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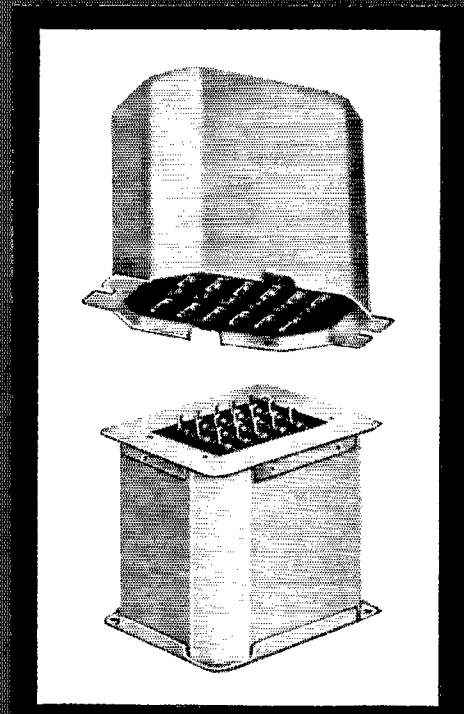
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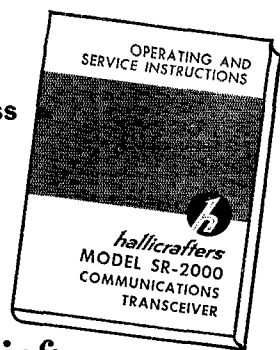
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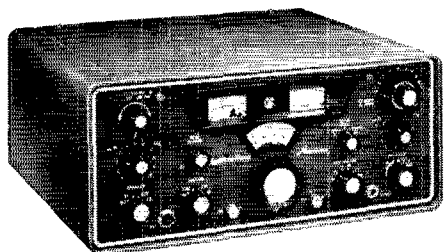
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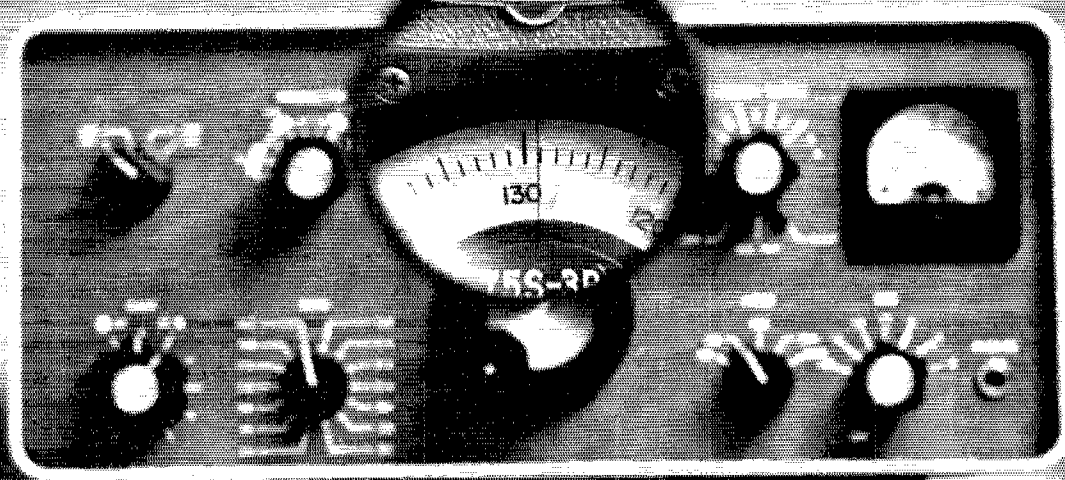


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OUR COVER

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QST

APRIL 1967

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-CONTENTS-

TECHNICAL —

Solid-State Receiver Design with the MOS Transistor
George T. Daughters, WB6AIG, Wes Hayward, W7OI, and Will Alexander, WA6RDZ 11

A 90-Watt Amplifier For 2 Meters
Doug DeMaw, WICER 16

An Antenna for the Traveling Man
J. Santangelo, WINXY 20

Antenna Rotators and Indicators
E. Laird Campbell, WICUT 23

Gimmicks and Gadgets:
The Torofil — a QRM Reducer for the Phone Man.... 28
The "Monode" Noise Generator
Ronald E. Guentzler, W8BBB 30

Simple "Tattoo" Control for the HT-37
Fred M. Ruzick, WA8GQQ 34

Increased Flexibility With The S/Line
Independent Frequency Control with the 32S-1 and 75S-3.....*Peter Gianas, W8BPE* 35
Cross-Band Operation with the 75S-3 and 32S-3
Roger A. Newlander, WB6AYN 38

Recent Equipment:
The ITT Mackay Marine 3010-B Receiver..... 45
Squires Sanders 66-er 50-Mc. Transceiver..... 48
Technical Correspondence..... 53

BEGINNER AND NOVICE —

How To Handle TVI.....*Lewis G. McCoy, WIICP* 41

OPERATING —

Take Me to Your Leader..... 64

GENERAL —

TVI Prevention — a New Method
Ralph A. Marino, W1MRW 51

20,000 QSLs..... 58

FCC's Chairman Looks at Amateur Radio..... 60

Football Score Network... *Harry T. Flasher, W8KKF* 62

How To Stop Traffic At The County Fair
Harvey Kjar, WA8FUE 69

Peruvian Adventure.....*Bill J. Payet, S.J., OA4BQ* 70

"But . . . But . . . But, Ma'am"
William R. Clark, WA5AUB 71

Good Old Neighbor.....*George W. Stevens, W0DZZ* 91

Electronic Crossword.....*S. M. Dunnam, Jr., K5KEI* 97

ARPSC..... 64 "It Seems to Us"..... 9

Coming Conventions..... 58 IARU News..... 78

Correspondence From Members 76 League Lines..... 10

Feedback..... 91 Operating News..... 92

Hamfest Calendar..... 54 Silent Keys..... 144

Happenings of the Month..... 72 Stations Activities..... 98

Hints & Kinks..... 56 World Above 50 Mc..... 86

How's DX?..... 79 YL News and Views..... 84

Index to Advertisers..... 158 25 Years Ago in QST..... 59

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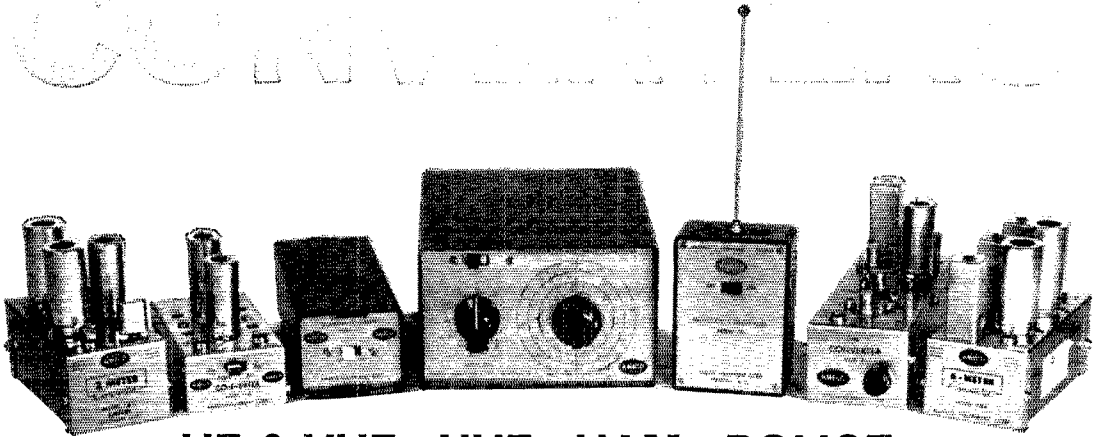
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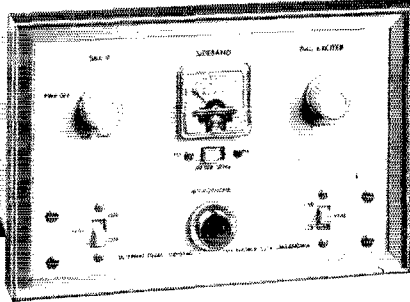
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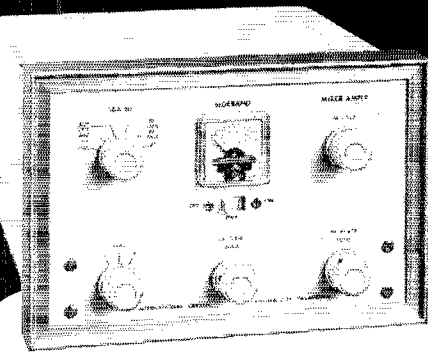
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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"It Seems to Us..."



BOARD MEETING

It's getting close to that time again — when (in early May) the Board of Directors will meet to chart the course of the League for another year. Many subjects will be discussed, and decisions taken. For the information of members we mention here a few which likely will come up for consideration.

One subject certainly due for attention is the matter of dues. The most recent rise was in 1959 — eight years ago. No one needs to be told what has happened to the economy, and thus the cost of operating an organization, in that time. Letters in the Correspondence Section of previous issues have offered pros and cons of a dues rise. What is *your* view?

A Life Membership, at a suggested figure of \$100, has been proposed, similar to the arrangement existing in a number of other organizations. What think?

And the subject of "freeloaders" will be discussed. Here again the Correspondence Section has shown a considerable difference of opinion. Should the League Hq. additionally limit any of its services to non-members? If so, how far should we go?

An FCC action in docket 15928 should, if the Chairman's expectations are realized, be announced prior to the meeting. WIAW and other OBS will bulletin the information as soon as available. Even though time may be short, give adequate consideration and study to whatever is decided, and then let the division director have the benefit of your thinking.

At copy time two proposals have been offered by individual directors for amendment of the Articles and By-Laws. One would change the terms of directors from two to four years, in line with a trend which seems to exist in our national and state governments to free officials from the handicap of frequent elections. Another would set age 21 as the minimum for a director candidate.

The Citizens Radio Service will also get attention in two basic areas — the feasibility of setting up cooperative amateur CB arrangements for joint efforts in emergency communications planning and operation, and the desirability of a concerted program to interest

more CB licensees in moving up to the higher standards and wider horizons available as licensed amateurs.

Will you now express your views on these and other subjects? We hope so.

The president of an ARRL affiliated club said in a recent bulletin to its members: "Our director made a mailing in late December to about 200 radio clubs in the division asking for comments on three questions which will be considered at the annual Board Meeting in May . . . a simple little questionnaire, not time consuming or demanding too much thinking. But, would you believe it, out of almost 200 letters sent out, he received to date only 2 — yes, TWO — answers to his letter. That's only about a one percent return. Are we so dead, lazy and complacent that we don't give a four-cent hoot to make a comment?"

Though perhaps an extreme case, it is far too typical of the problems directors face in representing their membership — despite correspondence, and club and individual visits to discuss amateur radio's and the League's current problems. Perhaps some amateurs feel that it isn't worth the trouble, that nothing will happen anyway. Perhaps some amateurs feel that the division director is best qualified to make decisions concerning our future in the common interest, and thus speak out only when they are dissatisfied. In any event, let us again solicit — both from individual members and affiliated clubs — comments to their respective division directors on subjects already under discussion plus any new suggestions or ideas they may wish to initiate. Director addresses are on the facing page.

QST—

ARE YOU LICENSED?

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

League Lines . . .

See page 60 for the latest (at press time) on incentive licensing. In an aside to his QCWA audience, FCC Chairman Hyde admitted that a prediction of action "in the near future" sounded like governmentese, but said he expected it actually to be a matter of only weeks.

An extensive study and appraisal of the amateur radio service, embodied in Stanford Research Institute report M-5436 under contract with ARRL, has now been distributed to many telecommunications officials in Canada and the U. S., and in foreign nations through IARU societies. A few extra copies are available from Hq. to members and affiliated clubs at the approximate cost of production and mailing—\$2. We expect to publish a brief summary of the report in a future QST.

Largely because of abuses and interference, FCC's staff is considering abolishing its 27-Mc. 100-mw. license-free walkie-talkie authorization and transferring such activities to the 49-Mc. region.

Our February article on 10-meter conversion of CB gear struck fertile ground—so much so that 29.6 Mc. has now been formally recommended by the League's Executive Committee as a primary gathering spot on the band, particularly for low-powered rigs. See page 93 for details, then give "Channel 60" a whirl. Let's face it—channelization has been a major asset to CB operation, and expansion of the concept could well be a basis for more efficient use of such portions of our bands as the top end of 28 Mc. What are your ideas?

Mobile? Aeronautical Mobile? Maritime Mobile? If you're mobile in, on or over U. S. territory, you're just plain "mobile" regardless of your vehicle—boat, biplane, bike or Bonneville. The terms "aeronautical mobile" and "maritime mobile" are reserved for operation on or over the high seas, outside areas claimed by the U. S.

Running commentary in the past several issues of our Correspondence Section on "free-loaders" triggered an interesting reaction: a great many requests for info from Hq. now carry the notation "By the way, I'm a League member, not a freeloader." FB!

In the spring a ham's fancy turns to thoughts . . . well, maybe of conventions and hamfests and such. Mark the National at Montreal as #1 for this year. Divisional conventions and local hamfests also offer lots of technical and operating info—and fraternalism, too. Watch QST announcements of coming affairs and convince the XYL you should schedule your vacation accordingly.

Sneak preview—The World Scout Jamboree is being held in Farragut State Park, Idaho and there will be an exhibition station under the call K7WSJ August 1-9 and especially for the "Jamboree-on-the-Air" August 5-6. More details later.

