB4ICF 127, K5TGA/4 127, W4WXZ 40, WA4GMC 36, K4TTN 36, K4VBG 32, WB4G1HK 27, WA4VNV 27, WA4UQC 19, WA4NUO 18, K4MC 13, W4ACY 13, K4CAX 12, WB4JMG 8, WB4JGS 7, W4EEL 3, WA4KWC 3, WB4BGL 2, (Feb.) WB4BGL 2, (Jan.) WB4BGL 47.

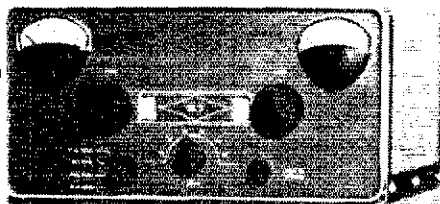
South Carolina - SCM, Charles N. Wright, W4PED - SEC: WA4ECL, PAM: W4VFO, RM: Vacant.

Net	KHz	Times/Days	Mar. Yr
SCPN	3930	Noon Dy, 0830/1530Z Su	
CN	3573	2245Z/0200Z Dy	78
SCSSBN	3915	2300Z Dy	105

WN4MCI, in Spartanburg, jumped from Novice to Advanced at one sitting. Congratulations! Aside from two traffic reports, that's all the news that was sent in this month. Better luck to my successor, who will take office June 26. I'd like to take this space to say that I've enjoyed working with the S.C. hams during my two terms as SCM and hope you will support whoever takes over. Although the pressures of other activities will not allow me sufficient time to handle the administrative duties of SCM, I will remain active in our nets and in League affairs in the state and division. Traffic: W10A/4 51, W4NTO 34.

VIRGINIA - SCM, Robert J. Slagle, K4GR - Asst. SCM: Albert L. Martin, Jr., W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY, RM: WA4EUL, K4MLC, W4SHJ, PAM: W4OKN, VHF PAM: WA4YXK. Regret to announce WA4WVU is a Silent Key. WA4YXK has been appointed VHF PAM, K4GCM OBS, K4TJ1 OO Class II and OPS, W4DSW OPS by Asst. SCM. WA4EUL needs input for Va. Ham. K4CYG, net mgr. of VFN, reports 28 sessions, QTC 49, check-ins 701. OI W4HU reports 15 out-of-band second harmonics, total 41 violations. W4HU had 0.0006% error on 14048,832 in the FMT! WB4FDT passed the Extra; took 1st place in Roanoke Div. in the SS Fone multi-op station, K4KNP was top traffic-handler in Mar. W4SQO was traveling, so his traffic score suffered. WB4GTS had a grand time with W4GF at PJ9GF. He still is building the SB-220. WB4FJK (K4KDJ) says school work and vacation keep traffic low. WB4DRB has antenna and power (50 watts from 15) up at school. W4DM is recuperating from the DX Contest. W4YZC operated cw mobile from 12 counties in the Va. (QSO Party, W4JUJ has confirmed 1529 counties was awarded 1st place (Va.) in the

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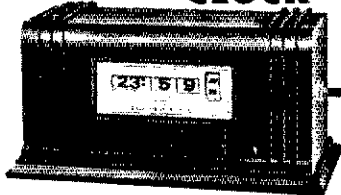
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La. and Ark. QSO Parties. K4JYM is new proxy of RARC. K4JM advises that should help in DX Contests. W4KAO won't give up the balky 18-year-old switch in the linear. W4GEQ still is moving and QRT. WB4PYA is moving around but is active in ECTTN and PCARS. W4XK deserted us for the rest of last year's vacation. K4LMB/W4TFE, XYT/OM team, report no traffic because they are proung antennas. K4FSS is very active in 4RN, VSN, VN. WB4GMC is moving. WB4GTH advises that he enjoys the column. We need more stations participating in nets and in traffic-handling - VSBN at 6 and 10 P.M. 3935, VSN 6:30, VN 7:00 P.M. on 3860 and VFN 7:30 P.M. on 3947. Our Director, W4KFC, presented a plaque at the OCWA Dinner to our lovely K4LMB, who has given so much of herself to ham radio. Traffic (Mar.) K4KNP 254, WB4CVY 251, W4UO 190, W4SOQ 170, WB4GTS 98, WB4GTG 92, WB4FK 80, K4KDJ 79, WB4ODN 76, WA4JF 50, WA4PHG 50, WA4EUL 49, WB4KCM 44, K4GR 39, WB4DT 37, W4OKN 36, WB4NNO 31, W4TJF/3 30, WB4JJS/4 26, K4YOX 21, W4OBE 20, WB4DRB 19, W4DM 17, K4TSJ 17, WB4IRA 14, WB4KBJ 13, W4ZYT 13, W4WOG 12, WA4YRH 12, W4SHJ 11, W4YZC 10, W4JUI 7, W4THV 7, W4DSW 6, W4MK 6, K4VCY 6, K4JM 5, W4KAO 4, WB4L4B 4, WB4LQV 4, WB4HJ 3, W4HJK 3, W4NJG 3, W4KX 1, WB4PYA 1. (Feb.) WB4GTS 113, WB4ODN 78, K4FSS 56, WB4GMC 24, K4MLC 17, WB4JJS/4 6, WB4DRD 4, W4KFC 4, W4GEQ 2.

WEST VIRGINIA - SCM, Donald K. Morris, W8JM - SEC: W8ANDY, RM: W8BRBG, PAM: W81YD, K8CHW. Phone Net Mgr.: W8BAQE. WVN-CW meets on 3570 at 7 P.M. and Phone Net on 3995 at 6 P.M. W8NCIX passed the General Class exam and has a new 1.4B linear. K8GWS has a new 220-watt all-hand rig. W8LBI received OK-Land award, 100 QSOs. W8HBO has new KWS-1 and 75-A4 with six-element beam. W8N1MA is active on 40-15. W8BEJN is up to 20 counties. W8POS renewed ORS. New Beckley ARC has W8HVB, pres.; W8UXF, vice-pres.; W8BAST, secy-treas. K54AN has returned to Beckley. West Va. Wesleyan ARC at Buckhannon is now affiliated with ARRL. K8CFT, K8NVF, W8ANDY, W8NIV, W8PFB, K8OYG and W8RQB served on the committee to pick the W. Va. Amateur of the Year for 1970. WVN CW net reports 49 sessions, 237 stations, 95 messages; Phone Net, 29 sessions, 197 stations, 43 messages; Mountain State Net, 5 sessions, 40 stations, 5 messages. W8BDXF is class instructor for Buckhannon ARC. W8YWK is working toward 5BWAS. W8N8FS received CPC-20. W8AZZI and W8BBG made PSHR. Remember - State ARRL Convention, Jackson's Mill July 4 and 5. Traffic: W8BBG 198, W8ANDY 83, W8CKX 23, W8AZZI 22, W8WCK 10, W8LFW 8, W8JM 7, W81ZP 5, W8RQB 5, W8YWK 3, W8BAQE 2, K81PE 2, W8AFB 1, W8AFJ 1, W8AKR 1, W8AVQ 1, K8CHW 1, W8EV 1, K8OEW 1, W8WEJ 1, W8YSB 1.

ROCKY MOUNTAIN DIVISION

COLORADO - SCM, Charles M. Cotterell, W0SIN - Asst. SCM: Neal Morris, K0TIV, SEC: W0HLO, RM: W0LRN, PAM: W0CXW, K0IGA, W0LRW, W0B0AWG. The Rocky Mountain Radio League and its W0WYX, repeater on 2 1/2 meters have been busy in the St. Patrick's Day Parade and in helping the Gilpin County's Sheriff's people. With W0B0AWG, the new VHF PAM, we should have some news of the Hamsters Club. The 40 Meter Eye Bank Net reports 674 QNI for Mar., 195 eyes requested and 51 sent. By W0MEM, The Colorado Code Net may still be on 3660 kHz. Took at least a one-month trial. K0MNO has 38 points for PSHR for Mar. W0LRW reports much interest in the 160-meter section net. W0LCE has been appointed by Jefferson County RACES to work on this band for them, too. W0WYX had 40 inches of snow in Mar. The new repeater reg may have put this repeater out of business. Denver area will miss this one, if so. Some good news on license plate application fees may be in the making. News will be on all state nets. CCN had QNI of 165, QTC of 89 and a time of 588 mins. 28 out of 31 sessions reported. W0MNL, CCN's lady operator, is a real pro. Colo. Hi - Noon Net reports QNI 1100, QTC 151 for 1284 mins. Columbine has several sessions unreported but about the same as usual. OVS: W0MOX and W0B0AWG made reports and sent into ARRL. Traffic: (Mar.) K0ZSQ 965, W0WYX 204, K0JSP 173, K0MNO 69, W0MNL 60, K0ECR 28, K0SPR 25, W0UAT 21, K0TIV 20, W0SIN 14, K0IGA 9, W0LRW 7, W0LVM 5, W0LCE 2, W0RFH 1. (Feb.) W0LVM 17.

NEW MEXICO - SCM, James R. Prine, W5NUI - Two events dominated March. The heavy snow storm of Mar. 27 interrupted telephone communications to Corona, N.M. A visiting mobile, W0OWR, originated a series of safety and welfare messages from Corona. The Road Runner Net provided outlets with special thanks to W5DMG, W5PDY, W5DER and W5SDK. The second event was planned, consisting of a Proclamation by the Governor designating the week of Mar. 30 through Apr. 5 as Amateur Radio Week in New

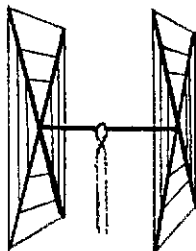
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4 El 20	34*	4 El 6	20
2 El 15	17	8 El 6	30*
3 El 15	21	12 El 2	27*
4 El 15	27*		
5 El 15	30*		

*20-ft. boom

ALL-BAND VERTICALS

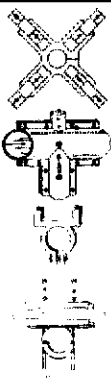
"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, WIWOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOR, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YSI-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

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Mexico. The New Mexico QSO Party Apr. 4-5 had very good participation. The results of the QSO Party will be published later. Traffic: W5RE 282, K5MAT 151, W5ASTA 66, W5MYM 57, W5PDY 37, W5AJXU 39, W5DMG 28, W5SWYV 21, W5SOHH 17, W5LXR 16, W5AJNC 16, W5BLL 15, W5NUI 14, W5GUNA 10, W5LST 8, W5AMIY 6, W5BWV 4.

UTAH - SCM, Thomas H. Miller, W7QWH - SEC: W7WKF. RM: W7OCX. BUN has changed time to 1830 GMT in keeping with the Daylight Saving Time change in the state. W7HKC is now an OVS. Official Bulletin Stations and Official Observers are needed in the Utah section. Contact the SCM if you are interested. K7CLO has a new Classic 33 Tribander, WA7MEL is now active on 160M with a Viking II and encourages more Utah stations to get on 160. K7CLO has been appointed OPS. W7OCX made 44 points in the Public Service Honor Roll (PSHR) and has made it every month since its inception. WA7LFS passed the General Class test and is now awaiting his ticket. W7EM is working on slow-scan TV equipment. BUN report for Mar.: Sessions 31, QNI 797, QTC 63, time 543 minutes. BUN meets daily at 1830 GMT on 7272 kHz and welcomes all stations. WA7HKV and WA7JOS have been awarded the BJN certificate. Congratulations! Traffic: W7EM 113, W7OCX 71, K7SOT 32, WA7LFS 7, WA7NHA 2, (Feb.) K7CLO 9.