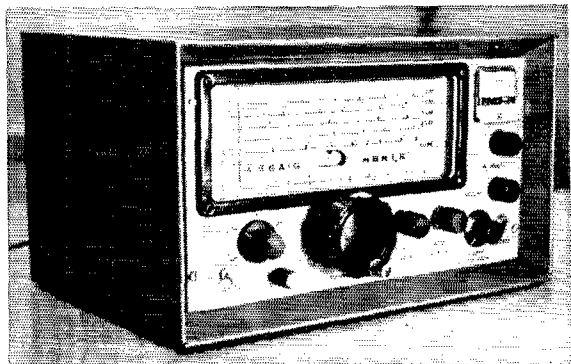
Solid-State Receiver Design with the MOS Transistor

In Two Parts — Part I

BY GEORGE T. DAUGHTERS,* WB6AIG, ex-K9KDE, WES HAYWARD,** W7OI, ex-WA6UVR, and WILL ALEXANDER,*** WA6RDZ

In the past decade, there has been considerable evolution in the trends affecting the design of communication receivers. Prior to 1956, the better amateur-band receivers were multiple-conversion affairs with a first intermediate frequency of a few megacycles and a second in the range of 50 to 500 kc. The relatively-high first i.f. was used to insure good image rejection while the lower second i.f. easily yielded good adjacent-channel selectivity. In 1957, a paper by Goodman¹ emphasized the drawbacks of such a design. Goodman stated that in the typical multiple-conversion receiver, signals are significantly amplified before being subjected to the high selectivity of the second i.f. amplifier. Due to these high signal levels, severe cross modulation and receiver desensitization often occurred when a strong signal out of the i.f. passband was applied to the receiver. Goodman then suggested that the optimum design would be one wherein the selectivity in the receiver was obtained at as low a signal level as possible. This is easily achieved by using a high-frequency crystal lattice filter at the first intermediate frequency. Indeed, modern crystal lattice filters are selective enough that a second conversion is usually redundant.

Following Goodman's paper, several receivers were built applying these ideas. It soon became apparent that the cross-modulation performance of these receivers, although improved, was still



This is the transistor receiver built by one of the authors, WB6AIG, using an insulated-gate field-effect transistor as a front-end mixer. There is no mechanical design, each of the authors having built different versions experimentally. WB6AIG's model is still undergoing modification as different circuit ideas are tried out.

lacking due to nonlinearities in the r.f. amplifier and mixer stages used ahead of the crystal lattice filter. Front-end design was finally optimized by Squires² through the use of a beam deflection tube mixer coupled directly to the antenna with no r.f. stage. The result was a receiver which was essentially free of spurious responses.

Concurrent with the developments described above was the introduction of good solid-state active devices. Hence, the all-transistor receiver became quite popular among amateur experimenters. Most of the more extensive solid-state ham receivers have been multiple conversion affairs such as those described by Priebe³ and Harris⁴. A notable exception is the single-conversion transceiver of Vester⁵. Typically, severe cross modulation was encountered. With transistors, the problems are, in general, even more severe than with tubes. This cross-modulation problem has been the only fundamental limita-

* Palo Alto Medical Research Foundation, Palo Alto, Calif.

** Microelectronics Research, The Boeing Co., Seattle, Wash.

*** Fairchild Semiconductor, Mountain View, Calif.

¹ Goodman, "What's Wrong with our Present Receivers?" *QST*, January, 1957.

The field-effect transistor has provided the solution to one outstanding difficulty with transistors in communications receivers — susceptibility to cross modulation. This article discusses the application of modern design principles to solid-state receivers, with Part I covering the front end. Written primarily for the experimenter having some experience in receiver building, it is an "idea" article rather than a "nuts-and-bolts" construction piece.

² Squires, "New Approach to Receiver Front-End Design," *QST*, September, 1963.

³ Priebe, "All-Transistor Communications Receiver," *QST*, February, 1959.

⁴ Harris, "A Tunable I.F. Amplifier Using Transistors," *QST*, December, 1962; "Selective Transistor I.F. Strip and Dual Detector System," *QST*, January, 1963; "A Transistor Audio System with Squelch Control," *QST*, February, 1963; "Transistor High-Frequency Converters," *QST*, March, 1963.

⁵ Vester, "A Solid-State S.S.B. Transceiver," *QST*, June, 1963.

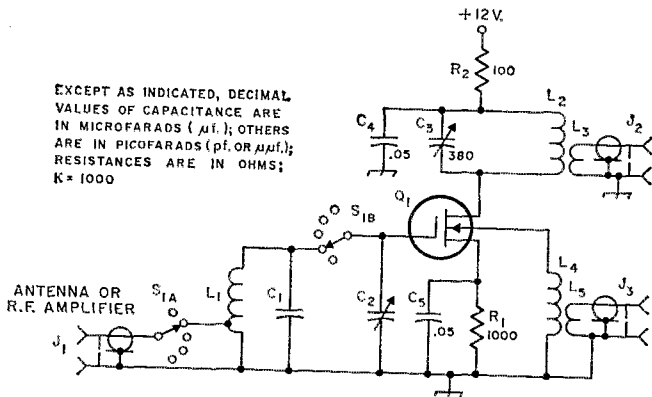


Fig. 1—High-frequency mixer circuit using the MOS transistor. Output at the intermediate frequency (9 Mc. in the i.f. system described in Part II) is taken from J_2 . Oscillator injection is through J_3 .

- C_1 —Silver mica; see Table I for values.
 C_2 —Midget variable, 150 pf. or more maximum capacitance.
 C_3 —Compression trimmer, 50-380 pf. (Arco 465 or equivalent).
 C_4, C_5 —Disk ceramic.
 J_1, J_2, J_3 —Miniature coax fitting, chassis mounting.
 L_1 —See Table I.
 L_2 —20 turns No. 24 enam. on toroid ferrite core, i.d. $\frac{1}{8}$ "', o.d. $\frac{5}{16}$ "' (Arnold A4-310-125-EP or equivalent).

- L_3 —3 turns No. 24 enam. wound over L_2 .
 L_4 —40 turns No. 32 enam. on same type core as L_2 .
 L_5 —10 turns No. 32 enam. wound over L_4 .
 Q_1 —Field-effect transistor (Fairchild FT57)
 R_1, R_2 — $\frac{1}{2}$ -watt composition.
 S_1 —Ceramic rotary, 4 poles, 5 positions (for 5 bands); number of sections and assembly hardware required depends on mixer-oscillator layout.

tion of transistors in receiver applications and has been the primary motivation for the work described in this paper.

The HBR-TR⁶ shown in the photograph was designed with several objectives in mind. First of all, it was desired to build a single-conversion receiver that was completely uncompromising with regard to fundamental performance. That is, sensitivity, selectivity, stability, and an over-all "clean" response compatible with modern s.s.b. and c.w. techniques should be obtained. Further, the receiver was designed with simplicity as a major factor, thus enabling the competent amateur experimenter to duplicate it easily. This was realized largely through the use of printed-circuit techniques. Finally, an effort was made to minimize the cost by using inexpensive epoxy-cased silicon transistors freely. Since the authors are blessed with well-stocked junk boxes, and friends with the same, their own cost was quite low. However, it is estimated that the receiver could be duplicated with new parts for less than \$120.

Although this paper is written in the format of a construction article, it is hoped that prospective builders will not hesitate to modify the design to fit their individual needs. Indeed, the three receivers built by the authors differ in many details. Sufficient data are given on individual circuit modules to allow the experimenter to use them in the manner he feels is most consistent with his needs. Further, some alternate circuits are discussed.

The receiver is described starting with the front end and working back toward the audio output. However, it is recommended that it be

⁶The choice of name reflects the popularity of T₆D Crosby's series of HBR receivers—although the design philosophy and circuits are quite different. — *Editor*.

built in the opposite sequence. This approach was used in the development work and greatly simplified the extensive front-end experimentation.

The Front End

As implied before, several different front-end configurations were tried. The circuit finally chosen is shown in Fig. 1. Signals from the antenna are introduced to the mixer front end through a high- Q tuned circuit. The mixer itself uses a new metal oxide silicon transistor (MOST) that was recently introduced by Fairchild Semiconductor and sells for \$9.00 in unit quantities. For those unfamiliar with the newer MOST and field-effect transistor (FET) devices, they have circuit characteristics very similar to a

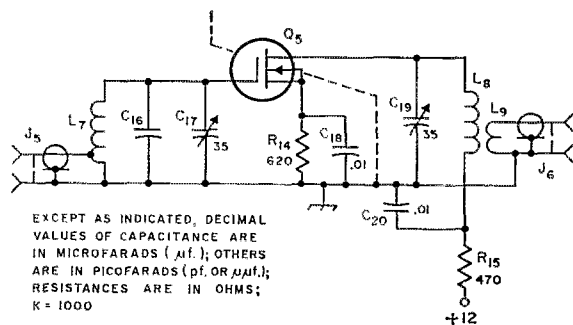


Fig. 2—10- and 15-meter preamplifier circuit using MOS transistor.

- C_{16} —Silver mica; see Table I.
 C_{17}, C_{19} —35-pf. miniature variable.
 C_{18}, C_{20} —Disk ceramic.
 J_5, J_6 —Miniature coax fitting, chassis mounting.
 L_7, L_8, L_9 —See Table I.
 Q_5 —Field-effect transistor (Fairchild FT57).
 R_{14}, R_{15} — $\frac{1}{2}$ -watt composition.

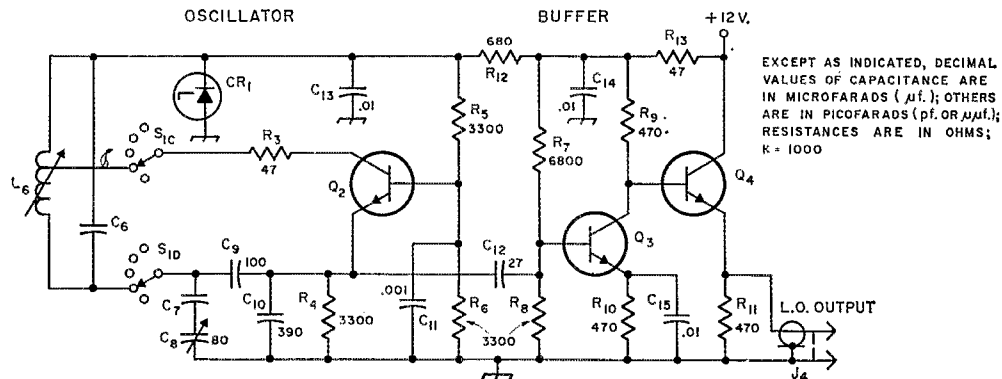


Fig. 3—High-frequency oscillator and buffer circuit. Although not shown in this diagram, an output coupling capacitor (0.05- μ . disk ceramic) must be inserted in the lead from the top of R11 to J4 to avoid short-circuiting R11 by the mixer-injection link of Fig. 1.

- C₆—Silver mica; see Table I.
- C₇—Silver mica; value to be selected to give desired tuning range with C₈.
- C₈—80-pf. variable; oscillator tuning (Johnson 149-4 or equivalent).
- C₉, C₁₀, C₁₂—Silver mica.
- C₁₁, C₁₃, C₁₄, C₁₅—Disk ceramic.

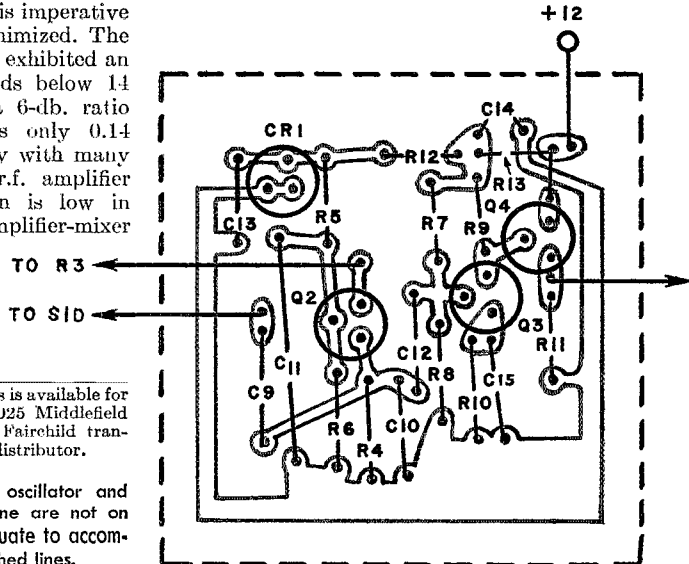
- CR₁—Zener diode, 6–7 watts, 1/4 watt.
- J₄—Miniature coax connector, chassis mounting.
- L₆—See Table I.
- Q₂—2N3641 (Fairchild) or equivalent r.f. amp. type.
- Q₃, Q₄—2N3564 or equivalent r.f. amp. type.
- R₃–R₁₃, inc.—1/2-watt composition.
- S₁—See Fig. 1.

pentode vacuum tube. In the mixer shown, the local-oscillator voltage is injected on the substrate electrode (in normal amplifier applications, the substrate is connected directly to the source). The local-oscillator injection level is somewhat critical in this circuit. An injection voltage of 4 to 8 volts peak-to-peak should appear on the substrate as measured by an r.f. probe and v.t.v.m. or a high-frequency oscilloscope. If the injection drops below 4 volts peak-to-peak, the conversion gain drops drastically. With approximately 5 volts peak-to-peak injection on the substrate, the measured conversion gain was 17 db. Proper injection level in the HBR-TR is provided by a simple broad-band r.f. transformer wound on a small toroid core.⁷

When using a mixer front end it is imperative that the mixer noise figure be minimized. The MOST mixer used in the HBR-TR exhibited an adequate noise figure on the bands below 1.1 Mc. The input signal level for a 6-db. ratio of signal-plus-noise to noise was only 0.14 microvolt. This compares favorably with many commercial receivers having an r.f. amplifier stage. However, since mixer gain is low in comparison to the normal r.f.-amplifier-mixer combination, some consideration should be given to minimizing noise in the first i.f. amplifier, and to minimizing loss in the crystal filter. This will be discussed further in the section describing the

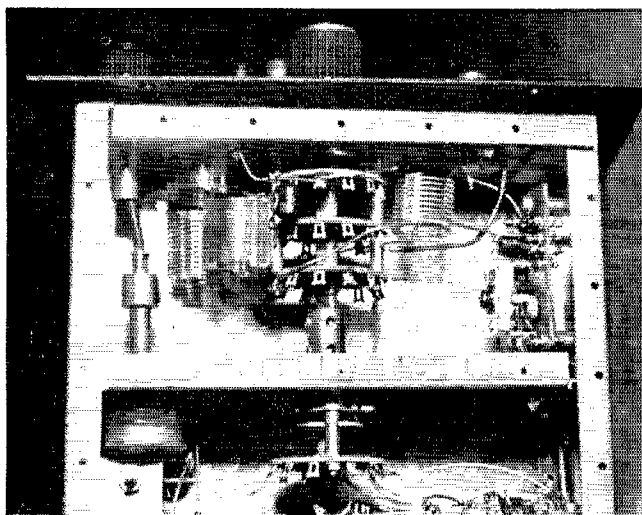
i.f. amplifier. While the 10-db. noise figure of the MOST mixer is more than sufficient for typical use below 15 Mc., it may be desirable on 10 and 15 meters to have a "hotter" front end. Shown in Fig. 2 is a schematic for a preamplifier using an MOST device. This amplifier offers 13 db. gain and a noise figure of less than 4 db. at 30 Mc.

There is one practical difficulty associated with the use of MOST devices. Typically, the resistance between the gate and the source or drain is extremely high. Values of a billion megohms are not uncommon and the input capacitance is about 3 pf.; hence, a very small electrostatic charge on the gate can produce a gate-source



⁷ A kit of 5 small suitable toroid coil forms is available for \$1.50 postpaid from Alcom Electronics, 2025 Middlefield Road, Mountain View, California 94040. Fairchild transistors are available through any Fairchild distributor.

Fig. 4—Etched circuit board for local oscillator and buffer. Components to left of dashed line are not on the board. Board may be any size adequate to accommodate the layout shown inside dashed lines.



The mixer coil assembly in a receiver constructed by one of the authors. The small circuit-board at the right contains the 3.5-Mc. crystal calibrator shown in Fig. 5.

voltage of several hundred volts—enough to destroy the device. It is thus imperative that special care be taken when soldering an MOST into a circuit. A technique used by the authors is the following: A 5-inch piece of stranded hook-up wire is stripped of its insulation, and a single strand is then separated. This very small wire is wrapped around all of the MOST leads, directly adjacent to the metal can. The device is then soldered into the circuit. After this, the small wire is removed.

Another consequence of the very high input impedance of the MOST mixer is the fact that there is negligible loading of the input tuned circuit due to the mixer. Very high input Q s are thus easily obtained. The Airdux coils used in the front end should be mounted a diameter away from metal walls to maintain optimum Q .

The single profound advantage of the MOST mixer is its immunity to cross modulation. A 10- μ v. "desired" c.w. signal was injected into the receiver through the 50-ohm antenna input, and a variable-amplitude 30-percent-modulated "undesired" signal was also introduced, inside the r.f. passband but outside the i.f. passband. Ten percent modulation of the desired signal occurred at a level of 100 millivolts of undesired signal. The desired signal decreased by 1 db. for an undesired-signal level of 20 millivolts. With the step-up in the input tuned circuit, it is easily seen that these are large voltages at the MOST gate. Work is presently being done in the expectation of further improving the performance.

It would be worthwhile to mention briefly the general results obtained with a more conventional front end. One of the initial experimental receivers used a conventional common-emitter r.f. amplifier followed by a standard mixer with the local oscillator injection being applied to the emitter. It was found that if the r.f. and mixer were biased to larger-than-normal collector currents, the cross-modulation characteristics were significantly improved. However, tran-

sistors must be chosen carefully so that a low noise figure can be maintained at the higher current levels. In this case, a 2N3564 was used in the r.f. and in the mixer, with a collector current of 10 ma. in each. The result was a receiver with much better cross-modulation characteristics than an earlier transistor receiver built by one of the authors⁸. The performance did not, however, approach that obtained with the MOST mixer front end.

The Local Oscillator

The band-switched local oscillator used is shown schematically in Fig. 3. The criteria used in its design were simplicity, ease of band-switching, and a reasonable degree of stability. The circuit is essentially a simple Colpitts oscillator that is followed by an untuned buffer and

⁸ Hayward, "A Transistor C.W. Station for 7 Mc.," *QST*, August, 1964.

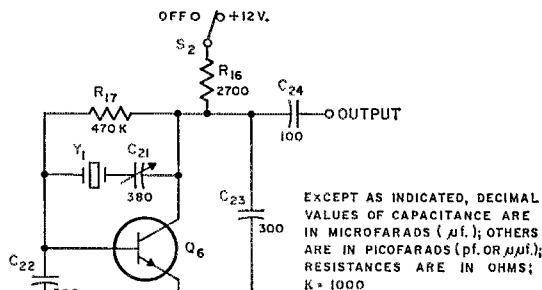


Fig. 5—Crystal calibrator circuit.

C₂₁—Compression trimmer 50-380 pf. (Arco 465 or equivalent); may be omitted if exact adjustment of frequency not essential.

C₂₂, C₂₃, C₂₄—Disk ceramic.

Q₆—2N3643 (Fairchild) or equivalent r.f. amp. type.

R₁₆, R₁₇— $\frac{1}{2}$ -watt composition.

S₂—S.p.d.t. toggle or slide switch.

Y₁—Marker crystal, 500, 1000, 3500 kc., etc.

TABLE I
Front-End Coil Data

	Band	80	40	20	15	10
Mixer	L ₁	6.5 μ h. 23 turns $\frac{3}{8}$ " dia. 32 t.p.i. (Airdux 632) Tap at 1 $\frac{1}{2}$ turns	3.5 μ h. 15 turns $\frac{3}{8}$ " dia. 32 t.p.i. (Airdux 632) Tap at 1 turn	1.7 μ h. 12 turns $\frac{3}{8}$ " dia. 16 t.p.i. (Airdux 616) Tap at 1 turn	0.9 μ h. 10 turns $\frac{3}{8}$ " dia. 16 t.p.i. (Airdux 516) Tap at 1 turn	0.9 μ h. 10 turns $\frac{3}{8}$ " dia. 16 t.p.i. (Airdux 516) Tap at 1 turn
	C ₁	200 pf.	100 pf.	—	—	—
Oscillator	L ₆ *	8 turns No. 24 close-wound Tap at 3 turns	4 turns No. 24 close-wound Tap at 1 $\frac{1}{2}$ turns	20 turns No. 24 close-wound Tap at 8 turns	6 turns No. 24 close-wound Tap at 2 turns	4 turns No. 24 spaced 0.05" Tap at 2 turns
	C ₆	200 pf.	150 pf.	50 pf.	240 pf.	50 pf.
R.F. Amplifier	L ₇	—	—	—	Identical to L ₁	Identical to L ₁
	L ₈ **	—	—	—	16 turns No. 24	16 turns No. 24
	L ₉	—	—	—	3 turns No. 24 on L ₈	3 turns No. 24 on L ₈
	C ₁₆	—	—	—	18 pf.	18 pf.

* All coils wound with enameled wire on $\frac{3}{8}$ " dia. slug-tuned form — e.g., Cambion 1534-2-2 or Miller 4400.

** All coils wound on toroid core, Arnold A4 315 125 EP or similar.

Notes: The component values for L₆ and C₆ in the local oscillator are those in use in an operating receiver having a 9-Mc. i.f. Different values may be necessary if different tuning capacitors, coil forms, etc., are desirable. Experimentation may be required to suit the individual's requirements.

The input coils in the mixer circuit are chosen to give very high selectivity in this circuit. If an r.f. amplifier is to be used, a high-Q circuit should be used there, and toroids may be used elsewhere in order to keep size down.

direct-coupled emitter follower. As is typical of emitter followers at high frequencies, the output impedance is a function of frequency. However, over the frequency range employed the output impedance is less than 50 ohms, and a voltage of 1.5 volts peak-to-peak is available. The isolation between the oscillator and mixer is excellent and there is no tendency toward "pulling." No temperature compensation is used in this oscillator, and as a result there is some drift with variations in ambient temperature. Under normal conditions this is not severe, and the stability is sufficient for 10-meter s.s.b. work. The more critical experimenter may wish to consider temperature compensation.


In the coil data given in Table I for 80 and 40 meters the local-oscillator frequency is higher than the frequency being received, and on 10, 15 and 20 meters, the local-oscillator frequency is lower than the frequency being received. This is done so that whenever the b.f.o. is adjusted for the sideband in common use on any given band the same b.f.o. setting may be maintained for all bands.

The usual practices of oscillator construction should be followed when building the oscillator. Fig. 4 is the layout for a printed-circuit board for the oscillator. Alternately, Vector board and flea clips may be used. In either case, the board should be mounted firmly to the chassis.

Crystal Calibrator

Shown in Fig. 5 is a schematic of a simple crystal oscillator which is used to provide

band-edge markers up through 10 meters. Clearly, the prospective constructor could use any one of several calibrator circuits.

The second part of this article will describe the 9-Mc. i.f. amplifier, product detector, audio amplifier and Q-multiplier, audio-derived hang a.g.c. system, and power supply. 

Strays

Attention radio amateurs who were former wireless operators and all other members of the communications branch of the Royal Canadian Navy and Royal Canadian Naval Volunteer Reserve who trained at H.M.C.S. St. Hyacinthe (Naval Signal School) in St. Hyacinthe, Quebec, Canada. The city of St. Hyacinthe, as their Centennial project, and to commemorate Canada's 100th birthday, is sponsoring a reunion of personnel who were stationed at the naval signal school during World War II. The program is planned from mid-June to mid-July 1967, with a reception to be held during the weekend of the National Convention, July 1. St. Hyacinthe is about 30 miles from the convention in Montreal. Priority of accommodation will be given to former naval personnel and their families wishing to attend. For further information and reservations write to Tourist Promotion Committee of St. Hyacinthe, 1555 rue des Casades, St. Hyacinthe, P. Q. or to VE3BD or VE3MF.

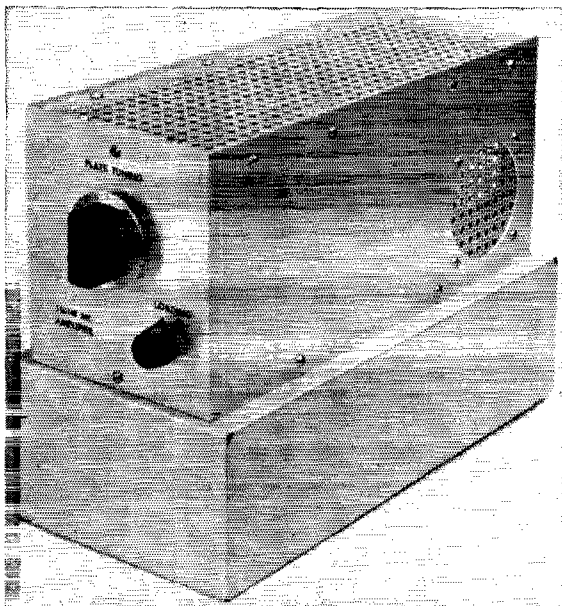
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The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, 06111.

A 90-Watt Amplifier For 2 Meters

A.M., C.W., and S.S.B.

with an 829-B



There are those who would look scornfully at tubes as archaic as the 829-B, but economics and availability can be as monumental to some as building the rig and getting it to work properly. This article describes a low-cost amplifier assembly that is easy to get operating and can be powered by an old TV transformer.

BY DOUG DEMAW,* WICER

THE desire to build a low-budget, medium-power amplifier for 2 meters is often frustrated by modern-day trends that seem to dictate the need for up-to-date tubes with their expensive hardware. Although such members of the v.h.f. component family are desirable for the generation of very high power levels at reasonable efficiency, the cost of the tube, or tubes, the sockets, and the cooling fan places the total price beyond the reach of many hams with modest incomes. Admittedly, tubes such as the 4CX250 can be garnered from time to time at reasonable prices. Similarly, the sockets and blower fans can be gleaned from bargain-house bins. But once the initial price barrier is hurdled by such judicious shopping, there is still the matter of financing a 1500-to 2500-volt plate supply for the rig. Doubtless, after all of the figures are totaled up, the prospective builder is ready to go back to another year or two of operating his "Communicator," or similar low-power rig, while he thinks the situation over. This article, then, is slanted toward those constructors who are necessarily frugal in the hobby-expense department, and who feel that a rig in the 90-watt class is ample for their needs.