WYOMING - SCM, Wayne M. Moore, W7CQL - SEC: K7NOX. W7TSM is now in Casper and very active on the higher bands. WN7OKN is a new ham on in Powell. Glad to have CMJ back home and out of the hospital. K7VVA took a quick vacation trip to California in Mar. W7HLA has been doing a lot of 160-meter work and talking to our Colorado and Nebraska neighbors. W7BKR now has his DXCC and is looking for a place in Casper to erect his tower and beam. WA7GOV has a new linear on the air. The Casper Club is in the process of erecting a new tower which was donated by K7UUI. The YO PD Net is enjoying a lot of activity and has moved to 3608 kHz to keep out of the ORM. The net meets seven nights a week at 1830 local time. Don't forget the hamfest at Glendo this year - hope to see you there. Traffic: K7NOX 358, W7GMT 230, W7SDA 121, K7TTH 81, K7VWA 45, W7TZK 42, W7VJ 22, W7HLA 13, K7QJW 13, WA7GYQ 10, WA7BDI 9, K7SLM 9, W7BHH 8, K7AHO 6.

SOUTHEASTERN DIVISION

ALABAMA - SCM, Donald W. Bonner, W4WLG - SEC: K4KJD. PAM: W4HDO. RM: W4HFL. That two-way contact was finally made between W4HGN in Muscle Shoals, Ala., and W4HHK in Collierville, Tenn., on 2304 MHz. The QSO was made on Mar. 28, 1970. HHK used an 18-ft. parabolo up 35 feet and HGN used a 10-ft. parabolo up 30 feet. I believe this is the first and is certainly a milestone for the two sections. Congratulations, fellows. W4UQH has a new Swan 270. WN4POC has 17-watt transmitter and DX-20 receiver and is active on AEND. Welcome to K4OZO, who just moved to Birmingham, from Kentucky. Listen for Lee on AENI (also 80-2). The North Alabama Hamfest will be held at Huntsville Aug. 15 and 16. Come early and enjoy the fun. Reports are that Columbus Hamfest was a big success. WN4PFE is a new call on the bands lately. Steve builds much of his own equipment and digs AEND. WB4LAL is proving that one can play football, keep up the homework and still handle traffic. Thanks. Ike, K4FZM and K4WWN have their Extras - well (I) be doggone! and, oh yes, isn't WA4GOS loud down in Birmingham! Traffic: W4FVY 142, WB4EKJ 133, WB4LAL 97, W4HFU 96, WB4JMH 91, K4AOZ 60, WB4KDI 58, WB4LAO 39, WA4GGD 27, W4WLG 17, WA4AZC 10, WA4VEK 8, W4DGH 7, WB4NCT 7, K4WHW 6, K4OZO 4, WN4POC 3, K4KJD 2, WN4OVR 1.

EASTERN FLORIDA - SCM, John F. Porter, W4KGJ - Asst. SCM: Albert Hamel, K4SJH. SEC: W4YU. Asst. SEC: W4SMK. RMs: W4ILE, K4EHT (cw), W4RWM (RTTY). PAM 75: W4OGX. PAM 40: W4SDR, W4BNE, EC for Hillsborough County, did an excellent job in setting up an emergency communications center in the Red Cross Bldg. in Tampa to handle Easter greetings to servicemen and civilians overseas during the East Holiday season. He was assisted by many members of the Tampa Amateur Radio Club under the able direction of W4CI, committee chairman. The operation proved a success. Plans are now underway to put in a complete station at Red Cross to supply the necessary backup for the upcoming hurricane season. Let's hear from others who are cooperating with their local Red Cross in a like manner. WA4SCK, W4TZ, W4DPZ, W2OIE/4, and W4LEP teamed up for an amateur radio setup at the Vero Beach Home Show in Mar. 65 messages were handled. WB4HKP is back in full swing on most of the traffic nets. Welcome back, Frank, W3UCU/4, W3VR/4 and WB4HKP made the BPL for Mar. Newly-formed Hollywood Radio Club is going great guns with over 33 members. Pres. is WB4MZ. The 6th Annual

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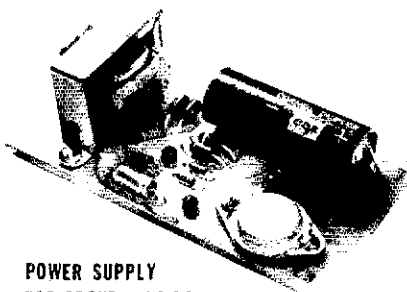
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Florida QSO Party was the biggest yet. Results will be in August Florida Skip. Congratulations to KF4MA on his FMT with a reading of 1.1 ppm. Don is one of our best OOs. Our traffic count for the past three months has been very good. The count comes out at 31,819 for the first quarter. The Tampa State Fair gave us a big boost. Of course Mae, WB3CUL/4, had a big hand in running up our count this winter. How about you fellows I hear on the nets sending in your reports. A radiogram will do fine. Traffic: (Mar.) W3CUL/4 3975, W3VR/4 653, WA4SCK 410, WB4ATW 371, W4FLC 319, W4ILE 257, WB4HQP 244, 8R1Y/W4 144, WB4HJW 141, W4DVO 126, W4SDR 110, W4KRC 103, W4EHW 88, WA4NBT 83, W4TRS 76, WB4IH 63, K4DAX 61, W8BZY/4 60, WA4HLD 59, WB4EPD 52, W4NGR 52, W4IA 50, WB4KUZ 48, W4SMK 48, W4YPX 44, W4OGX 42, K4SJI 42, WA4FJA 40, W4LEP 37, K4GJ 35, WB4IER 34, W4KJG 33, K4CVO 31, WB4GHD 25, W4LYT 25, WB4FLW 23, W4TJM 23, W4BNE 20, WB4HNL 20, W4IAD 20, K4HS 19, WB4FIY 18, WB4JRV 18, K4LPS 16, W4VPO 16, W4ZAK 15, W4LK 13, K4FBE 12, WA4EYU 11, WB4KPK 11, W4GUJ 10, K4OER 9, K4DVW 8, W4BCZ 4, W4BRC 4, WA4OHO 4, W4SCY 4, WA4EY 3. (Feb.) W8BZY/4 107, WB4ELW 11.

GEORGIA - SCM, A.J. Garrison, WA4WOU - SEC: W4YDN, RM: K4BAI, PAMS: K4HQI, W4LRR. W4DQD reports that WF4SUN was a special events station licensed by the FCC for Mar. 7 in connection with the total solar eclipse visible in the Southeastern United States. The station was operated by the Ga. Southern College Radio Club in cooperation with the Dept. of Physics at the college. Over 400 contacts were made with amateurs in more than 40 countries. The following Georgia amateurs participated in a scientific expedition in the total eclipse area by providing communications for a group of scientists before and during the eclipse: W4OVS, WB4DMO, WA4EQL, WB4GOX, WA4VWV, WB6UTC/4, W4YDN, W4DSX, WB4FTZ, WB4JIB, WB4JSK, WB4FNR, WB4KUX, WB4KUN, WB4CHT, WB4OKN, WB4DTY, K4SEP, K4IMK and WA4WOU. Arnold Terry has just received his Novice call, WN4PZY. K4PIK, W4BOY and WB4DMO are the proud owners of new Advanced Class licenses. WB4FTZ reports 6-meter openings the day following the eclipse. Stations in Fla., La. and N.C. were heard from Statesboro. We welcome K7HIX/4 to St. Simons; he's operating 6 meters. GSN reports 62 sessions, 56 different stations participating, QNI 574, QTC 185 for Mar. Congrats to the Columbus group for a real outstanding hamfest Mar. 6. Traffic: WA4RAV 140, WA4WOU 124, K4BAI 109, WB6UTC/4 107, WA4GXZ 85, W4PIM 77, WA4VWV 75, W4DDY 49, W4CZN 45, WB4DMO 39, W4NSO 39, WB4HXE 21, W4YDN 17, WA4UQO 12, WB4KVE 9, W4AMB 6, W4FDN 4, WA4LLI 3, K4NM 2.

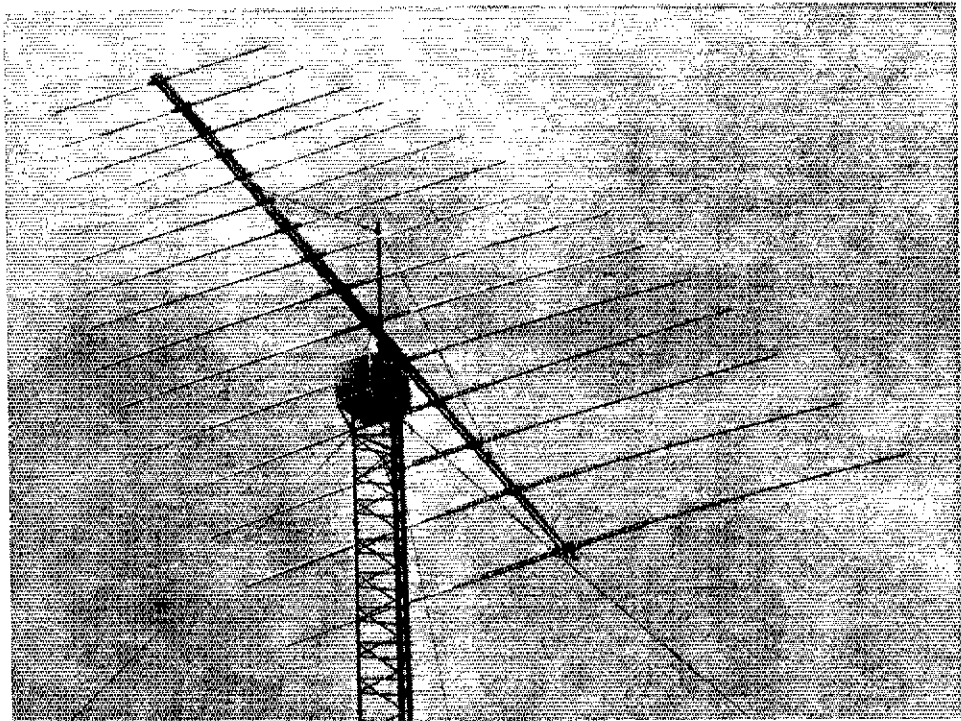
WEST INDIES - SCM, Jose Medina-Hernandez, KP4CO - KV4EY passed the Advanced Class exam and has 75-80 meter inverted "V" and 5-band antenna. KV4AB is back at Radio Hill North. KP4CS/KP4AVB passed away recently. Radio Club de P.R. offered the funeral oration. KP4AQQ gave the farewell address at National cemetery in the name of all KPs. WB2LMY came from New York for the funeral. KP4JM has a 295-ft. long wire and inverted "V" for 75-80. KP4AM, KP4CQQ, KP4AST and WB4FOI/KP4 participated in the 36th ARRL Phone DX Competition. KP4DEA and WB4FOT/KP4 participated on cw also. 6- and 2-meter Protomantes, KP4DFH, K3GAU, KP4DAL, KP4ZC and KP4JM are hopping around the island. KP4ZC and KP4DAL have a new galaxy GT-550. KP4QC and KP4BJM have FB signals with the new SB-220. KP4VA will soon reappear at the U. of P.R. at Mayaguez. KP4AKB is QSY from Fort Mammoth to Vietnam. All interested in DX, look up the DX Challenge Column of KP4RK in the P. R. Amateur Society Bulletin, P.O. Box 5505, College Station, Mayaguez, P.R. 00708. KP4PW is net control of the Army MARS Net on 4001.5 kHz Mon, at 2330. KP4COB is net control of Army MARS on 6997.5 kHz Sat. and Sun, at 1500. Traffic: KP4WT 179.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RKH - SEC: W4IKB, PAM: W4MOQ, RM: K4VEY, RM-RTTY: W4WEB. Nets:

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3957	2300Z	Dy	31	-	-
QFN	3651	0000/0300Z	Dy	62	674	453

Pensacola: K4LAN was appointed ORS and OO; WASGIT/4 was appointed OPS. WN4PMK and WN4PYO are new Novices; WB4DVM moved up to Advanced Class. The W4UC repeater now has a solid-state 1.D. generator and auto-patch. Fort Walton: New Playground ARC officers are WB4NHH, pres.; WB4NJW, vice-pres.; W4UXW, treas.; K4UBR, act. mgr. New hams include WN4PDM, WR4PNL, WA4SWC and WR9DBD/4. W4BVE operated on 2 meters from the hospital while recovering from a recent illness. Several timers are going to 146.88 to get away from .94 QRM. K6QPI/4 ran

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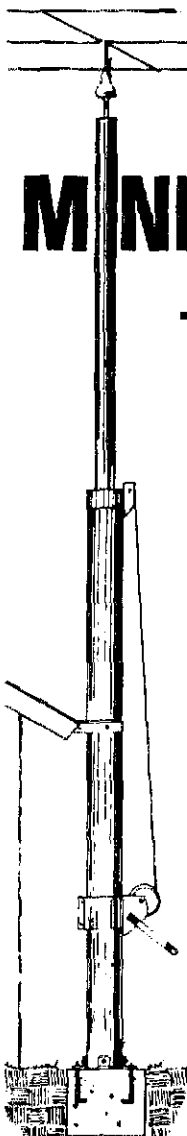
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up a high score on cw in the Fla. QSO Party; W4FDJ was also active. The EM Club station at W4ZBB is operational on .94 and the repeater channel. Panama City: PCARC has been reactivated, with new officers WN4PLZ, K3HLU/4 and WN4PNJ. WA4IMC was awarded a plaque at the Annual Banquet. K3HLU/4 is on 2-meter fm. The Jyndall Club is setting up a ham station, separate from the MARS facility. Wewahitchka: WN4QBW just got his ticket. Tallahassee: K4GRD and K4VYF operated portable from rare Liberty County during the Fla. QSO Party. WB4LOQ passed the Advanced Class exam and is studying for Extra. Traffic: (Mar.) K4VYF/4 377, KR1Y/W4 144, W4WEB 49, WB4DVM 16, W4RKH 10, W4FDJ 9, WB4NH4 4, K6QPH/4 2, (Feb.) WB4DVM 29.

SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SM - K7GPZ. RM: K7NHL, PAM: W7UXZ. K7UGA presented K7CRO the Arizona VHF Amateur of the Year Award. K7CRO received a plaque and a 2-meter transceiver for his contributions to vhf activities during 1969. Casa Grande is where the Arizona ARC of Phoenix and the Old Pueblo ARC of Tucson had a pot-luck lunch and then slugged it out in a softball game Apr. 5. WA7HUH and WA7KUM, of Globe, officiated the game and the final score was 26 to 4 in favor of Phoenix. S.W. Division Director W6LW spoke at an Arizona ARC meeting Apr. 2 to a group of 70. The U of A has a radio club with SB-301, SB-401 and a three-element beam operating under the call WA7IYG. Officers are WB2BBD/WA7NKL, pres.; WA7ICE, vice-pres.; Betty Compton, secy.-treas. Recent license upgradings are W7PKM to Extra, WA7HUH and WA7MZI to Advanced and WA7OBS to General. K7WUG has new SB-101 and SB-220. Others with new SB-220s are WA7MZI and W7UXZ. W7EBJ operated maritime mobile aboard a sailboat off the west coast of Mexico. W7CFJ, W7DI and W7HR scored well in the CW DX Contest. K7RDH has now worked 200 countries on ssb. Coming activities include Field Day June 27-28 and the Ft. Tuthill Hamfest in Flagstaff July 25-26. Deadline for SCM nominations is June 10. PSHR: K7NHL 48, W7CAF 33, WA7FCQ 25, W7UXZ 22. Traffic: K7NHL 230, K7UYW 118, W7PG 42, W7OUE 32, W7JMQ 31, W7CAF 26, W7UXZ 16, WA7IYG 15, W7GEP 15, WA7JCK 12, K7NTG 12, K7ZMA 12, WA7NQA 10, K7RDH 10, W7DRR 9, W7GET 8, W7DQS 5, W7LLO 5, WA7NRM 4.

LOS ANGELES - SCM, Harvey Hetland, WA6KZI - Asst. SCM: Phil Goetz, W6DQX. SEC: WA6OZY. The Monterey Park RC had a club meeting comprised of actual demonstrations of new amateur equipment. The So. Calif. Amateur Net has organized as a club with K6VKY, pres.; K6YCM, vice-pres.; WA6AIT, secy.; WA6PVN, treas. The So. Calif. VHF has started a code class Wed. 7:30 P.M., Paramount City Hall. W6ORG reports that K6VLM, WA6ZIO, WB6FXG, WB6WPO and W6PCQ are active on 1240 MHz using APX-6 gear. W6FD has a new HQ-215, and WA6MCK got a TR-3. WB6TJZ, WA6JRA and WB6IMV are active on 2-meter ssb with 145.02 MHz recommended for monitoring with horizontal polarization normally used for ssb. WB6NST is back on 6 meters and W6FOW is active again on 2 meters. WB6TNG advises that new Marina RC officers are WA6YRY, pres.; W6KWO, vice-pres.; WB6WHT, secy.-treas. WB6BT is working on a 2-meter mobile installation. WA6KZI has a new tri-bander up. The W6IN Soc. acquired some RTTY gear for ed. The So. Calif. VHF Club recently provided communications for the City of Carson Parade and those helping out included WA6JOK, WA6ZNP, WB6IMV, WB6FNE, WB6MWT, WA6DSN, WA6OSD, WB6YVP, WA6ARC, WB6GPD, WB6ORA and WA6JQC. The Tri-Counties Amateur Radio Assn. has a Hanifest-Picnic planned for 10 A.M. July 26 at Westmont Park in Pomona. Pomona area amateurs interested in RACES may contact W6ELZ regarding possible membership. Asst. Dir. K6UMV gave talks to the Jet Propulsion Labs RC and the Downey RC on the ARRL and how it functions. Net reports for Mar.:

Net	MHz	Times	QNI	QTC	Mgr.
SCN	3.60	6:30 P.M. Dy	438	402	W6LCP
Novice	7.18	10:00 A.M. Sa	24	26	WA6KZJ

In addition to monthly reports from amateurs in the section, as your SCM, I depend upon radio club bulletins to be informed on what clubs are doing. The ARRL Directors also appreciate receiving such bulletins because of their information value. Does your club provide its elected ARRL officials with copies as part of the communications link in the League's structure? Why not do your part to help your ARRL officials serve you better? All clubs sending me their bulletins will receive our section's bulletin in exchange as do those individuals who provide me with monthly reports. Traffic: (BPL/PSHR): (Mar.) W6AM 3/0, WB6BRO 439, W6BHG 14/0, WN6BJP 1/0, W6BWX 1/0, W6CBT 0/14, K6CDW 99/22, K6CL 4/0, W6GGB 2/0, K6EA 21/0, W6EJB 17/8, W6FD 18/0, W6G1J

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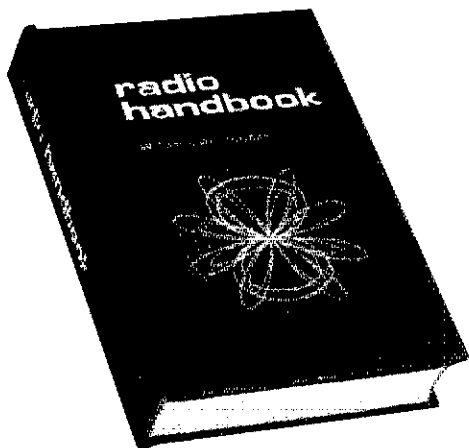
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1/3, W6EJF 10/31, WA6FQC 8/5, W7GAQ 5/10, WB6GGL 5/5, WA6GSV 0/1, W6IN 4/4, W6INH 354/0, W6IVC 10/10, WB6KCK 9/17, WB6KXI 15/14, WA6KZI 20/26, WA6LSB 0/17, WA6MCK 3/5, W6MLI 493/3, W6OEO 28/10, WB6PAV 2/0, WB6PKA 7/2, W6QAE 136/43, W6RCV 0/6, W6TIN 9/0, K6VKY 0/19, WB6ZVC 4/5. (Feb.) K6GIP 45/17, WB6GGL 4/5, WB6PKA 6/8, WB6ZVC 117/5.

ORANGE - SCM, Jerry L. VerDuff, WA6ROF - Asst. SCM, Richard W. Bierbeck, K6CTD. SEC: WB6COR. RMs: W6LCP, W6BNX, PAM: WB6RVM. The Fullerton ARC is sponsoring the Young Amateur Radio Club (YARC) for its younger members. Programs for YARC are being arranged by W6JTR. OVS K6YNB had another fine article on "High vs. Low Antennas" on p. 20 of Mar. QST. ORS WB6LYZ participated in a school project of bouncing uhf signals off a comet with a 200-mw 6-in. dish. Some way to relay traffic, huh? RM W6BNX is busy with phone patches to Coast Guard ships in Antarctica. OBS W6WRJ suggests we all become familiar with the new standard section abbreviations on p. 83 of Mar. QST. "Orange" section is now abbreviated "OG." K6LF gave a recent talk on ham radio over KBCR-FM radio in San Bernardino. The SCM and SEC attended the March meeting of the Citrus Belt ARC. The "Ham's Wide World" film was shown and SEC WB6COR presented W6ZGC with an Asst. EC appointment for Barstow RACES/AREC. Bill also received a gasoline generator donation to the AREC through his letter to the "Trouble Shooter" published in the Santa Ana Register. New officers of the Autonetics ARC are WB6YWT, pres.; W6NI, vice-pres.; K6APY, treas.; WA6GYS, secy. The club continues to run phone patches to SFA; Feb. total was 1531. A listing of all active clubs within the section is available from the SCM. I will soon publish an occasional section bulletin to all appointees and clubs within the section. Articles from the field are urged. My address appears on p. 6 of each QST. Public Service Honor Roll: W6RNX 63, WA6ROF 51, WB6HT 14 (Feb). Support your local club and section AREC and NTS nets. Traffic: W6LCP 279, WA6ROF 137, W6BNX 96, WA6FOQ 82, W6WRJ 35, WB6TYZ 16, K6OT 12, WB6ZFC 5, K6GGS 4, W6BLK 3.