This amplifier could rightfully be called an updated version of the 829-B assembly that appeared in *QST* a number of years ago. More recently, the same circuit was published in *The Radio Amateur's V.H.F. Manual*.¹ Improvements

over the original amplifier include a linear tank circuit for better circuit Q , a broad-tuned grid circuit, unbalanced input and output circuitry for matching into coax lines, an output loading control, and a shield box over the top of the amplifier to lessen shock hazard and to confine the r.f. energy. The 829-B tube was selected because of its bargain-house availability and because many a v.h.f. ham has them in his private "goodie" cache. These tubes are often bartered at swap-and-shop sessions, too. Since 90 watts is a practical power level for general operating and moderate DXing, the 829-B is a "natural." It can be used without a cooling fan, or with one if a few extra watts of power are desired. The tube socket is readily available and is quite inexpensive. All in all, the unit described here is a practical, low-cost approach to moderate-power operation.

The Circuit

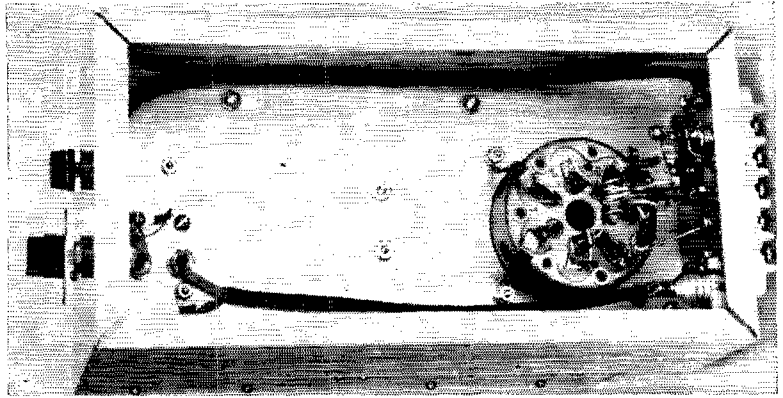
The linear tank inductor, L_3 , of Fig. 1 provides better circuit Q , contributing to better efficiency than is possible with lumped-inductance circuits of the type used in the earlier model. The inclusion of C_3 in the return side of L_4 gives some control over the loading of the amplifier. Output from the amplifier is taken at J_2 and is coupled into either a 50- or 75-ohm unbalanced load.

Drive to the 829-B is applied at J_1 , also from a 50- or 75-ohm unbalanced line, and fed to L_2 through coupling link L_1 . A fixed capacitor, C_1 , is connected between the return side of L_1 and

* Assistant Technical Editor.

¹ 1st edition (A.R.R.L.), page 126.

Looking into the bottom of the chassis. The feed-through bushings for plate power and r.f. output are at the left. Coax cable is used for the high-voltage d.c. lead. Wide copper straps are used to ground the filament and cathode pins of the tube socket. A hood is used over the back side of J_2 , lower right, to help isolate the input from the output.



ground, tuning out much of the reactance of L_1 . A 3-to 30-pf. trimmer can be substituted if more precise adjustment is desired. No tuning capacitor is used with L_2 because the input capacitance of an 829-B is rather high. L_2 is resonant with the tube capacitance and is adjusted by squeezing or spreading the coil until the circuit is resonant at about 145 Mc. It is possible to QSY from 141 to 145.5 Mc. with no noticeable decrease in 829-B grid current.

Neutralization was not required in the model shown. Should the builder desire to include a neutralization circuit, information is available concerning this simple technique.²

Construction Notes

The amplifier is constructed on a 3 X 5 X 10-inch aluminum chassis. The top deck of the assembly is boxed in by an aluminum cage which

² *The Radio Amateur's V.H.F. Manual*, p. 126, Hall, "A 100-Watt 2-Meter Transmit-Receive Converter," *QST*, Jan. 1966, p. 35.

is 9½ inches long, 1 inch wide, and 1½ inches high. Three holes, each 2¼ inches in diameter, are cut in the rear and sides of the cage and are covered with perforated aluminum as shown in Fig. 2A. The holes are located at the tube end of the box to permit a free flow of air around the tube envelope. Because a perforated cover is used for the top of the cage, the air circulates through the enclosure in good fashion. A cooling fan can be placed near any one of the three vent holes. Its air stream should be directed against the 829-B if this is done. Forced-air cooling will permit slightly more input power. Data for this are given in the manufacturer's tube tables.

The tube socket is an E. F. Johnson 122-101, but other styles can be used. The leads between the socket terminals and ground should be fashioned from ⅜-inch wide strips of copper or brass. Such connections will be used on pins 1, 4, and 7. The use of wide ground straps will reduce lead inductance, making possible a better r.f. ground — an important consideration if the amplifier is

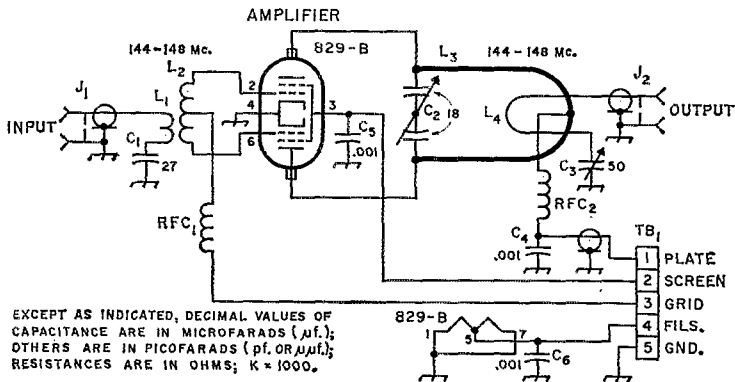


Fig. 1—Schematic diagram of the 2-meter amplifier.

- C_1 —27-pf. silver mica.
- C_2 —18 pf. per section, butterfly variable (E. F. Johnson 167-22 with 3 stator plates removed from each side. Also, two rotor plates are removed).
- C_3 —50-pf. variable (Millen 20050).
- C_4 —0.001- μ f. transmitting ceramic (Centralab 858S).
- C_5, C_6 —0.001- μ f. 1000-volt disk.
- J_1, J_2 —SO-239 connector.
- L_1 —2 turns No. 22 insulated hookup wire in center of L_2 .

- L_2 —5 turns No. 20 solid, tinned wire, ⅜-inch diameter by ½ inch long (see text).
- L_3 —Plate inductor. See Fig. 2 for dimensions.
- L_4 —6-inch length of No. 12 enam. wire bent into a U with 1¼-inch spacing between sides (cover with spaghetti tubing).
- RFC₁, RFC₂—1.72- μ h. choke (Miller RFC-144).
- TB₁—5-terminal barrier strip (Millen 37305).

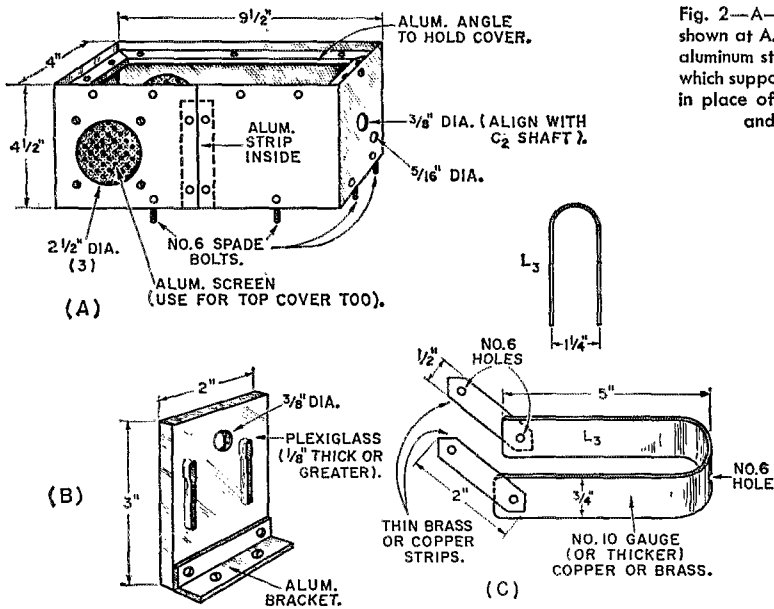


Fig. 2—A—General layout of the shield box is shown at A. The box is made from No. 16 gauge aluminum stock. B—Details of the mounting block which supports C_2 and L_3 . Polystyrene can be used in place of the plexiglass. C—Dimensions for L_3 and its connecting strips (see text).

to be stable. The 0.001- μ f. capacitors at pins 3 and 5 should be returned to pin 4, using the shortest leads possible.

The grid coil, L_2 , is suspended between the grid lugs on the tube socket. Link L_1 is inserted into the center of L_2 and is later adjusted for optimum coupling. A 3-lug terminal strip is attached to the rear inner wall of the chassis and is used to support C_1 and L_1 . A 5-terminal barrier strip, J_3 , mounted on the rear of the chassis is used for connecting the amplifier to its power supply. The r.f. input and output connectors, J_1 and J_2 , are located opposite one another on the rear of the chassis. A UG-106/U shield hood is used to cover the back side of J_2 . This helps to isolate J_1 and J_2 , reducing the possibility of stray coupling between the input and output terminals of the unit. To reduce further the chance for stray coupling, coaxial cable is used to connect J_2 to L_4 . A second piece of coaxial line is used to carry the B-plus from J_3 to the feedthrough bushing at the front of the chassis.

Details for building the plate tank assembly are given in Fig. 2 at B and C. It is important that the stator posts of C_2 be soldered to L_3 along their entire length. This helps to keep lead inductance at a minimum—an important consideration in v.h.f. circuits. The narrow slots in the plexiglass mounting block can be cut with a keyhole-type hack saw after first making a pilot hole at the start of each slot. The pilot hole can be made by drilling three or four small holes in a row, so that they touch one another, then routing out the plastic between them until there is room to insert the tip of the saw in the plexiglass. L_3 should be slipped into place in the slots prior to soldering C_2 to L_3 .

C_2 is mounted just above L_3 on the plexiglass block. A shaft coupling and a length of insulated

material are used to make C_2 tunable from the front panel. Wooden dowel rod if phenolic or plastic rod is not available. The insulated shaft is necessary so that there will be no metal in the immediate field of L_3 , and so the rotor of C_2 will not be grounded. The low-impedance end of L_3 is supported above the chassis by a 1-inch long steatite insulator. A No. 6 spade bolt is attached to the exact center of the bend in L_3 , and is then threaded into the steatite insulator. The link, L_4 , is supported between one stator post of C_3 and the feedthrough bushing to which J_2 is connected. C_3 is mounted on the front panel of the shield cage. Its rotor should be grounded, also, to the main part of the chassis, using a large bus wire and a solder lug.

In this model, L_3 is made of brass and is silver plated. Although the plating wasn't necessary, it resulted in a neater-looking job. Plain brass or copper would have worked just as well. The important thing to remember is that the plate lines should be polished until very clean. All edges should be filed until smooth. After the plate tank is completely assembled on the chassis, a coating of clear lacquer can be placed on L_3 to prevent it from tarnishing.

Fahnestock clips are used for plate connectors on the 829-B. L_3 and the Fahnestock clips are joined by 1/2-inch-wide connecting strips. The strips can be made from brass or copper, but should be fashioned from thin material so as to be a bit flexible. This will prevent undue stress from being exerted on the plate pins of the tube. To contribute further to this end, the links are drilled, as shown in Fig. 2C, to accommodate No. 6 screws; when assembling the tank, 4-40 hardware is used in these No. 6 holes, allowing sufficient play at the joints to permit tightening the connections without exerting pressure on the 829-B plate pins. The tube should be seated squarely in its socket before the joints are tightened. Lock washers should be used to assure long-term tightness of each connection.

TABLE I
829-B Operating Data

Operation	E_p	I_p	E_{g2}	I_{g2}	E_{g1}	I_{g1}	<i>Drive P_{OUT}</i> (Approximate)		
Class C. Convection Cooling									
	A.M.	600 v.	150 ma.	200 v.	16 ma.	-60 v.	7 ma.	0.5 w.	70 w.
	C.W.	750 v.	160 ma.	200 v.	17 ma.	-50 v.	7 ma.	0.9 w.	90 w.
Forced-Air Cooling									
	A.M.	600 v.	200 ma.	200 v.	20 ma.	-70 v.	13 ma.	1.1 w.	90 w.
	C.W.	750 v.	200 ma.	200 v.	20 ma.	-50 v.	12 ma.	0.8 w.	115 w.
Class AB ₁ . Convection Cooling									
	S.S.B.	600 v.	110 ma. (max.)	200 v. (reg.)	26 ma. (max.)	-18 v.	0	0	44 w.
			40 ma. (no sig.)		4 ma. (no sig.)				

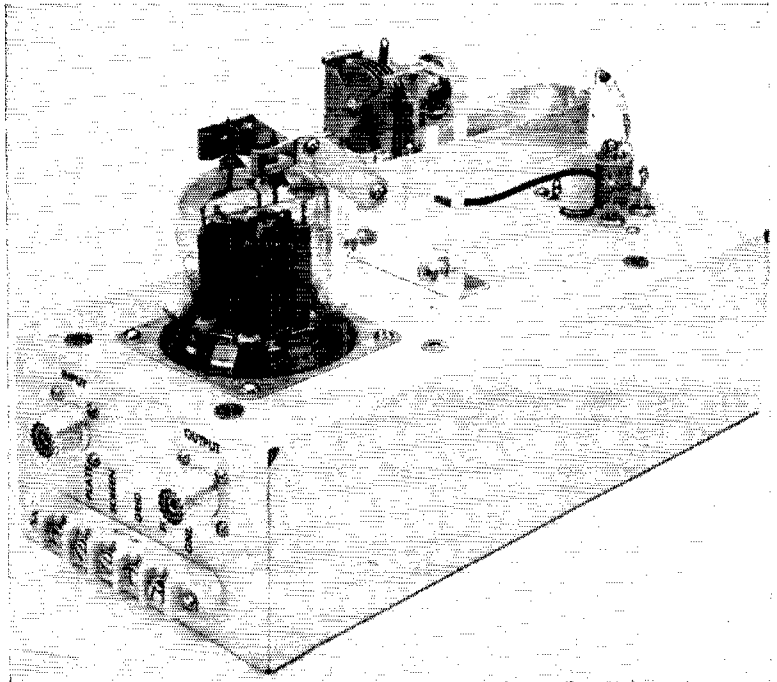
Maximum ratings for ICAS use with natural or forced-air cooling, as specified by the manufacturer, RCA.

Operating Data

Table I gives operating voltages and currents for Class C and AB₁ use. Although these are the voltages preferred by the author, other values

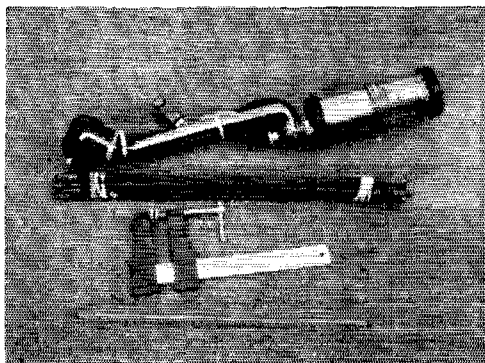
can be used if the operator desires. Data for several different ranges of voltage, current, and power are given in the manufacturers' tube tables. If a 450-volt supply is desired, a trans-
(Continued on page 146)

Top of the amplifier chassis, as seen from the rear with the shield cage removed. The connectors between the plate pins and the tank inductor are visible in this photo. The output link with its black spaghetti tubing is just below the U-shaped plate tank inductor. The loading control, C₃, is mounted on the shield cage and is not shown here.



An Antenna for the Traveling Man

Compact System for Multiband Operation



This portable multiband antenna collapses into a package only 19 inches long.

BY J. SANTANGELO,* WINXY

FOR the past several years I have been traveling throughout the country on business trips. About three years ago I decided it would be desirable to bring an h.f. rig along with me on these trips. I purchased a transistor transceiver that required only the microphone and a 50-ohm antenna system to be operational. The transceiver also has provided me with mobile operation, a feature that has proved very enjoyable and is a significant bonus.

For portable operation, the item that is least standard, yet the most cumbersome for operating on 80 through 15 meters, is the antenna system. Requirements of an antenna for my purposes meant, basically, light weight and portability. The antenna system that evolved over the past three years is functioning exceptionally well. It includes a surplus part, a few standard parts, and some ingenuity! Primarily, the antenna consists of a 127-inch collapsible whip (AN-131A, surplus), a multiband loading coil, approximately 30 μ h. maximum (Master Mobile type 333), a homemade bracket, 12 feet of coaxial cable (RG-58C/U), and an inexpensive adjustable C clamp (Stanley No. H-157).

The AN-131A collapsible whip is available from some surplus supply houses in various parts of the country. It weighs about a pound,

and consists of eight sections of thin-wall tubing with a cable through the center. The cable is spring-loaded to the base section, the spring holding the pieces in place when the sections are assembled. The antenna folds into a package about 17 inches long and 1½ inches in diameter. When extended, it is 127 inches long, and can be used on 15 meters, with the loading coil completely shorted out.

The Master Mobile coil has been popular as a center-loading coil for mobile operation, and was designed to cover 40 through 10 meters with an 8-foot whip. The 10½-foot length of the AN-131A makes it possible to operate on 80 meters as well. With the longer antenna, 10-meter operation requires that the top section or two be folded back. However, my use did not require anything below 15 meters; therefore I simply moved the adjustable tap to short out the coil completely for 15-meter operation.

The coil has a female ⅜ × 24 thread at both ends, which accommodates the AN-131A whip antenna directly. The lower end of the coil is fastened to the window bracket with a bolt of suitable length, and insulating material, as shown in Fig. 1A. The bolt must be insulated from the metal bracket. This can be accomplished with a shoulder washer (or flat washers) and insulating tubing over the bolt, or a machined piece may be

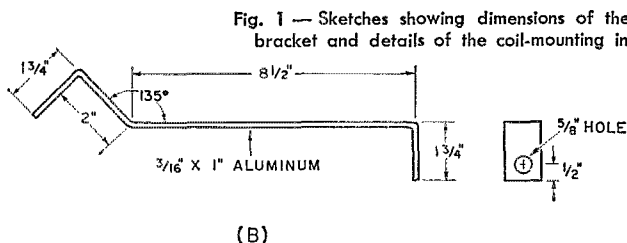
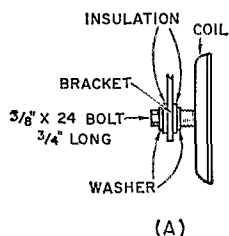
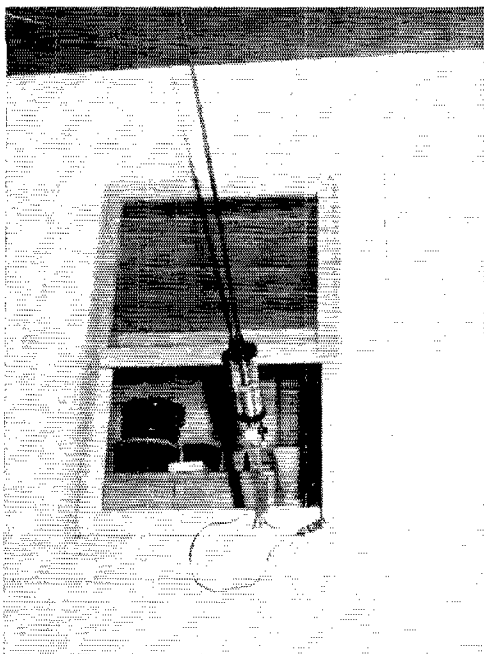


Fig. 1 — Sketches showing dimensions of the mounting bracket and details of the coil-mounting insulation.

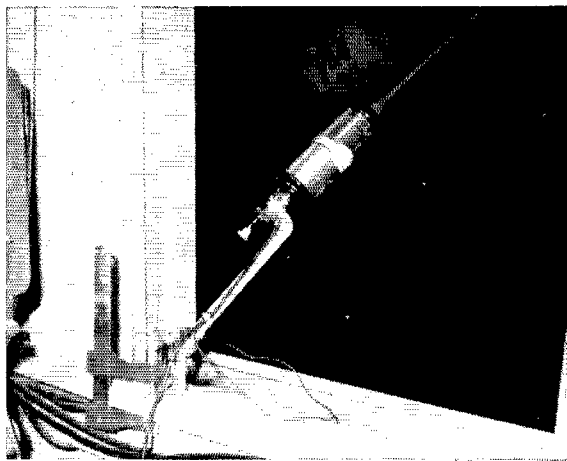


A metal screen/storm-window sash may serve as the "ground" connection.

made of nylon or Teflon. An effective shoulder washer can be made by stacking different-size flat washers. It is also possible to use phone-jack insulating washers. Don't overlook faucet washers, available in most hardware stores. Since the antenna is not exposed to the elements for any great length of time, almost any good insulating material should be satisfactory. If sufficient attention is given to insulating, connectors, and cable, the only limiting factor for power capability is the loading coil.

The bracket is aluminum, although it could be fabricated from other metal. It is bent so that the coil and whip are at a 45-degree angle when clamped to a window sill. The length of the whip is such that the tip is virtually horizontal. About 12 feet of RG-58C/U cable is used, although the length is not critical. The shield is fastened to the bracket, and the center conductor is connected to the lower end of the coil. In addition, about a foot of flexible wire with a large battery clamp is joined directly to the metal bracket, as shown in the photographs. The bracket in use for this antenna is made of a piece of aluminum 3/16 inch thick and about 14 inches long, with three bends in it as shown in Fig. 1B.

With all parts assembled, a trial run was performed, using a v.s.w.r. bridge to check out the matching capability of the combination. The antenna was initially set up for tests by running it out through the shack window, and utilizing the aluminum storm/screen window as the ground plane or counterpoise. Tests were made on each of the amateur bands. The sliding bar on the coil was adjusted for minimum v.s.w.r. on each



The antenna is mounted by clamping its bracket to a window sill.

band, and the position scribed on the bar for future reference. The v.s.w.r. was found to be less than 2 to 1 on all bands, varying from approximately 1.2:1 to about 1.8:1. This was considered adequate.

The antenna system has been used for over two years on all bands, at different hotels and motels. The only requirement is to be able to open the window! The first few times out I carried all kinds of extra paraphernalia, such as several 35-foot lengths of wire (emergency counterpoise), small portable v.s.w.r. bridge, extra lengths of coaxial cable, small tools, a.c. extension cord, and several kinds of coaxial adapters. After much use of this truly portable antenna, the "excess baggage" has been cut down to a small screwdriver. This has been used primarily to show visitors the innards of the transceiver, and improve the vertical height and linearity of the TV set which is on during ham activities! So far, I've had no TVI at any of the various operating locations.

The cost of this portable antenna depends on the ingenuity of the user. As a matter of fact, it is quite probable that exact duplicates of the coil and/or the collapsible antenna may not be available in some localities. However, equivalents can be home-brewed, or other available mobile-antenna components adapted for use, depending on the band or bands of operation desired. Stainless steel hardware is nice, if available, but is not functionally necessary.

The total weight of the antenna, including feed line, C clamp, and bracket, is about three pounds. The antenna breaks down into three separate parts, the longest being the coil-and-bracket assembly which is about 19 inches long. The whip is 17 inches long, when collapsed, and the C clamp has a length of 9 inches. All of these pieces will fit easily into an attaché case, or can be distributed among the clothing in a one- or two-suitcase. The total weight for my portable ham station is less than 25 pounds.

QST

Antenna Rotators and Indicators

In Two Parts

Part I—Rotators

BY E. LAIRD CAMPBELL,* WICUT

It is a distinct advantage to be able to shift the direction of a beam antenna at will, thus securing the benefits of power gain and directivity in any desired compass direction." So says the ARRL *Handbook* introduction to the section on rotary-beam construction. But how do you rotate your antenna? Do you use electric motors, systems of pulleys and ropes, or do you rotate by hand? All are perfectly good schemes. However, before going into some of the details on the different mechanical methods of changing the direction of a beam antenna (and a system for indicating the beam direction), here is a short discussion of some important rotator factors.

Wind-Loading Requirements

Bending moment. Loads acting on the antenna, rotator, and tower are essentially the same as those acting on buildings and other structures. Wind loading is by far the most critical. The design wind load is usually set up from reference to U.S. Weather Bureau reports and maps for each locality, and it varies from a recorded 132 m.p.h. in Miami to 49 m.p.h. in Los Angeles.

When considering the loads experienced by the rotator, it will be necessary to know the wind pressure developed against the antenna surfaces. This means that the total antenna area must be known, a figure that is rarely seen in advertising or catalogs. However, if the antenna area is known or can be calculated, the pressure developed against an antenna surface runs approximately in accordance with the formula:

$$P = cV^2$$

where P is the pressure in pounds per square foot of projected area, c is a constant (0.0025 for cylindrical surfaces), and V is the wind velocity in miles per hour. The EIA (Electronic Industries Assn.) has recommended a wind-loading standard of 30 lbs. per square foot of projected surface, which corresponds to a velocity of 110 m.p.h. when calculated in accordance with the above formula, although 40 and 50 pound areas do exist along the Gulf and Atlantic seaboard. However,

the use of the above data in design procedures should lead to an antenna system able to withstand average wind conditions. The areas and wind loading of some amateur beam antennas are shown in Table I.

Once the projected area has been found or estimated and dropped into the formula, and the pressure (which in the case of wind is in a horizontal direction) in pounds per square foot is known, what will be the force (bending moment) on the rotator? A look at Fig. 1 shows the bending moment on a rotator resulting from a 110 m.p.h. wind against an antenna with a 10-square foot area, which is mounted 1 foot above the rotator. The bending moment is found simply by multiplying the resulting pressure P (from the above formula)—30 pounds per square foot, by the antenna area—10 square feet, by the distance between the antenna and the rotator—1 foot. The resulting bending moment of 300 pound feet would jump to 600 pound feet if the antenna were 2 feet above the rotator, or 1200 pound feet at four feet! Thus an important rule: To keep bending moments low, place the antenna as close as is practical to the rotator. Of course, the use of a bearing between the rotator and antenna will reduce the bending moment applied to the rotator.

Now that you know the bending moment for your particular antenna/rotator system, how do you know if the rotator is capable of withstanding

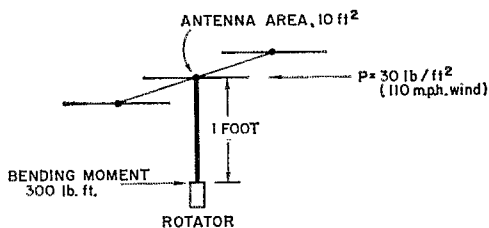


Fig. 1—The bending moment on the rotator is found by multiplying the wind pressure, P , by the antenna area and by the distance between the antenna and rotator.