SAN DIEGO - SCM, Richard F. Leffler, WA6COE - Most of the S.D. amateurs have been getting gear ready for Field Day. W6INI (Asst. SCM) and XYL represented this section at the Fresno Convention. The Convair ARC again helped with the Borrego Dunebuggy Races on 75 meters. El Cajon ARC planned a pre-Field Day tryout in May. SD DX Club held its May meeting at the home of K6ZMZ. W6VEV was elected chairman for 1970 over the S.D. Radio Council. SOCARS has a new editor for its monthly paper in W6SRN. S.D. Chapter of OCWA gets together on 3840 at 1900 each Wed. evening. Section News: K6AJ passed away in Apr. W6JUT helped W6OOU raise that 500-lb. sky needle tower with new tri-bander on top. WA6GLS is erecting his 71-ft. tower for vhf work. All 11 AREC members who ordered generators have them going now. WA6JCG reports that ATV is now going strong here in S.D. and to L.A. with pictures. Nice to have W6DFY and XYL in S.D. section. Roy was SCM of the Orange section. W7GRV/6, active on 75 mobile, is now back in Washington State. WB6UNB renewed his ORS appointment. During these summer months why not report your station activities to your SCM? If you are vacationing, be careful. We want you back -- to join the AREC, of course. Have a nice summer! Traffic: K6BPI 3749, W6FOT 630, W6VNO 547, W6IRU 422, W6BGF 247, K6HAV 234, W6YKF 38, W6INI 6, WA6COE 5, WA6FAM 4, K6KDE 3, WN6TVE 1.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6OKN - RM: W6UJ. WA6MGG is the newly-appointed EC for the San Luis Obispo area. W6NZWM has moved into an apartment and is off the air until he can get an antenna up. WA6WVC has his massive antenna up and is now working on a linear to add to his nearly-all Heathkit station. K6CS is now handling RN6 traffic for the Oxnard area. WA6DEI is putting up a new delta loop beam for 10 meters. WA6HZ is pres. of the Ventura County ARC which meets the 2nd. Fri. of each month at the Oxnard Community Center. For additional information call 483-3443. The Thousand Oaks ARC meets the 1st Fri. of each month at the Recreation Center and for further information call Lavern (WN6PFY) at 495-0145. K6GV, our SEC for the Santa Barbara section, has moved to Northern California and the position of SEC is now open. If you are interested in emergency work, please contact the SCM at the address shown on page 6. Traffic: WA6DEI 144.

WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.F. Harrison, W5LR - Asst. SCM: Frank Sewell, W5JUL, WASPPF was appointed OO. Karl Brownstein is the new skipper of DARC. Your SCM needs assistants

in DX, VHF, UHF, Contests and other departments. WA5PXQ in the Arlington ARC pres. Sorry I was unable to attend the Midland Hamfest. WA5WSC, Denton County ARC, advises it is a good idea to install heaters in transistor mobile units so they will start on cold mornings. ETTN membership now is 112 in 48 cities: 11 La., 5 Okla., 3 Ark., remainder Texas. KC Club Ft. Worth has a new pres. WA5VSS KC secy. issued annual questionnaire to membership to update records, including officers, class license, etc. Dallas QCWA Chapter Dinner attendance was 50. Speaker was Hal Sears. Houston. Your SCM was invited to attend the Garland and Irving ARC meeting showing the ARRL film. Attendance totaled 70. E TexENET, K5QKM net control, reports 5 sessions in Mar. with 63 check-ins and 4 Bulletins read. PAM W5BOO says the Waco Radio Club is moving to new quarters and the League film was shown on Channel 10, thanks to WSDZ. All Northern Texas members are reminded of the importance of returning the poll sheet included in Jan. '70 CD bulletin. Net certificates were issued to CenTexEmgny Net members. All net mgrs. please report the net name, frequencies, etc., direct to ARRL, Communications Dept., 225 Main St., Newington, Conn., for appearance in the 1970 Net Directory. Lubbock ARC meets 1st and 3rd Thurs., Red Cross Bldg. Broadway & Ave. S. WA5QOJ, Ft. Worth KC Club, reports progress contacting the proper people on WBAP, Channel 5, for showing the ham film. W5KUC says hello. OO W5QPX lost his beam in an ice storm. PSHR includes K5BDC, WA5PPF, W5JSM and W5QOZ. K5ABV is interested in OO work. He, ex-WA6CLR, W5IZU and W5CNO of Tyler, attended the Houston ARC "Old Timers" Night. K5ILL is joining Navy MARS. Frank also states the following Tyler hams are active: WA5RNF and WA5RWF on RTTY. W5CJX is awaiting a K7 QSL card. The 2-meter repeater group is active and can work the Athens, Tex. (W5QWB) group. Others on the air are W5AFY, W5QMF, W5KNN and W5CJX. DARC program director John Oliver has prepared the next twelve programs. Traffic: WA5PPF 5484, W5QOZ 115, W5HVF 59, W5JSM 42, WA5VJW 31, WA5SMI 20, K5BDC 18, W5LR 16, W5PBN 12, W5NFO 10, W5EVS 6, W5MSG 2, WA5QWA 1.

OKLAHOMA - SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. "Smoky" Stover, K5OOV. SEC: WA5FSN, RM and QSL Bureau: W5QMJ. PAM 75: W5MFX. W5HXL is the proud owner of a new Ron 60-ft. tilt-over tower. W5OZE has a new TR-4. K5KZV has a new TR-6. K5OCX is awaiting delivery of a new SB-101. W5VCJ

received WAC award with 50-MHz endorsement. Well, here it is Field Day time again and I am sure your emergency generator and equipment is up in good shape. We should keep our emergency generators in top-notch condition here in "tornado alley," but let's hope our greatest need for them is for Field Day operation. Congratulations to the Duncan club on the new call, W5BEW, and its real nice station setup in the Stevens County EOC with a big high antenna (about 150 feet up). The Duncan Club is holding Novice classes, too, along with Kingston and Lawton. Congratulations to graduates W5AZS and W5BCH. Net reports.

Net	KHz	Time(Z)Day	Seas.	QNT	QTC
OPEN	391.5	1400 Su	5	242	5
OPON	391.3	2300 M-F	22	393	72
STN 1	3850	2330 M-S	26	363	31
STN 2	391.3	2330 M-S	26	353	37
OWXN	391.3	0001 T-Su	26	340	WX
OLZ	3682.5	0100 T-Su	17	51	68
SSZ	3682.5	0345 T-Su	13	41	30

Traffic: K5TEY 468, WA5YRO 131, W5QMJ 76, W5FKL 46, W2FIR/5 35, W5PML 35, WA5MO 29, W5MFX 28, WA5ZOO 18, WA5FSN 8, K5WPP 7, K5OCX 5, WA5NZM 4.

SOUTHERN TEXAS - SCM, G.D. Jerry Sears, W5AIR - SEC: K5QOQ. PAM: W5KLV. RM: W5EZY. New appointments: WA5TPY as EC Nueces County-Corpus Christi; WA5MKV as EC Brazos County-Bryan; K5FJZ as OO. K5ROZ again made PSHR with 43 points. Congratulations, and the rest of you guys get your points in. A visitor to the Houston area for most of Apr. was SP9VU, on business but meeting all the DXers he could find. RM W5EZY received his Extra in Mar. WA5UHG and 10 Novices have formed Explorer Post 850 Amateur Radio Net, with meetings at 0300Z on 21.175 kc. Give them a call if you hear them on. New officers of the Houston ARC: K5HXR, pres.; WA5FJM, vice-pres.; W5NC, treas.; WA5BTO, secy.; WA5SFX, program and WA5SEW, membership. K1PKO/5 is back on the air after two weeks off, now with a new Drake line. W5KLV has new Heath gear ready to install in permanent location. W5QO has been experimenting with 20-meter antennas. K5SUY, of Beaumont, reports the Beaumont ARC RTTY VHF Net meets at 2100 CST on 50.178 MHz. First stations in Nov. '69 were WA5NXP, K5SUY and WA5VDM and there are new eight stations participating with possibly three more to be added. Traffic: WA5MXY 212, K5HZR 123, K5ROZ 102,

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QS 6-70

W5EZY 88, W5ABQ 56, W5QO 42, W5BHO 24, W5TFW 22, K5SUY 8, K5WYN 6, W5KLV 4, K1PRQ/5 2.

CANADIAN DIVISION

ALBERTA—SCM Don Sutherland, VE6FK—SEC: VE6XC, PAMs: VE6ADS, VE6DO. RM: VE6TY. ECs: VE6AFQ, VE6SS, VE6AFR. OOx: VE6HM, VE6MJ, VE6TY. OBS: VE6SB. OPSs: VE6AFO, VE6SS, VE6ATH, VE6HN. ORSs: VE6ATH, VE6ATG. QVSS: VF6MX, VE6AHE. Congratulations to VE6XC and VE6TY on their appointment as SEC and RM, respectively. VE6MX reports several contacts of 60 miles on 2-meter fm. The NARC recently supplied vhf communications for ice chuck wagon races and for snowshoe races. The ATN meets at 0330 Wed., Fri. and Mon. GMT (days advanced one for GMT) with VE6TY as mgr. and VE6AWI as NCS. The net is of the slow-speed variety to help amateurs improve their code speed and operating ability for their Advanced Class amateur exam. Look for the ATN on 3690 kHz. The APSN on 3770 kHz is well attended. The average QNI per session is 50. Many of us are already thinking of FD. Get your club out or organize your own FD group and join in the fun. This contest is a great test of your emergency preparedness. Murphy never attacks and any old FD hand will assure you that the wx is always ideal. Traffic: VE6TY 43, VE6FK 28, VE6XC 28, VE6HD 11, VE6FV 5, VE6YW 5, VE6AER 3, VE6SS 3, VE6HS 2, VE6TS 2.

BRITISH COLUMBIA—SCM, H.E. Savage, VE7FB—March came in and out like a lamb. No news, but traffic did increase by reports. East Kootenay ARC officers are VE7ADI, pres.; VE7AIT, vice-pres.; VE7BKW, secy. We also are looking forward to a new FC from there. VE7AEB, VE7BRZ got married in May. VE7FB and VE7SH visited VE7BGV/W7 in Knappa, Ore., for four days and had a ball. British Columbia Emergency Net, 3650 kHz, is holding its slow speed net, Tue., Thurs. and Sat. at 0400 GMT. Here is the opening for your start in cw traffic. Vancouver Island Annual Picnic will be held Sun., June 14, at Shawnigan Lake. For information contact any Vancouver Island amateur, or Victoria Short Wave Club, Box 134, Victoria, B.C. VE7BJT has left Comox AFB and will be signing VE6 from Edmonton. Have you received B.C. fm. bulletins? Contact Darrel Wicks, WA6MAY/VE7, 306-2050 West 1st Ave., Vancouver 9 B.C. Traffic: VE7KZ 19, VE7QQ 15, VE7LL 14, VE7BNK 6, VE7GG 4, VE7BZA 3.

MANITOBA—SCM, Keith Witney, VE4FI—Centennial Awards stations for July are VE4SE and VE4JJ. VE4GI was at the science fair with a 2-meter rig hooked up to a telsa coil but did manage to make a few contacts. March was the month for an invasion of Brandon mobiles in Winnipeg. We hope that VE4DO gets back from Athens OK. We understand they have a law against sideburns. The WARC boys and ladies were privileged to see the ARRL film. VE4VA has his keyer working and now can excuse his cw. VE4XJ is taking a course; perhaps to help with the repeater maintenance. It seems as if 2-meter RITY might be getting up enough steam to last through the summer with the addition of VF4KE. The new phone net check-in seems to be working fine so far. Enjoy your holidays and remember the hamfests. Traffic: VE4FO 44, VE4RO 22, VF4KE 17, VE4NE 9, VE4QJ 9, VF4EF 7, VE4RL 5, VE4IW 4, VE4JA 2, VE4RW 2, VE4JQ 1, VE4RB 1, VE4XQ 1.