* Managing Editor, *QST*

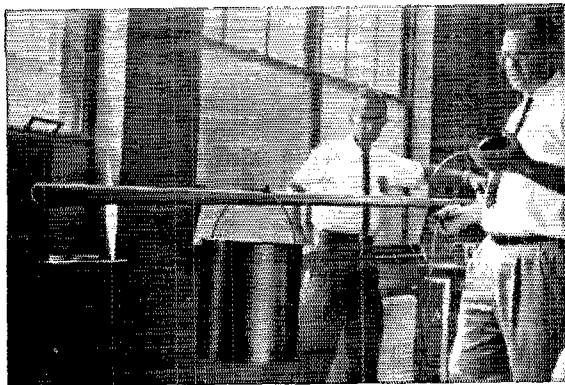


Fig. 2—Roger Phillips (l.) and Jack Bennett, W8WEN, of Alliance Mfg. Co., at work doing a bending-moment test-to-destruction on a rotator. The test is made by securing the rotator to a table and attaching a horizontal pipe to the rotator's shaft. A sand-filled bucket of known weight is moved out on the pipe until something fails. The last position of the sand bucket, as measured from the rotator, is used to calculate the bending moment required for failure.

these forces? Unfortunately you probably don't, since there are no published ratings given for most amateur antenna or TV-antenna rotators.

The writer has observed informal tests made on various TV and ham rotators. The photograph in Fig. 2 shows one such test to determine bending moment capability. The rotator under test is clamped to a table, but with the rotating drive shaft in a horizontal position. A mast is attached to the shaft and a bucket of sand of known weight is hung on the mast. As the bucket is moved down the mast away from the rotator, greater and greater bending-moment forces are applied to the rotator. Finally, a point is reached where the forces are too much for the rotator and it fails. In these tests, a series of rotators made by one manufacturer failed first in the area of the ball bearings and bearing races. As bending moments built up, the forces were concentrated on the ball bearings which circle the outer center rim of the rotator housing. When the forces reached the breaking point, the ball bearings actually started pushing through the aluminum casting. Even before the failure occurred, the bearings would indent the bearing

race, causing the rotator to grind to a halt. Finally, the rotator mounting hardware sheared off.

Another unit tested showed failure in a different area. When the bending moments finally reached the limit for this unit, the nuts that thread onto the studs that attach the rotator to the mast were literally pulled off. Or, if the nuts held, the studs themselves were pulled out of the rotator housing. However, after this failure, the rotator was still functioning.

The bending moments at time of failure were in the 800 to 1000 pound feet range for one make of rotator which was higher than any of the other units tested.

Running Torque and Windmilling. Another important feature of the rotator is that it should not windmill (rotate as a result of wind pressure). If the rotator does not have an effective braking system, the wind can cause the antenna to rotate, or will in some cases actually strip the drive and motor gears. If a torque wrench is available, you can determine the "windmill rating" of your rotator. Simply attach the wrench as shown in Fig. 3 and try to turn the drive shaft, with the rotator held fast, of course. At the point where the shaft begins to turn, read the torque, which is usually in pound feet. The torque imposed by a given antenna is difficult to estimate since the value will depend on the nonuniform wind distribution on the antenna. Under certain wind conditions, the antenna will want to "weather vane," so if strong winds are forecast for your area it's a good idea to turn your beam "into the wind." In the case of horizontal beams, this is usually with the wind looking into the ends of the elements.

The running torque rating of your rotator can be found by holding the wrench fast (and thus the shaft) and turning on the rotator. The rotator



Fig. 3—A torque wrench is attached to a rotator for a running-torque and "windmilling" test.

Table I

Wind Loading For Amateur Antennas

Name	Weight (lbs.)	Wind Load (lbs.)	Wind Velocity (m.p.h.)
Mosley TA36	69	210.1	90
Mosley TA33	40	114.0	90
Hy-Gain TH-2	19	85.9	100
Hy-Gain TH-3	29	144.0	100
Telrex 3-el 20 M.	48	184.0	100
Telrex 4-el 20 M.	108	382.0	100
Telrex 6-el 20 M.	176	533.0	100

will run for a moment until it can no longer overcome the force of the fixed wrench. The running torque is then read from the wrench.

One factor that has not been treated is the importance of the antenna weight. Except for small rotators, antenna weight may not be significant, but it does place a limitation on the length and material of a drive shaft between the rotator and antenna or tower thrust bearing.

Some conclusions. Keep the antenna as close as possible to the rotator; keep the area of the antenna as small as possible; do not use large-area plates which would act as sails in the wind; choose a rotator with a high bending-moment capability and good braking.

Rotating The Antenna

Most rotatable installations use electric-motor drive to turn the antenna, although the "Jack Armstrong" method is practical. If hand rotation is used, the antenna must be within easy reach of the operator and the system usually requires some sort of brake or locking scheme, so that the drive shaft will not windmill when unattended. Other mechanical systems involving belts or chains can be devised, and even direct-drive is possible when the operating position is on a floor directly beneath the roof of the house so that a pipe can project through the roof of the shack.

When it comes to motor drive of the antenna, there are several possible choices: TV-antenna rotators, amateur antenna rotators, prop-pitch motors, and home-devised drives made from converted motors and gear boxes from washing machines.

Home-Devised Drives

In assembling a motor-drive system from available parts, the principal difficulty is likely to be the acquisition of a suitable gear train. Gear trains can be assembled from gears purchased new for the purpose, but it is also possible to find suitable ones in discarded appliances such as washing machines. The bearing for the rotating shaft that supports the antenna should be good but, since the system involves a speed-reduction system, enough torque will usually be developed to overcome minor bearing frictions. A motor capable of delivering $\frac{1}{8}$ horsepower is usually sufficient. The reduction gears will act as a brake for the system so that it does not coast too far past the position at which the power was shut off. The builder usually has to exercise some ingenuity in devising a mechanical system that permits adapting materials that may be useful in a rotator.

Prop-Pitch Motors

World War II surplus provided the popular prop-pitch motor (an aircraft propeller-pitch feathering motor) and although somewhat scarce today on the surplus market, it seldom fails to appear at ham auctions or swap fests. The motor and gear train have a tremendous amount of torque since the gear reduction ratio is something

approaching 10,000 to 1! The motor was originally designed to operate from 28 volts d.c. but it will operate on 10 to 30 volts a.c. or d.c. and is reversible. There are two models, a "large" and a "small." However, both models are enough alike that conversion information will apply to both.

At 24 volts, the outside gear on the assembly will run at about $\frac{3}{4}$ r.p.m. This can be speeded up by following the scheme shown below, suggested by W2VLL¹.

- 1) Remove the bevel gear;
- 2) Remove its thrust-bearing plate;
- 3) Remove the upper case of the speed-reduction unit housing;
- 4) Remove the large ring gear with the spline on it. The last item is the first thing you will see upon removing item 3;
- 5) Grind the teeth off the hardened, splined ring gear (not off the splined portion, but off the *inside* of the ring!);
- 6) Next drill and tap four holes in the gear carrier over which the ring gear was placed. Line the holes up with the holes that already exist in the face of the ring gear, and bolt the two together;
- 7) Reassemble the whole thing and refill it with oil.

W2VLL points out that the beam will now turn at 4 or 5 r.p.m. but that a more comfortable 1 or 2 r.p.m. can be attained by simply reducing the voltage applied to the motor.

If the prop-pitch motor has not already been converted for "continuous amateur operation," W6APQ has a conversion² consisting of several steps that can be done in an hour or two.

- 1) Remove the lead balance weight located under the small plate on the outside of the motor;
- 2) The motor cover is held on by three machine screws which in turn are safety-wired. Remove the safety wire, the three machine screws, and the motor cover;
- 3) Remove the small rectangular locking lug by removing the safety wire and machine screws which secure it;
- 4) With an iron bar and hammer, remove the back half of the exposed brake plate by tapping it in a counter-clockwise direction, and lift out the brake shoe from the gear;
- 5) Remove the cotter key and nut from the motor shaft. Use patience for it may not come off easily;
- 6) Remove the small gear from the shaft by tapping on the end of the shaft with a soft-nose hammer while applying pressure under the gear with a lever;
- 7) Lift out all of the remaining brake assembly by removing the three nuts from the inside of the brake plate;
- 8) To prevent chattering, short out the two contacts that lead to the solenoid coil, with a piece of heavy wire. These are the two nuts that are close together on the edge of the assembly into which the brake unit was formerly seated;
- 9) Replace motor cover and secure it with the three machine screws;
- 10) By using the two terminals that are closest together on the outside of the case, and the case

¹"Hints and Kinks," QST, June 1949.

²Hippe, "Tower and Rotator Techniques," QST, June 1950.

itself for the common connector (ground), the motor can now be operated. Using one of the terminals and ground (motor case) the motor will turn in one direction. Using ground with the remaining terminal, the motor will rotate in the opposite direction. Do not remove these terminal wires from their channels in the case casting; this helps to act as a shield. Leads to the motor can be connected by digging the wax out of the terminal points. This will bare a brass screw head which can be used to hold a solder lug for the proper connection. Forget about the two wires on opposite sides of the motor as they are connected to internal switches and have no use for this application;

- 11) The motor should be treated for r.f.i. A pair of .002 μ f. capacitors from the "hot" terminals to the motor case should do the trick. If the electrical "noise" is really bad, coaxial capacitors should be used;
- 12) The large beveled gear on the top outside of the motor should be carefully removed and kept as it affords an opportunity to make use of the radial thrust bearing built inside the gear housing and which can be seen when the gear is lifted off. To the top of this gear, weld a pipe flange which will take a 2-inch pipe nipple 6-inches long. The nipple and flange are also welded together for strength and to prevent loosening. The antenna drive shaft can be a piece of thick-walled aluminum pipe, 2 $\frac{1}{4}$ inches o.d. One end of this pipe fits nicely over the pipe nipple and rests on the flange. The nipple and aluminum pipe are fastened together with two 10/32 bolts which pass completely through the two pipes at right angles.

Amateur Rotators

At this time, the number of available commercial antenna rotators designed specifically for amateur radio use is small. There have been many different units on the market in years past, and these may still be available at ham auctions or from individuals. At the moment, there are only two rotators that are sold as "amateur antenna rotators." Of course, there are commercial or military models that could be well adapted for amateur applications.

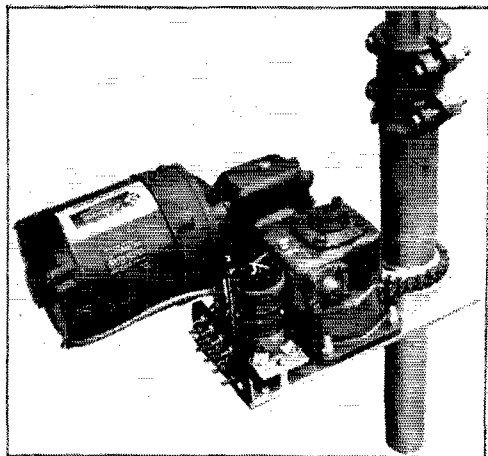


Fig. 4—Telrex rotator.

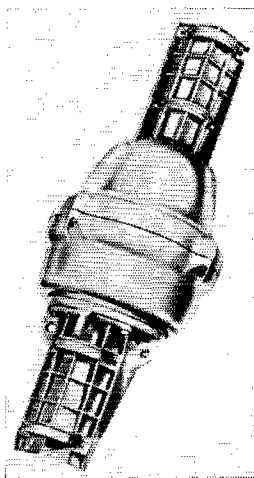


Fig. 5—Ham-M rotator

Telrex. Probably the most rugged amateur antenna rotator is the Telrex series of rotators and indicators (see Fig. 4). All models use a 2-stage worm and worm wheel reducer, which drives a chain-driven mast clamp. The antenna mast goes through the clamp and can then rest on a thrust bearing. Five models in weights from 52 to 110 pounds are available with rotating torques from 1400 to 8500 inch pounds, brake torques from 1800 to 10,000 inch pounds, and drive motors from $\frac{1}{12}$ to $\frac{1}{8}$ horsepower. You can see from these figures that these are heavy-duty rotators! They are fitted with selsyn generators, and a standard control console (or rack-mounted control panel) is available that houses the read-out indicator and control switches. The system is designed for 380-degree rotation and has limit switches to confine rotation to this amount. The prices of these rotators range from \$250 to \$600. Twelve-conductor cable is required. They are manufactured by Telrex Labs, Asbury Park, New Jersey 07712.

Ham-M. One of the most popular amateur rotators is the Ham-M rotator manufactured by CDE (Cornell-Dubilier Electronics), Fuquay Varina, North Carolina. According to the manufacturer, the Ham-M is designed to support "exceptionally heavy antenna arrangements used by amateur radio operators." Fig. 5 shows the Ham-M. Because of its in-line construction, the weight of the antenna and upper mast is carried directly in line with the supporting mast. The rotor, radial and thrust bearings, electrically operated brake, gear train and indicator components are all contained in the elongated bell-shaped housing which is made of aluminum. Here are some of the specifications of the Ham-M as listed by the manufacturer. Input voltage—115 v.a.c. 60 cycles; motor—24 v.a.c. 2.25 amps. split phase 10-percent duty; meter—d.c. 1000 ohms/volt voltmeter calibrated directly in degrees from north (3 or 5 degree increments). The indicating meter circuit is a rotating potentiometer and voltmeter, which will be discussed in Part

If of this article. Indicating accuracy — within 5 degrees when calibrated; 360 degree rotation time — approximately 50 seconds. Mechanical stops, along with electrical limit switches, are built into the rotator mechanism. Brake mechanism — positive lock into one of 96 segments which are spaced every 3° 45'. The brake assembly is released by a 24-volt solenoid. A wedge is attached to the solenoid plunger and, when it is positioned for braking, a cam latch locks the wedge in the teeth of one of the drive gears. Rotator dimensions — 8 inches maximum diameter, 20-inches high; weight — 13½ pounds; permissible mast size — 7/8 to 2 1/16 inches diameter; cable — 8-conductor required.