MARITIME—SCM, William J. Gillis, VE1NR—SEC: VE1HJ. It is with deep regret that we note the sudden passing of VE1HD. VE1AQT is now VE1EZ. VE1AGH is pursuing his hobby with homing pigeons. Is the QRM that bad? A number of clubs are actively preparing for Field Day. VE1AOH reports complaints from XYL re power bill TVI and his preoccupation with 2-meter work has held up construction of new linear amplifier. VO1AW has been appointed Asst. SCM for Newfoundland-Labrador and VO1HI has been appointed AREC. With these appointments, it is hoped that more reports will be available from Newfoundland and Labrador. By now, you will have received the Maritime Section Newsletter, which was sent to all clubs and ARRL members. If your name was not on the mailing list, please advise. VE1RO is now on phone. APN reports QNI 257, QIC 76, sessions 62. Traffic: VE1AMR 114, VE1RO 83.

SASKATCHEWAN—SCM, Gordon C. Pearce, VE5HP—Hamfest in Saskatchewan will be held July 3, 4 and 5, 1970. Place: Luther College, Dewdney Avenue and Royal Street, Regina. Accommodations available at Luther College—\$2.00 per person per night, \$4.00 per family per night including any children you can accommodate in the room with your own sleeping bags. Breakfast—\$1.00. Lunch—\$1.25. Banquet—included in registration fee (to be announced later). Unlimited space for campers. 50 cents per night on the college grounds. See you at the Hamfest. Traffic: VE5GL 115, VE5SC 28, VE5DN 26, VE5XL 4, VE5OJ 2.

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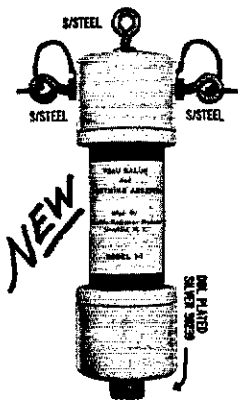
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THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

QS 6-70

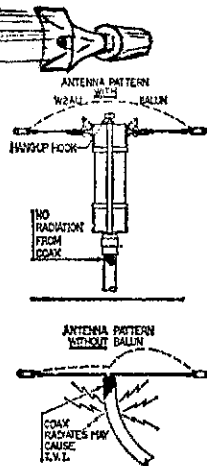
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QSLs. All types. Attractive designs, quick return, free samples. W7HZ Press, Box 2387, Eugene, OR 97402.

SAMPLES 10c. Harry Sims, 3227 Missouri Ave., St. Louis MO. 63118.

QSLs, finest YLRL's, OM's samples 10c. W2DJH Press, Warrensburg, NY 12885.

QSLs-100 3-color glossy \$3.50; silver globe on front; report form on back. Free samples. Rusprint, Box 7375, Kansas City, MO. 64116.

PICTURE QSL cards of your shack, etc. from your photograph. 500, \$12. 1,000, \$15.25. Also unusual non-picture designs. Generous sample pack, 25c. Half pound of samples 50c. Raum's, 4154 Fifth St., Philadelphia, Pa. 19140.

QSLs, SWLs, WPE, Samples 15c in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix, Ariz. 85017.

QSLs-SWLs. Hundred, \$2. Samples dime. Willow Press, 223 N. Udicks Dr., Battle Creek MI 49017.

LOW Priced QSLs (25c deductible) KLL Press, P.O. Box 258, Martinsville, NJ 08836.

QSLs, samples 10c. Fred Leyden, WINZJ, 454 Proctor Ave., Revere, Mass. 02151.

QSLs Free samples, attractive designs. Fast return, W7HZ Press, Box 2387, Eugene, Oregon 97402.

QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Hiegel Ridge, Milford, NJ 08848.

3-D QSLs - The modern concept that makes all other old-fashioned. Samples 25c (refundable). 3-D QSL Co., Monson 2, Mass. 01057.

QSLs 300 for \$4.50, samples 10c. W9SKR, George Vesely, Rte. 71, 100 Wilson Rd., Ingleside, IL. 60041.

3-LINE Engraved badges, any color, \$1.25. Special rates to clubs. W8GEW, Fallert's Engravings, 121 N.C. St., Hamilton OH. 45013.

RUBBER stamps \$1.25 includes tax and postage. Clint's Radio, W2UDO, 32 Cummins Ave., Verona, NJ 07044.

DELUXE QSLs Petty, W2HAZ, P.O. Box 5237, Trenton, NJ 08638. Samples 10c.

ANTIQUÉ Wireless Association 1970 Historical Radio Conference, Ford Science Museum, Dearborn, MI. Weekend August 8 and 9th. Write W2QY for information.

QSL, SWL cards that are different. Quality Card Stock Samples, 10c. Home Print, 2415 Elmo Ave., Hamilton, Ohio 45015.

QSLs. Second to none. Same day service. Samples airmailed, 25c. Ray, K7HLR, Box 331, Clearfield UT 84015.

GORGEOUS QSLs, Rainbows, etc. Top quality! Low prices! Samples, 10c. Refundable, Joe Harms, W4BLQ, Box 158, Edgewater Fla. 32032.

NEW! QSLs professionally designed. Every card original. Samples, 10c. Printing follow-through by W1FLX, QSL Designs, 26 Batton St., Pittsfield, MA 01201.

WIRELESS shop. New and reconditioned equipment. Write, call or stop for free estimates. 1305 Tennessee, Vallejo CA 94580. Tel. 707-643-2797.

QSLs "Brownie", W3CJ, 3111 Lehigh, Allentown, PA 18103. Samples 10c. Catalog 25c.

QSLs, stationery! Free samples, estimates. S. F. Cohen, Drawer Q, Pittsford NY 14534.

MICHIGAN hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8R. Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Mich. 48104. Tel. Normandy 8-8262.

FORDONS, 88 rnh uncased, 5/2\$2.50. Postpaid Humphrey, W46FKN, Box 34, Dixon, Calif.

SAVE. On all makes of new and used equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Mass. 617-598-2530 for the gear u want at the prices u want to pay.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York, NY 10007.

1000 PIV @ 1.5 ump, epoxy diodes includes disc bypass caps & bnding resistors, 10/\$3.95, 100/\$30. Postpaid USA. Dealers inquiries invited. East Coast Electronics, 123 St. Boniface Rd., Cheektowaga NY 14225.

EDITING a club paper? Need public relations help? You should belong to Amateur Radio News Service. For info, contact Al Marcy, W4ID, Sec'y., 461 Third Ave., Eau Gallie, Fla. 32937.

HEWLETT-PACKARD 524c counter and Tektronix 545A scope. Collins 51S-1 and 51J4 receivers, URR/388, 290 and 290A receivers. Cash or trade equal value for Collins ham gear. Write or phone, W2ADD.

QSLs Wanted: December 1915 to December 1916, 1913 IRE Proceedings. Any unreasonable price! Ted Dames, W2KUW, 308 Hickory St., Arlington, N.J.

AN Invitation NYC Area Hams and SWLS are invited to attend NY Radio Club Meetings - 2nd Monday of every month. George Washington Hotel, 23rd St. and Lexington Ave at 8 PM.

QCWA Quarter Century Wireless Association is a non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Write for information, A. J. Gironda, W2JE, Box 394, Mamaroneck, NY 10543.

JUNE 7 1970 - Save this date for the Starved Rock Radio Club Hamfest. Same place as last year. Details on request after April 1, 1970. Write SRRC/W9MKS, G. E. Keith, Sec'y.-Treas. RFD 1, Box 171, Oglesby, IL 61348.

If you have operated Amateur radio 40 years ago you are eligible for the exclusive Old Old Timers' Club, Inc. Write Ray Meyers, W6MLZ, Box B, San Gabriel, CA 91778 for details.

AMATEUR Paradise Vacation, Livingstone Lodge, Mascota Luke, NH. Cosy cabin for two, weekly, \$85. Swimming, Fishing, Boats, Sports, Ham Radio, Hot Showers, Fireplaces, Light Housekeeping, Children half, Camp sites, literature. A.Q. Livingstone, W2QPN.

HAMFESTERS 36th Annual Hamfest and picnic. Sunday, August 9 1970, Santa Fe Park, 91st and Wolf Road, Willow Springs, Illinois, southwest of Chicago. Exhibits for OMs, XYLs. Famous Swapmeat Row, information and tickets, Tom Ondriska, W4YZZW, 6509 South Kedvale, Chicago IL. 60629.

SOUTHERN California amateur network 14.325 mHz Monday through Friday 0400 GMT, K6YCM.

FREE Sample copy Long Island DX Association Bulletin. Latest DX news. Business size s.a.s.c. to K2ZAPY, Box 74, Massapequa, LI NY 11762.

HAMFEST - Indiana Radio Club Council's annual picnic Sunday July 12, Memorial Park, Michigan City, Ind. Group meetings, contests, ladies' handwork displays, reserved flea market booths, advance registration, awards, talk-ins 3,910, 504 and 146,94. For flyer, write William Cannon, W9JLS, 205 N. Roeseck, Michigan City, IN 46360.

GREENE. Center of dipole insulator, with or without balun. Free flyer. See our display ad in this issue! O. Watson Greene, Box 423, Wakefield RI 02880.

EVANSVILLE, Ind. Hamfest, 4th grounds (Highway 41 North 3 miles) July 12, 1970 air conditioned, swappers/hams/families welcome. Tri-State on Radio Society, Tom Dick, 2851 Wayside Dr., Evansville, IN 47711.

HAM ticket. The Amateur Radio License Course for Novice, General, Advanced, Extra Class. FCC makes it difficult to get a ham license. Let Ham Ticket make it easy! Packaged course for each class license. Courses leased, not sold. Copyright 1970. Write for brochure, Clayton Radio Co., 220 Mira Mar Ave., Long Beach, CA 90803.

WE buy all types of tubes for cash, especially Eimac, subject to our best. Maritime International Co. Box 516, Hempstead, NY 11551.

CASH Paid for your unused Tubes and good ham and commercial equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NY 10012. Tel. 212-925-7000.

WANTED. Tubes and all aircraft and ground radios. Units like 17L, 51K, 61RT or S, R388, R390, GEC. Any 51 series Collins unit. Test equipment, everything URM, ARM, GRM, etc. Best offer paid. 22 years of fair dealing. Ted Dames Co. 308 Hickory St., Arlington NJ 07032.

RTTY gear for sale. List issued monthly, 88 or 44 MHz toroids five for \$2.50 postpaid, Elliott Buchanan & Assoc., Inc., Buck, WVPC, 1067 Mandana Blvd., Oakland, Calif. 94601.

NOVICE crystals: 40-15M \$1.33, 80 M, \$1.33. Free flyer, Nat Stinnette, Electronics, Umatilla, Fla. 32784.

SELL swap and buy ancient radio set and parts magazines. Lavery, 118 N. Wycomb, Lansdowne, Pa. 19050.

TELETYPE parts. Fast service. Machines to M.35. Buy, too. S.A.S. Typetronics, Box 8873, Ft. Lauderdale, Fla. 33310.

REPAIR and calibration service. Write before shipping. Pan Tronics, Inc., 6608 Edsall Road, Alexandria, VA. 22312.

WANTED: For personal collection: The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914, WICUT, 18 Mowback Drive, Unionville, CT. 06085.

NOVICES: Need help for General ticket? Complete recorded audio-visual theory instruction, Easy, no electronic background necessary. Write for free information, Amateur License, Box 6015, Norfolk, Va. 23508.

WE'RE trying to complete our collection of callbooks at Headquarters. Anyone have extra copies of Government Callbooks 1922-1925 and Radio Amateur Callbooks 1928-1934, ARRL, 225 Main St., Newington, CT 06111.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductor and resistors. Astral Electronics, 150 Miller St., Elizabeth, NJ 07207. Tel. 201-354-3141.

SPIDERS for boomless quads. Hellarc welded aluminum. AP's Antenna Accessories, 1339 So. Washington St., Kennewick, Wash. 99336.

WANTED: An opportunity to quote your ham needs, 30 years a ham gear dealer, Collins, Signal/One, Drake, Swan and all others. Also \$25,000.00 inventory used gear. Request list, Chuck, WBUGC, Electronic Distributors, 1960 Peck, Muskegon, Mich. 49441.

TRANSFORMERS rewound. Jess W4CJL, 411 Gunby, Orlando, Fla. 32801.

CIRCUITS for 32 electronic projects, r.f., audio and gadgetry, complete plans \$1. P.M. Electronics, Inc., Box 46204, Seattle, Wash. 98146. Dealer inquiries invited.

COLLINS S-line - 3293 - 7553 - 312R4 - 516P2 - Hygain Antenna \$1150. Hallicrafter SR150 with ac sync dc power supplies - Astatic Microphone - Webster antenna \$300. Courier CB Rig & Turner microphone \$100. Mrs. D. G. Ursel 9301 West Frontage Rd. NE Space 133, Albuquerque, New Mexico 87113.

FRAME Display, and protect your QSLs with 20 pocket plastic holders 3 for \$1.10 for \$2, prepaid and guaranteed. Tepabco Box 198T Gallatin TN 37066.

WANTED: SX-42 receiver. Will pay good price for SX-42 in good condition. H. J. Hire W8ZET 141 Sherbrook Rd. Mansfield OH 44907.

WANTED: 6 & 2 meter xmtr, revt, convrt, Xmtr for RTTY xsb 80 to 10 meters, or complete station covering MARS freq. John Waskowitz 35-30-73rd St. Jackson Hts. LI NY 11372.

TELETYPE Mod. LPR 28 receiver-only typing reperfector without cover good cooperating cond., sync motor 60 wpm. \$125. Tape winder 110vac \$15. + 28 LEXD1 trans-dist 60 wpm. sync motor, wired for complete 110vac operation and converted to 117, 42 code \$75. T. Howard Box 252 Boston MA 02101. Tel. 617-742-0916.

COLLINS 75A4 \$395. 32V3 \$195. Speaker \$15. Collins wattmeter \$35. Electrovoice 664 \$25. Steel cabinet supporting Ham actor 20 meter Telrex 10 meter Telrex 250 feet RG8 all for \$295. HT9 \$55. Other station components. Everything in excellent condition. Joseph M. Mazzei W3SQN 1314 Romine Ave. McKeesport PA 15133.

DRAKE TR4 RV4 AC4 EV 648 152B, R4A panadaptor SWL crystals \$325. Swan 5100K mod \$417.404C plus extras \$425. HD10 \$25. DR30 DR30S \$260. HE45 \$45. All lab tested. Can ship collect. Henry Niklas 7 Delmont Boston 02122. 617-288-5846 Nite.

V E R Y In-ter-est-ing! Sample copy free. "The Ham Trader", Sycamore IL 60178.

INSTRUCTOGRAPH 115 volts, with (1) International Morse Code tapes. Just like new, \$40, Phil Gedaly, WB2ZK V. Tel: 212-876-9372.

WANT Early issues of Pioneer Wireless Magazines for W4AA Historical Library. Wayne Nelson, Concord NC 28025.

SELL Or trade: QST, CQ, Popular Radio, Electrical Experimenter, Radio, Modern Electrics, Wireless Age and call books, any quantity. Wanted: old radio gear, books and magazines. Erv Rasmussen, 164 Lowell, Redwood City, CA 94062.

CAPACITORS. Brand new 140 mfd electrolytics @ 450 vdc, ten for \$9.50. K4IHP, Mehaffey, 6835 Sunnybrook Lane, NE, Atlanta, GA 30328.

WANTED: Motorola Manual D43GGV-1 model. Writ WABQCU, 1016 Beauty Ave., Cambridge OH 43725.

SATELLITE Amateur Radio Equipment Co. New and used ham gear. Repair service. Ham antennas, supplies. 426 Boston Post Rd., Waterford CT 06385. Tel: 203-443-8841.

COUNTER, 100 kc, Berkley EPTV. Model 71A0BDK, excellent condition, \$200. John Link, 1031 Aron St., Cocoa, FLA 32922

WANTED: Viking 1 transmitter, 475W Matchbox, state cond. modifications etc. Offering \$25 plus shipping either unit. Don WRQHW 3156 Timberview Dr., Cincinnati OH 45211. Tel 513-481-2386.

SALE Or trade RCA CMFA-100 watt 50 MH mobile unit with cables, books and used only one week. Like new. \$425.00 or trade for 5143 or comparable receiver. W4VAD, Fredericksburg VA. 703-373-7282.

COLLINS For sale: KWM-2, 113378 with a.c. and d.c. p.p. \$225. 30L1, \$300. All real clean. K8IQA, Box 96, Sparta, M 49345.

WORLD QSL BUREAU. See display ad elsewhere in this issue

PHONE Path, with 2.6 kc filter, for Telex coupler or direct in not required, no tricky adjustments. Kit \$6.95; wired add \$4 Ham Kits, Box 175, Cranford NJ 07016.

DRAKE 2C, 2CQ and xtal calibrator, excellent cond. \$205 F.O.B. Ken Bauer, 6358 Lyric Lane, Falls Church, VA 22044.

CANADIANS: NCX-5 with NCX-A power supply, \$500, new condition. Offer from National factory overhaul and in min cond. George Burnside, R7F1, Angus, Ont. P., Canada.

TOROID Cores OD 0.125" - .375" @ 25g; .435" - .587" @ 35g; .582 - .940 @ 40g; 1.437 or 2.310" @ \$1.00. Specify frequency, include 25g postage. Barben Electronics 274 E. 6th Pleasant Ave. Livingston, N.J.

"HOSS Trader Ed Moory" says he will not be undersold on Cash Deals! Shop around for your best cash price and then call or write the "HOSS" before you buy! New Equipment; Factory Warranty; BTL LK-2000 Heavy Duty, Reg. (\$495.00), Cash Price \$659.00; New Sany Model Swan 25, (Synet with microphone \$435.00), Cash Price \$329.00; Swan 350C, Reg. (\$420.00), Cash Price \$339.00; Gonset GSB 201 MkIV Linear 2000 Watts, Reg. (\$495.00), Cash Price \$349.00; New Rohm 50 Ft. Foldover Tower Prepaid, \$199.95; New Mosley Classic 3C and Demo Ham-M Rotator, \$198.00; Used Equipment: R-4A \$279.00; HT-37, \$179.00; 75A-4, \$299.00; Ed Moory Wholesale Radio Co., Box 506, Dewitt, Arkansas 72042

SELL: Hammarlund HQ-110AC, factory reconditioned in Dec. 69 - excellent condition \$150.00, Eico 720 CW transmitter, worked 2 states in two months \$40.00, Eimac 4E47 - free condition \$30.00, all with manuals. S.R. Pond, WN4E0G, 1511 Skipwith Rd., Richmond, Va. 23229.

160 Meter Matchwerter resonates any 40 or 80 meter inverted vee/dipole on 160 meters. Standard 250W PEP \$29.95. For Radio Systems, Dept 4, 5349 Abbeyfield, Lone Beach, Calif. 90815

FOR SALE: HQ-170AC, Ameco PCLE Preamp, Ameco TX-62 Ameco VFO-621, Heathkit SB-100 with Pwr. Supply it, matching speaker cabinet, Heathkit SB-610. All equipment good with much of it little used. W0JDN Robert E. Stuhr, Shelby Iowa 51570

HAMMARLUND HQ 110AC w/matching speaker excellent \$150.00. ETCO 720 w/77 novice xtals vry gud \$50.00 both \$190.00. WN7MB1, 9 Vichy Dr., Ballston Spa, N.Y. 12020

NCX-5MK11. Power Supply & Speaker. NCX-5 UFO (Sell as one unit) Excellent condition all for \$500.00; SB-200 \$200.00. Write, call - WB2ZOA, Barrywarren 21 Westover Rd, Troy, N.Y. 12180

HALICRAFTERS SX-111 RCVR in excellent condition \$120.00 postpaid in continental U.S. Ken Keskinen, 4116 Alicante Ave. Ft. Worth, Texas 76133.

FOR SALE HQ180AC with noise immunizer - SB82C Scannerizer both like new unknk offer Dave Thomas 81 Rosewood Ter, Lakeview, N.Y. 14085

COLLINS 30S1 amp for sale beautiful cond. with good spare tube \$750 PH 812-882-3696 Paul Kent W9CQ 1622 Ritterskamp, Vincennes, Ind. 47591

SELL: Motorola T41GGV 60 watt 6 meter f.m. on 52.525 capable of 2 frequency operation. Excellent condition with accessories. Howard Salzman WA9KJX 3846 Birchwood Ave. Skokie, Illinois 60076

BEAT Rust-Corrosion! Aluminum adapter plates for yags. Fine stainless, other, threaded, washer, hardware. Use indoors - outdoors! Guying, antenna, accessories. Lists 15¢! Writ, WR8RL Ham Hardware Headquarters, 29716, Briarbank, Southfield MI 48075.

DRAKE R-4A factory updated, original crane, \$275.00 sold state instructograph all tapes like new \$35.00 just returns from National NCL-2000 perfect original carton \$395.00 Drake T-R4, AC4, RV4, DC-4 new in carton \$695.00. Special designed 100ft. TRI-EX space needle "Fabulous" details on picture on request. New Trons 4 BIV vertical antenna with ground radials \$25.00 30 meter and 40 meter KW mob antennas \$10.00 each. Galaxy 5 with Galaxy AC and DC supply new finals \$275.00. W9CKF, Porter Barnes, 2922 Muensterman Evansville, Ind., U.S.A. 812-4259857 after 6:00 p.m.

COLLEGE BOUND: Johnson thunderbolt amplifier with a cables and connections, \$230.00. Very good condition. Richard Orr, WA4YXW, 1100 Pollock Street, Kinston, N.C. 28501 Tel 523-3734.

WANTED - Rescue Squad needs Donation of Low Band HF Equipment and Accessories, such as GE Progress Line, Rot mobile and base. Send to Bill Dunn, Winchester Rescue Squad, Winchester, VA. 22601.

BICO 763 & 751 p.s., \$125. WA0TYU, 1414 28th Ave., Greeley Colorado 80631.