If you wish to mount the Ham-M inside a tower, a space 8 1/4 inches in diameter and 15 inches high will accommodate the rotator bolted to a flat plate (without the lower mast clamp attached). To facilitate this kind of mounting, a steel plate, cut to fit against the bottom of the rotator housing, is available from the manufacturer (Kit No. AK-121). This plate carries four heavy bushings drilled to match the screw holes, and will hold the rotator 1/2 inch above the tower plate. Instructions are included with the kit together with suggestions for thrust bearing for the top mast.

Specifications for allowable bending moment forces for this rotator are not published. Price class: \$120.

TV Rotators

If proper attention is paid to the wind loading placed upon the rotator, any of the popular TV rotators can be used to turn amateur radio beam antennas. Here is a list of some of the more popular TV rotators available at the moment.

CDE Model TR-44. This rotator looks from the outside almost exactly like the Ham-M just described. However, the dimensions show that it is slightly shorter (17 3/8 inches) and weighs less (8 3/4 pounds). This is probably because the TR-44 does not have the electrically retracted brake mechanism or as many ball bearings as the Ham-M. The indicator is exactly like that of the Ham-M although only 7-conductor cable is needed. Except for the above-mentioned differences, the specifications are about the same as those listed for the Ham-M. This rotator could possibly handle a single small tri-band beam. Price class is \$60.

CDE Model AR-22R. A light-duty model which might operate safely with a small light-weight 6- or 10-meter beam. The rotator clamps will take masts from 7/8 inch through 2 inches. The control box/indicator is marked in points of the compass and the control unit pointer is set to point at the desired position of the antenna. The antenna will then automatically rotate to this position and stop. A manual rotator system (TR-2C) that operates by depressing a touch bar switch is also available. The rotator stops when the switch is released. The antenna position is indicated by back-lighted windows that indicate points on the compass. The automatic system

requires 4-conductor cable; the manual system requires 8-wire cable. Price class: \$35 automatic, \$30 manual.

CDE Model TR-10. This inexpensive rotator would probably work with a small v.h.f. or u.h.f. antenna. A steel antenna mast is an integral part of the rotator and the antenna is mounted directly to it. The rotator can be attached to masts up to 1 1/2 inches in diameter. As in the model described above, there are two different control/indicator models available, an automatic and manual. Price class: \$25 automatic, \$20 manual.

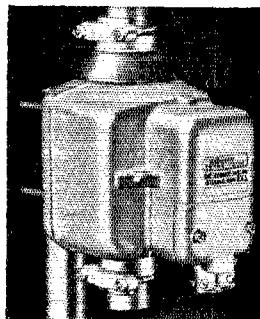


Fig. 6—Alliance Tenna-Rotor.

Alliance Tenna-Rotor Model C-225. Although advertised primarily as a TV rotator, this unit definitely is a TV or amateur antenna rotator. This husky little rotator, shown in Fig. 6, has tremendous wind-loading properties because of its unique patented construction, and can therefore safely support and rotate rather large amateur beams (see Fig. 7). The secret of the Tenna-Rotor's

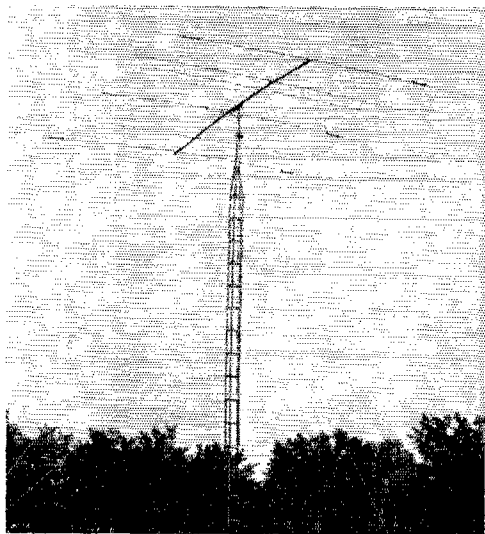


Fig. 7—Typical installation showing a TV rotator (Alliance Tenna-Rotor) and a tri-band beam.

strength is the use of through-line construction of the driving shaft. The antenna supporting mast comes straight down through the rotator and out the bottom in one unbroken piece. (The rotators described previously have in-line construction but the drive shaft ends inside the rotator housing and does not come all the way through, so that lateral loads are transferred to the ball bearings and bearing races rather than to the supporting mast). Use of a thrust bearing bracket (which probably should be called a "bending moment bracket") such as the one shown in Fig. 8 (Model TBB2), places most of the loading on the supporting mast at the bracket and at the point where the rotator is attached to the mast.

The drive motor for the Tenna-Rotor is geared directly to the drive shaft, which turns at 1 r.p.m. Magnetic braking is used and the "works" are housed in a zinc die-cast housing. The mounting clamps will take an antenna and supporting mast sizes up to 1 3/4 inches.

Although the manufacturer does not publish any official wind load ratings, the Alliance *Tenna-Rotor Service Manual* does mention that "antenna cross sections of up to 25 square feet whose acting centers are mounted not more than 1 foot above the rotor are successfully supported and rotated. . ." In the destruction tests mentioned earlier, these rotators showed capabilities of withstanding bending moments in the order of 800 to 1000 pound feet.

A super-accurate (1 to 3 degrees resettability) transistorized control/indicator is used with the C-225 and it will be discussed in Part II. Five-conductor cable is required. Price class, \$35.

Two other models are available. Both have the same rotator just described but have differ-

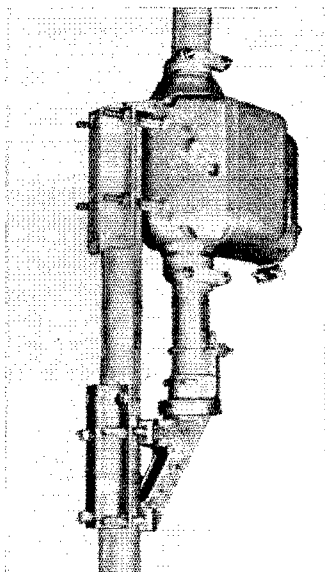


Fig. 8—A thrust-bearing bracket mounted below an Alliance Tenna-Rotor.

ent indicators. The *Model U-100* (price class \$28) has an automatic indicator. Just set the dial and the rotator turns and stops at the desired position. The *Model T-45* (price class \$23) is manually controlled and has a dial calibrated in points of the compass for direction indication. The Tenna-Rotor is made by the Alliance Manuf. Co., Alliance, Ohio 44601. Q57

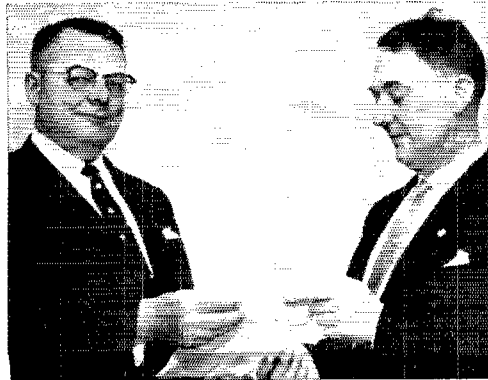
(Part II, on Indicators, will appear in an early issue of *QST*.)

Strays

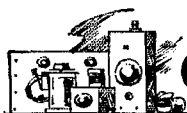
Stolen Equipment

On January 4, the following equipment was stolen from the home of Donald Yeo, WA1ARJ, 549 Middle Road, Haverhill, Mass. 01830: HQ-110C, serial No. 7601; Knight V-44 v.f.o., serial No. 3TW-235; Heathkit Twoer; Knight T-60; Knight V-107 6-meter v.f.o.; 6146 6-meter trans. (National r.f. meter on front) and Pentone and Argone mic.

Lt. Commander R. E. Mickley, USNR reports the following equipment, property of KR6DI, was stolen: Henry 2K linear amplifier, serial No. 411; Collins 3283 transmitters, serial Nos. 13701 and 13046; Collins 75S3B receivers, serial Nos. 16537 and 15226; Collins 516F2 power supply, serial No. 2176 and other number not available; Collins station controls, serial Nos. 1605 and 353; Hall-crafter receiver SR-42, serial No. 503333; Zenith transistor all-band receiver, serial No. 2007324; and Collins 312B-3 speaker, serial No. 1324.



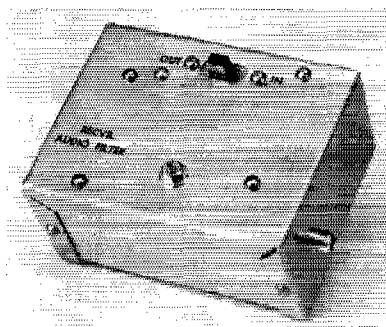
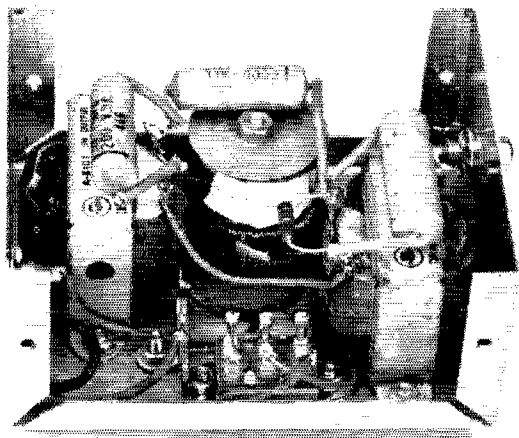
This New Year's day marked the successful inauguration of Canada's first amateur radioprinter net 3C3RTT, in regular operation. ARRL President, W0NWX, had filed messages with W1AW addressed to Canada's Prime Minister and Hon. J. W. Pickersgill, DOT's Minister of Transport. All messages were filed to be released at 0000 GMT to start the New Year. A full net session was observed. Six messages were sent to VE3COL by W1AW on 3624 kc. RTTY. Then VE3COL sent for USA ARRL officials in return; VE3GK and VE2BEN additionally worked W1AW. The Canadian Amateur Radio Teletype Group did itself proud. Since the head of the DOT was in Newfoundland the CARTG relayed on radioprinter to 3B1AT, the Newfoundland Radio Club's station at Gander. The photograph shows Fred L. Biggs 3B1AT (left) who saw the traffic through, presenting the message to Hon. J. Pickersgill DOT's Minister of Transport.



The Torofil—a QRM Reducer for the Phone Man

SOME forms of phone-band QRM can be minimized by the addition of an audio filter at the receiver's output. This is particularly true of receiving equipment that does not have a high degree of i.f. selectivity. By using a filter that attenuates the audio frequencies above 2000 and below 500 c.p.s., much can be done to improve the readability of weak a.m. and s.s.b. signals. Such a filter can, if suitably designed, remove the annoying low-frequency rumble from adjacent-frequency phone signals, and can attenuate high- and low-frequency heterodyne notes that impair readability. Similarly, high-pitched audio components from nearby signals can be greatly attenuated by the use of an audio bandpass filter. A worthwhile reduction in the level of some forms of noise is also a benefit to be realized when using audio selectivity.

When used with receivers that have broad i.f. response the Torofil shown here can make a tremendous difference in the operator's ability to pick the weak ones out of the QRM. With some transceivers, this filter will provide a marked improvement in copying phone signals; the degree of improvement will depend upon the sharpness and skirt selectivity of the i.f. bandpass.



The Torofil ready for use. The switch on the top of the case cuts the filter into and out of the circuit.

The sharper the receiver's passband, the less effective the filter will be. When used with the author's s.s.b. transceiver, which has a 2.1-kc. 9-Mc. i.f. filter, there was a very significant improvement when the Torofil was added. The improvement was really startling when the filter was used with a general-coverage communications receiver having only conventional i.f. selectivity.

The Circuit

The Torofil has a narrower passband than most audio filters. It is down 3 db. from peak output at 600 c.p.s. and again at 1900 c.p.s., and is reasonably flat in response from 700 to 1500 c.p.s. The low-frequency rolloff is very pronounced, being down some 10 db. at 500 c.p.s. This characteristic does not affect the intelligibility of a phone signal, but it does impart a somewhat unnatural quality to it.

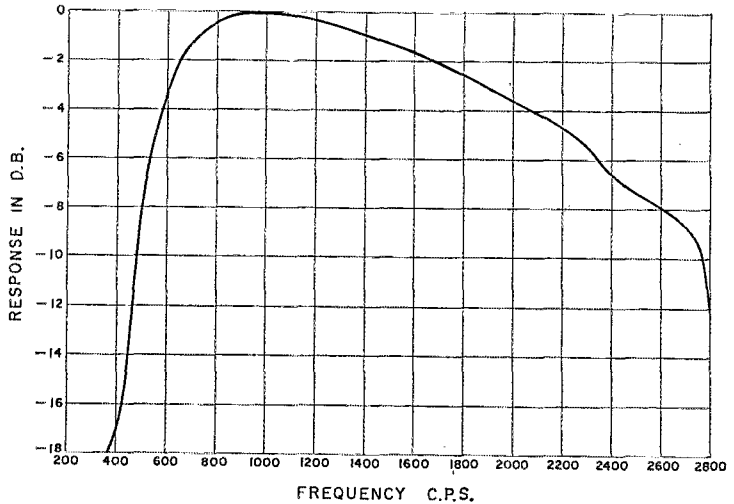
A significant difference between the Torofil and other audio filters that have been described is that it is designed for use in 4-ohm speaker leads. The insertion loss is in the order of only 3 db., so no additional audio amplification is needed; most receivers have ample reserve gain to make up for the slight loss through the filter.