DISCOUNT prices! New Equipment, Factory-sealed cartons, full warranty. New Drake TR-4 (Reg. \$699) \$595, New Drake R-4B (Reg. \$475) \$404, New Drake 4XB (Reg. \$499) \$420, New Galaxy GT-650 (Reg. \$550) \$435, New Galaxy G-550 (Reg. \$795) \$639, New Hy-Gain TH6DXK (Reg. \$169) \$139, New Hy-Gain TH3MK3 (Reg. \$149) \$111, New Hy-Gain Quad (Reg. \$109) \$89, New Mosley Classic 33 (Reg. \$147) \$119, New Classic 36 (Reg. \$171) \$136, New Tri-Ex W-51 Self-Supporting Crank-up (Reg. \$395) \$333, shipped prepaid, New Hamu Rotator (Reg. \$129.95) \$99.95. Send for price quote on all amateur equipment. Discount Radio Sales, Box 6044, Lubbock, Texas 79413.

WOULD you like to play a game of chess with a fellow amateur? If so how about checking in to the Midwest Chess Net Saturday, June 6th at 2000 GMT on or about 7100 KHz. Check-ins will be paired off and allowed to play chess on another frequency. The net frequency will be kept clear for any possible traffic. I would also like to take this opportunity to thank all the hams who expressed an interest in radio chess by order of letters and radiograms, and to express my regrets for not being able to reply individually because of the amount of replies. 73's es cul de WA9WHE NC

"COLLECTORS Item re proceedings run fifty thru fifty four, broken forty five thru forty eight s.a.s.e. list. Interested Kennedy 110 and SR2000 have grebe cr5 and crosley I1 trade W5LR 1314 Holly Glen Dallas 75232"

GONSET G-76 Xcvr, AC & DC pwr sup, working cond. Webster all band whip ant. First best offer, Roger Stern, 10 Adams St, Lexington, Mass. 02173.

TRADE: Galaxy V for Transcom SBT-3 or SBE-34. West Coast Only - K6GKU 2990 Harrison St., Arlington, Calif. 92503.

WANTED For Cash - COLLINS 7533B, State S/N, Condition, and price. W2BJD, 94-45 238th Street, Bellerose, L.I., New York 11426.

COLLEGE: Sell Heath DX-608, HG-10 VFO, Lafayette HA-225 RCVR, Johnson T-R Switch, Ameco PCL-P Preamp, SWR/FS meter, xtals, and spkr. Complete station \$235 PF or best offer separately. Jim Price, Millington, Md. 21651.

SALE Swan 500 AC-DC supplies \$350.00 Thunderbolt amp, conv to Class B \$225.00 Amerite tower 50' plus base and Fly-Gain Quad \$160.00 WA3CVR Dutton Mill Rd., Newtown Square, Pa. 19073, (215) - 644-5166.

HEATHKIT SB300, SB400, SB600, SB620, SB200, all for \$550. Must sell. Bob Tribble, W6CLD, 11888 Acama Street, North Hollywood, Calif. 91604. Tel: a.c. (213) 985-1182.

NATIONAL NC-173 Receiver - Good Condition - \$60.00+ shipping. W9HQF - 109 W. Main St., Newburgh, Ind. 47630.

U.S. NAVY long wave receiver RAK7 power supply. Range 15Khz to 600Khz \$25. Sorry unable ship. K2YFM Allendale, N.J. 07401.

CLEGG 22er, new, \$139.00 SX43B, \$45.00 Kellersman, Apt 304, 30 Nutmeg Lane, East Hartford, Conn.

SELL- Drake 2B with Q Multiplier/Speaker T-R Switch & RCVR. Muting, \$200.00 Heath 2er with 12v pwr supply \$45.00 All in good shape. Will ship ur expense. W6DJB/7 2510 East 9th St, Casper, Wyo. 82601.

FLORIDA Traffic Handers Routing Guide, 48 pages, 800 cities, zip, counties, calls, nets, rosters, toll free info, useful for county hunters. \$1.00 postpaid. Regs Kramer, 195 NE 76 St, Miami, Fla., 33138.

SELL Drake 2B, 2BQ, \$185, Heath HW 32, HP23A, \$125, DX 40, \$30, All excellent. R. Weaver, 942 Vindell Ave. N.W. Massillon, Ohio, 44646.

MUST Sell: Apache and NC-300. Both excellent. Best offer for one or both. Tim Destato, 4288 Broadway, Louisville, Ohio 44541.

WANTED - Good clean used Galaxy Rejactor, Charles Willis, Rt. 1, Pittsburg, Texas 75686

TRADE Roberts Professional Stereo Tape Recorder Model 720 Excellent Operating condition X Wnt SSB Transceiver with power, mike and VOX (904) 385-4547 L. Reagan 3206 Springdale Drive, Tallahassee, Florida 32303.

MINT Drake TR-4 and AC-4 \$595, 1-515-233-1895 Walt S. Gass.

HEATHKIT HR-10B excellent condition, \$65 Roof mounting kit for 14AVG, \$12, Stephen Adamus, 27 So. Astby Avenue, Livingston, N.J. 07039.

SWAN 500C, 117XC, A.C. Supply, Vox, excellent cond. \$500.00, EICO 717 Electronic keyer wired excellent, \$45.00 Fred C. Crone 105-18 131 st, Richmond Hill, N.Y. 11419 A.C. 212 641 2559.

HEATH HW-16 for sale by wife. Key, speaker, 3 crystals, \$100.00. Professionally aligned, used 5 months. John Nolan, 3264 Sharpe, Memphis, Tennessee 38111.

MINT NCX3, NCXA, XCU27CAL - Turner Mic, Galaxy cvr monitor, HQ-10 Monitor Scope, SWR, Bridge - New 4-125A, New 813's 4.67- 3.4 VKCT or 600 MA, & 4-2.3-6.3 VKCT or 500 MA xFormers, Make offers. WABJR 50 Wesleyan Drive, Kenhorst, Reading, PA. 19607.

SELL: NCX3 + AC supply, KW matchbox, courier linear, T-R Switch, All or part very little use. A. Tolda: Box 403; Oakland Gardens, New York 11364 (212) 428-0200 Ext. 379.

RCVR - R 392/URR - 500Khz to 31Mhz- 31 bands - digital readout - VAR, B.W., cal ea band - rugged, all features - exc. cond - all accessories - \$400 - W2TO - 1935 83 St, Brooklyn NY, 11214.

HICKOK DMS3200 Main frame. Includes DP100 DVM, DP150 counter plugs, \$325, Beckman counters, parts. Sundtek, 131 Allen Ave, Springfield, Ore 97477.

WANTED - Coils for HRO-60T AA, AC, AD, E, F, G, H, J, with calibration scales and spare scale drum. Also new dial and matching speaker, write ZS6JC 41 Shipley Road, Hathboro, PA, 19040 or phone (215) 674-0426 after 6PM.

WANTED: For museum of memory, radio sets, ham gear and parts before 1925 only. Atlee, K4PI 92-31st. Ave., St. Petersburg Beach, Fla. 33706.

WANTED: HP-13, and mobile ant. for 15 mtr. (pref. Hustler), WB2ARO, Gene Timpano, 16 Elmira St., Hicksville, N.Y. 11801 or (516) WE-5-3112.

HEATHKIT SB 300 receiver SB-401 transmitter excellent condition \$520.00, Phone, write, visit Michael Poston WA4EFY 25 Forest Street, Cornelia, GA. 30531 404-778-6076.

HEATHKIT Apache, Mohawk, bridge, oscilloscope, signal tracer, grid dip, cable, extras. Selling out - best offer - Perfect condition. Carter Box 226, Miller Place, N.Y. 516 683-0309.

TRADE: Ameco 6 mtr. convr. for "TWOER" or? Dan Azlin 2074 Federal Ave. Costa Mesa, Calif 92627.

HAMMARLUND HQ 170-A 6.2, Clock, Xtal, Recently completely re-conditioned, \$250. G.A. Fredricks WA8NMF Route 1 Green Springs Ohio 44386.

WORLD Radio's used gear has trial-guarantee-terms! 22'er - \$129.95; 65'er - \$99.95; 99'er - \$69.95; KWM2A - \$749.95; 350 late - \$299.95; 400 & 420 VFO - \$279.95; NCX3 - \$159.95; Galaxy V - \$229.95; HT40 - \$49.95; 75A1 - \$149.95; 2A - \$159.95; R4 - \$299.95. Free "Blue-Book" list for more. 3415 W. Broadway, Council Bluffs, Iowa 51501.

SELL: Two Rotors Cornell type AR22/R, A/I condition \$200 ea, Heath HA 2076M Linear, 2/10W in, out 125W P.E.P./75 D.C. A.M. Mint cond. New 6146s in, \$90.00, P&H Audio Compressor AFC-1/W AC Supply/ In-Out Switching/Shielded Cables/never used, \$25.00 All F.O.B. Pond Road, Mont Vernon, N.H. 03057. F.P. Pursell W1DEM.

SELL QSTs 22 yrs. 1948-1969. Complete good cond \$35. Will ship FOB. G.L. Edson 255 E. Loma Vista Dr., Tempe, Arizona 85281.

BONUS Specials! #1) Matching AC Supply free w/purchase of CQSTs (855.00 F.O.B.) #2) Free Ham-41 Rotor w/purchase of combo TR Switch W-61 tower, Hy-Gain TH6DXK at \$559.00 - from "The Best In The West" L.A. Amateur Radio Sales, 24214 Crenshaw, Torrance, Calif. 90503.

HEATH SB 610 signal monitor for sale, assembled & tested and new used, new shipped & prepaid at price of lit \$79.95. WA4VYV, S.E. Hyatt, Box 530, Canton, Ga. 30114.

COLLINS KWM-2 d.c. supply, 516E-1 #56; HT-41, new tubes, no scratches \$225. W6HFF, 5005 Indiana, Ft. Wayne, Indiana 46807.

MANUALS - R-390/URR, R-390A/URR, BC-639A, \$6.50 each. Many others. List 20¢. S. Convalso, 4905 Roanne Drive, Washington, DC 20021.

FOR Sale in sets Only: QSTs Mar 1920-Mar 1968, CQs Apr 1945-Nov 1968, 73s Sept 1962 - Oct 1968, Radio Jan 1936 - Mar 1942, Also Super Pro Receiver and BC-221-AK Frequency Meter, Mrs. Forrest W. Dana, 4200 Chukker Drive, West Palm Beach, Florida 33406.

COLLINS KWS-1 SN 955, 10-D Mike, Antenna Relay, excel. cond. New finals. Best offer over \$575. John Messer, C4-40 Hillside St., East Hartford, Conn. 06108.

STATION: Knight T-60, matching R-55A with X-10 extal. cab. - \$85 total. Also, Allied A-2515 revr, spkr (Feb. '69 QST) excel. cond., \$70. - WA7JLU, 1109 Utah Ave., Libby, Mt 59923.

MUST sell - Going mobile Hallcrafters HT32B; Hammarlund HQ180 With Noise Immunerizer \$450, Sam Carter WA9VBG 6676 East 19th Indianapolis, Indiana 46219.

TRADE Eico 722 VFO in perfect cond. for Heath Twoer in good operating cond. Rich, 1440 E. 52 St., Brooklyn, N.Y. 11234, 212-CH-1-8877.

GOING into Army. Must Sell Hammarlund HQ110AC with spkr \$165, Apache \$80. All perfect cond. WB2FPO, Martin Straker 41 Cherry Lane, Hicksville, N.Y. 11801 Tel 516-PE-5-9489.

WANTED HW-17 or HW-18-1 trade X-99, QF-1 and DX-20 or sell WN9YED, Box 1074, Glenwood Springs, Colorado 81601.

HW-100 factory aligned, HP-23, Johnson KW matchbox with meter, Johnson TVI filter, Turner 254-C mike, Viproplex champion, Best offer; WA1JAD Mark Radding 53 Longlane Rd. West Hartford, Conn. 06117, 1-203-232-7176.

NOVICES - Excellent rig in operation, Elmac AF-67 transmitter with power supply, reconditioned Hammarlund HQ-100C with clock, SWR meter Relay, and all patch cords \$175.00 - Shipping charges collect, David Landers WB4PDN 10201 Maplested Lane, Richmond VA 22235 - 703-277-3334.

SELL: K.W. Linear, spare 4-250A's, HQ-170AC, Apache Xmtr, SB-10 SSB Adaptor, HQ-10 Monitorscope, HC-13 Hamscan, All mint, with manuals. Best offers. Tel. a.c. 203-743-1124. M. DeFazio, 14 Stevens St., Danbury, Conn. 06810.

DX100, SB10 \$110, HQ110A, \$95; HR108, \$50; VF1&AT1, \$15; New 5867/AX9901, \$15; Selement 6mtr beam, \$18; Johnson T.R. Switch, \$10; Phone Patch, \$10 or best. R. Brown WA2EKW 260 Ellen Dr. Buffalo, N.Y. 14226 Tel. (716) 6335799.

VHF/UHF Receiver RDO three bands, \$100; LM-13, calibration, \$40; ARC-4 two meter transceiver, PET preamp, \$40. WA6CFE 214-378-0110.

FOR Sale Atwater Kent Model 26 w/speaker. Best offer over \$100.00, Lenn Cadwallader 1820 Crenshaw St., San Diego, CA. 92105.

SELLING: Book "Practical Wireless Telegraphy", QSTs 1919-1921 years, Map of Member stations Two Gov. callbooks, Rane! W3ADK, Box 699, Indiana, PA 15701.

SELL Johnson Rangell \$135.00, Lafayette HES0 10 meter xceiver \$45.00, Johnson challenger with homebrew T/R Switch and 6N2 VFO \$70.00, Eico 400 Scope \$75.00, SBE34 xceiver with mike built in calibration and mobile bracket \$260, WB2PYE 325 Wilson Ave., Westwood, N.J. 07675.

SB-101, A/C speaker, Externa VFO, phone-p, SWR, Station Control Unit, \$440, Jeff Sokol, 167 College Ave., Somerville, Mass., 02144, 617-625-6920.

SACRIFICE: Must sell NCX-5, NCXA-A, VY-501, NCL-2000, HD-19, HD-10 Reyer & Vibroplex key, SB-600 scope, Ham-Motor, TA-33 SR beam, KW matchbox, RG-8u cable. Package deal only to sender of first certified check for \$1100. See working station yourself, WB2NZA, Herbert Novitsky, 41 Grant Avenue, Glens Falls, N.Y. 12801, Call 518-792-2780. Will pay 1/2 shipping charge.

GUITAR - Trade hardly used Fender Jaguar for a HF or VHF transceiver with mobile supply. Best offer, Del Schier, WAILNJ, Morningside Dr., Greenwich, Conn. 203-661-4940.

KNIGHT T 60, \$40.00, National NC 183, \$70.00 plus shipping, Don Boyer Route 2 Bemidji, Minnesota 56601.

WANTED: HP524A freq. converter and any plug-in accessory for HP524B or Northeastern Ege, Inc. 14-20C counters. Need 10-18 oven and assembly for 14-20C counter, prefer working one, and manual for 14-20C. Pepos S. Dounson, 914 W. Mistletoe Ave., San Antonio TX 78201, Tel. 512-785-5564.

TRADE 2KSR, 18 Typing reparator, TT/L-3, for 2NASR, 60 cycle supply or motor for info, David G. Flinn, 10 Graham Road West, Ithaca, NY 14850.

FOR Sale: DX-60B, HR-10B with crystal calibrator, 6 months old. In perfect condition, W9DKX/4 2718 London Lane, Winston Salem, North Carolina 27103.

HEATH Apache TX-1 and SB-10 SSB adaptor with manuals \$125. Separate sales considered, W9DKX/4 2718 London Lane, Winston Salem, North Carolina 27103.

WANTED: Collins 32-3 transmitter with or without 516-2 power supply. O. K. McCullough 917 West Avalon Drive, Phoenix, Arizona 85013 (602) 277-0738.

SELL NRI first class commercial course 48 texts, study guide, practice exams, problem answers half price \$75 Thomas Barbish Box 73 Joppa, Md 21088.

NATIONAL NC 200/PS, \$250; SX 101 A Mk III, \$150; BW 5100 \$60, WA1JGD, La Salette Seminary, Ipswich, MA 01938.

RHONE 60, 80 foot tower, 8 10 foot sections - no guys required. Best reasonable offer takes F.O.B. Peter Gwosdoff K6UYQ, 1306 Sao Paulo, Placentia, California 92670 714 524-3066.

WANTED: Davco Dr-30 and NCL 2000 linear. Quote price and condition. Bud Fischer, W7IOR 4163-40 Northeast Oak Harbor, Washington 98277.

SR-400, HA-20, and PS-500 a.c. supply excellent best offer over \$600. RD Elmore K5HUG, 2403 Texas Ave., Bryan, Texas 77801 (713) 823-4059.

DRAKE 2B ham band receiver for sale, \$180, also Clegg 99 6M transceiver, \$90. Both in mint condition. Must sell. Contact John Fishback, BOQ Box 1111, Hanscom Field, Bedford, Mass. 01730.

SELL Heath SB 620 Scanalyzer Factory aligned by Heath, professionally wired, Purchased and assembled this year. E. Thiede W2EC 8 Nathan Hale Drive, Setauket, L.I., N.Y. 11733.

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SELL QST's Oct 1946 to date. Only July 47 missing. CQ Nov 51 to July 58 not sold. Best offer on QST's and will throw in 51's or sell separately. Closing date 30 days after publication. T. Reger 9661 Angleridge, Dallas, TX 75233.

TA-33-Jr, CDE-TR-44, BN-86, HM-11, GMT-clock, \$100.00, Zachary Botwinneck, 253-42 87th Drive, Bellerose, N.Y. 11426.

MAKE offers: New Johnson KW matchbox with indicator and coupler, good SX-100, mint Clegg 22'er with mike, good Heath VTM IM-11, good Heath SWR meter Model AM-2, good Drake low pass filter, mint Hy Gain balun, new Cescor Reflector meter indicator and coupler, new Allied Ten-2 CB checker, mint Pace Grid Dip meter. W. Semonavick, 71 Saxton Rd., Dover, Del. 19901.

HALLICRAFTERS HT-32 Mark I \$190.00, SX101A w/speaker \$175.00, Heathkit Silver mobile supply \$40.00, EICO 730 50-watt modulator \$35.00, WAGEK, 244 Iroquois Rd., Oak Ridge, Tenn., 37830.

COLLINS 51J3/R388. General Coverage Receiver. Very good condition, mechanically and electrically. \$350, K2QDN, 201-444-0804.

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TRANSFERRING out of country. For sale: 2 months old Drake TR-6 with Noise Blanking, RV-6 AC-4 P/S. Best offer over \$600. Cost \$750. I pay shipping. Send cashier check or money order. Joe, WB4RSZ, P.O. Box 4037, West Hollywood, FLA 33023. Tel: 305-983-0267. Sry, no collect calls.

SELL - Professionally Assembled DX-60B in mint condition. \$79.4 Ken Wilkerson WN4LV, 311 Second St., Farmville VA, 23901.

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ESTATE of Ted Crosby W6TC: Viking Challenger, VFO, Knight Tube Checker, Simpson #260 Volt-Ohm-Milli Meter, unused Eddystone Dial, Vibroplex. Best offer, FOB, Write Mel Rinzer, Sun City, Cal. 92381.

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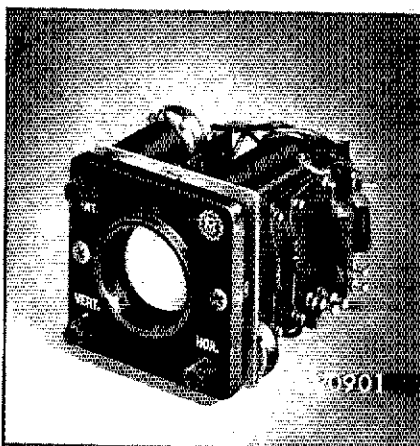
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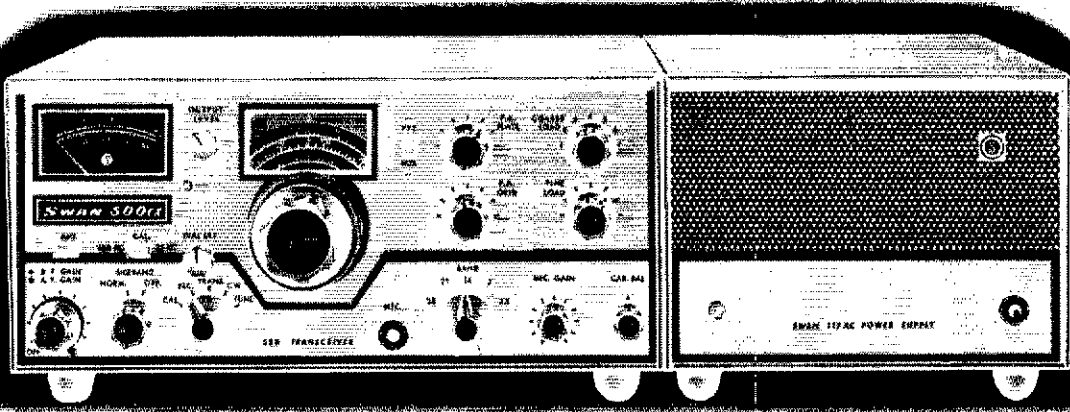


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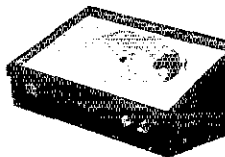
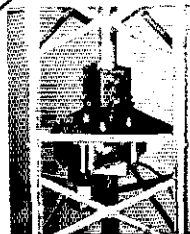
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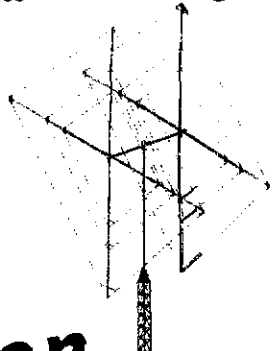
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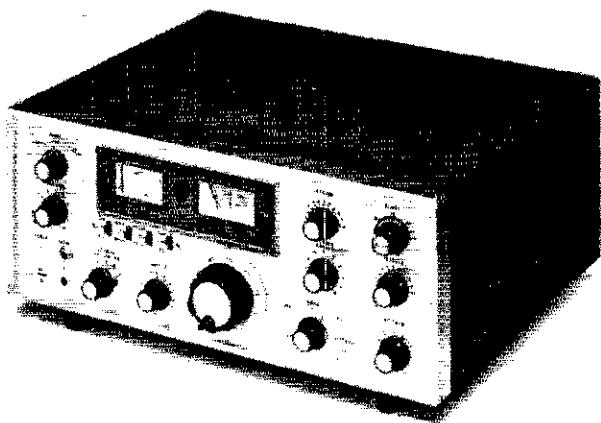
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