Telephone-type toroid inductors¹ are used for

¹ These toroids are available from some electronic surplus outlets. Check the classified ads in *QST* for additional sources.

Parts arrangement inside the filter cabinet. The toroids are held in place by a long 6-32 screw, a washer, and a 6-32 hex nut. There is nothing critical about the layout.

Response curve of the Torofil relative to 1000 c.p.s. The low-frequency roll-off is quite pronounced. The high frequency side has a more gradual slope.



L_1 and L_2 , Fig. 1. Transformers are used at the input and output of the filter to effect an impedance match between the filter and the 4-ohm terminations. The impedance of the filter at 1000 c.p.s. is approximately 500 ohms. This is a handy figure because it enables the builder to use standard 500-ohms-to-voice-coil transformers at T_1 and T_2 .

S_1 has been included so the Torofil can be taken out of the circuit at the operator's discretion. When it is switched to OUT, the filter elements are bypassed and normal operation is restored.

Construction

The circuit is built in a home-made box that measures $3 \times 5 \times 2$ inches. (A standard $3 \times 4 \times 5$ Minibox would allow ample room for all of the parts.) Rubber feet on the bottom cover of the box prevent damage to any equipment the filter is placed on.

The toroids are bolted to the chassis with $2\frac{1}{2}$ -inch 6-32 machine screws. Plastic washers are

used between the inductors, between the chassis and the inductor nearest the chassis, and between the remaining toroid and the metal washer that holds the assembly in place. All of this hardware, except the 6-32 bolt, came with the five-toroid assembly that the author bought. The 6-32 bolt should have spaghetti tubing over it to prevent the bolt threads from damaging the insulation on the coil's windings. Use only enough tension to hold the inductors snugly in place.

Using the Filter

To install the Torofil disconnect the speaker from the receiver's voice-coil terminals then connect the filter in series with the speaker line.

For headphone operation a jack that matches the headphone plug can be wired in parallel with J_2 . Some headphones have restricted frequency response, making it unnecessary to use an audio filter, but others — hi-fi types in particular — will reproduce everything that comes through the receiver's audio line. The Torofil will be a useful accessory when used with the latter.

— WICER

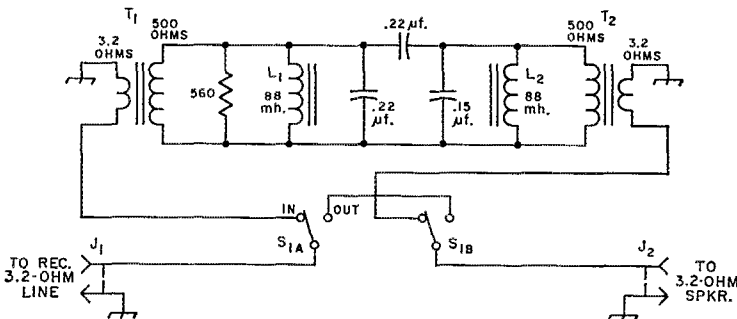


Fig. 1—Schematic of the audio filter. Capacitors are paper. The 560-ohm resistor is a $\frac{1}{2}$ -watt composition unit, and need not be included in the circuit. It was added originally to prevent possible "ringing," a condition that will not occur under normal circumstances.

J_1, J_2 — Phono connector.

L_1, L_2 — Telephone-style toroid inductor, 88 mh. If coil has 4 leads (2 windings), connect the windings in series.

S_1 — D.p.d.t. slide switch.

T_1, T_2 — 500-ohm to 3.2-ohm matching transformer (Stancor A-8101 or equivalent).

The "Monode" Noise Generator

Hot-Resistor Noise-Figure Measurement

BY RONALD E. GUENTZLER,* W8BBB

THIS article describes a noise generator that should find use in amateur work either as a noise source for noise-figure measurements or as a reference source for comparison with the output from some other noise source. It is inexpensive and simple to construct. The "Monode" noise generator is essentially a hot resistor whose noise output is known when the temperature and resistance are known.¹ The hot resistor is the tungsten filament of a No. 12 radio pilot lamp heated from a d.c. source. The term "Monode" is derived from vacuum-tube terminology, a monode being a one-element vacuum tube.

The Monode noise generator was constructed to obtain a known source of random noise to check the performance at 147 Mc. of a 5722 temperature-limited diode generator similar to the one in the *Handbook*.² The reason for desiring a means of checking the 5722 generator arose from comments by J. A. Huie³ and A. van der Ziel⁴ regarding the effects of stray capacitance and inductance on the noise output of the 5722 generator at high frequencies. (The output of a 5722 generator was found to be 12 per cent or 0.5 db. high at 147 Mc. before compensation!)

Two other Monode noise generators were built to prove that the principle of the Monode noise generator was indeed practical at lower frequencies. These generators are for use in the 6- and 40-meter bands.

* Chelston Road, South Euclid, Ohio 44121

¹ A. van der Ziel, *Noise*, Prentice-Hall, 1954, pp. 60-61.

² *The Radio Amateur's Handbook*, 42nd ed., 1965, pp. 527-528.

³ Huie, "A V.H.F. Noise Generator," *QST*, Feb. 1964.

⁴ A. van der Ziel, op. cit., pp. 63-69.

The Resistor as a Noise Generator

A resistor at any temperature above absolute zero generates a noise power

$$P = KTB \text{ watts}$$

where

$$K = 1.38 \times 10^{-23} \text{ Joules/Kelvin degree,}$$

T is the temperature of the resistor in degrees Kelvin, and

B is the bandwidth in cycles per second.

When the temperature of a resistor is other than some reference temperature, T_0 (usually taken as 290°K), it may be convenient to use the terms "excess noise temperature" or "excess temperature," which are defined as the temperature of the resistor minus reference temperature; i.e.,

$$T_{e.N.} = T - T_0.$$

The term "excess noise" is commonly used; the excess noise is the excess noise temperature divided by the reference temperature; i.e.,

$$E.N. = (T - T_0) / T_0.$$

The excess noise may be given in db., where

$$E.N.\text{db.} = 10 \log_{10} (T - T_0) / T_0.$$

In order to obtain enough noise for convenience of measurement, the resistor may be raised to many times room temperature. The filament of an incandescent lamp makes a good hot resistor because tungsten is a well-behaved material and has a high melting point. The temperature can be raised by passing a direct current through it.

The Monode Generator

The Monode has the advantages of simplicity, low cost, and being an absolute standard. The disadvantages are fixed output and the necessity for tuning each amateur band (but not within the band). The complete generator is composed of three basic parts: a regulated variable-voltage power supply, a room-temperature "quiet" termination (R_1), and the noise generator with its r.f. filtering and coupling network (Fig. 1).

The variable d.c. voltage from the power supply is used to heat the filament of the lamp. The d.c. is filtered by means of RFC_1 and a 0.001- μ f. capacitor, C_3 , to eliminate any r.f. noise component that might be present in the power supply. RFC_2 is used to conduct into the lamp the d.c. required to heat the filament while preventing the thermal noise generated in the hot lamp filament from being lost in the supply. The noise generated in the filament is

A resistor is about as basic a noise generator as you can get. The filament temperature of a No. 12 dial lamp can be adjusted to the desired resistance with sufficiently-high noise output, and the corresponding noise temperature is available from the calibration curve given in this article. With these data, measurement of receiver noise figure becomes simple.

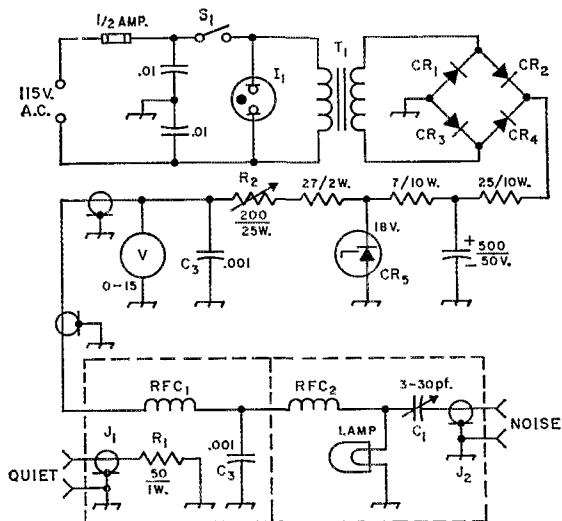


Fig. 1—Circuit of the Monode noise generator. Except as indicated, capacitances are in $\mu\text{f.}$; capacitor with polarity marked is electrolytic, other fixed capacitors are disk ceramic. Resistances are in ohms.

- C_1 —Ceramic trimmer (Centralab 822-EN or equivalent).
See text for values for frequencies other than 144 Mc.
 C_2, C_3 —Disk ceramic (see text).
 CR_1 — CR_4 , inc.—Silicon, 500 ma., 100 volts p.i.v. or higher.
 CR_5 —10-watt Zener, 18 volts (1N1819 or equivalent).
 I_1 —Neon pilot-light assembly.

- J_1, J_2 —Chassis-mounting coaxial connectors.
 R_1 —47-ohm carbon adjusted to 50 ohms.
 R_2 —Wire-wound.
 RFC_1, RFC_2 —1.8- $\mu\text{h.}$, 1000-ma. choke (Ohmite Z-144).
 S_1 —S.p.s.t. toggle.
 T_1 —Silicon rectifier transformer, 30 volts, 2 amp. A 24-volt, 1-amp. filament transformer may be used if a suitable value of resistance is substituted in power-supply filter.

coupled to the output connector, J_2 , by means of C_1 ; this capacitor also serves the function of resonating the lead and lamp-filament inductances so that the output impedance is purely resistive.

Construction

The major portion of the noise generator can be built using any mechanical construction desired. The one described was built on a $3\frac{1}{2} \times 19$ -inch relay-rack panel. The power supply is mounted in a $3 \times 4 \times 6$ -inch aluminum chassis fastened to the rear of the panel. The r.f. filter network and the quiet termination, R_1 , and its connector, J_1 , are mounted in a small Minibox. The No. 12 lamp, C_1 , RFC_2 and J_2 are mounted in an identical Minibox. The two Miniboxes are fastened together and to the panel; the connectors J_1 and J_2 protrude through holes in the panel.

One obvious innovation would be to have the Minibox containing the lamp physically separate from the power supply and connected to it by means of a flexible cord. In this event, the coaxial socket J_2 would be replaced by a plug and R_1 would be mounted in a separate plug.

The power supply is a conventional bridge-rectified, RC -filtered supply with a shunt Zener regulator. The supply was made electrically larger than necessary because it was not known at the time of construction what lamp type would be used in the final version. The $\frac{1}{2}$ -ampere, 18-volt capability gives a range of voltages and

currents large enough for experimental purposes. The actual maximum output required for the No. 12 lamp is 10 volts at 200 ma. The regulation is probably not necessary.

The noise-generator portion of the unit requires more than usual care, considering the frequency for which the unit is designed. Stray inductance and capacitance are not particularly important, although they should be kept low; this is the opposite of the 5722 generator where stray inductance and capacitance result in improper amounts of noise output. However, losses cannot be tolerated; i.e., any resistance appearing in the noise-generating circuit other than the hot lamp filament must be eliminated. This is again the opposite situation from the 5722 generator where losses will, in general, have no deleterious effects and can be beneficial.

Fig. 2 is a photograph of the noise-generating portion of the unit. The components are mounted in such a way that the lead lengths are as short as possible in order to keep their losses low. The lamp is mounted in a "socket" constructed from two of the metal inserts taken from a miniature-tube socket. An entire tube socket cannot be used because the pin spacing is improper. Also, sockets introduce the possibility of losses.

The Monode described here is usable at frequencies below 144 Mc. with slight modification. Two separate noise-generating portions were built, one for use on 6 meters and one for use on 40 meters. For 6 meters, C_1 is a 50-380-pf. mica trimmer, RFC_1 and RFC_2 are Ohmite Z-50

inductors, and C_3 is the same as listed for 2 meters. For 40 meters, C_1 is two 0.001- μ f. fixed mica capacitors in parallel, RFC_2 is an Ohmite Z-7 inductor, RFC_1 is omitted, and C_3 is a 0.1- μ f. ceramic.

For the other high-frequency bands, use the appropriate Ohmite inductor for RFC_2 , omitting RFC_1 ; use a 0.1- μ f. disk ceramic for C_3 . C_1 should be the size required to resonate the lamp filament and lead inductance in order to present a pure 50 ohms at the output connector.

Adjustment

Although the temperature of the lamp filament can be varied by varying the applied d.c. voltage, only one temperature of operation is usable because the resistance of the filament is also a function of the applied voltage, and this resistance must be set to give the proper output impedance. Some means of impedance measurement in the band in which the unit is to be used should be available; this can be either an impedance bridge or meter or an s.w.r. bridge known to be properly calibrated. The impedance-measuring device must be sensitive enough to operate on small amounts of r.f. This is necessary to insure that the r.f. getting into the lamp does not heat the filament to a temperature greater than that resulting from the applied d.c. A good check can be made by applying the r.f. while the d.c. is off. The lamp should not glow.

With the impedance-measuring device connected and operating, the d.c. lamp voltage is applied and the voltage and C_1 are adjusted until the output impedance at connector J_2 is 50 ohms,

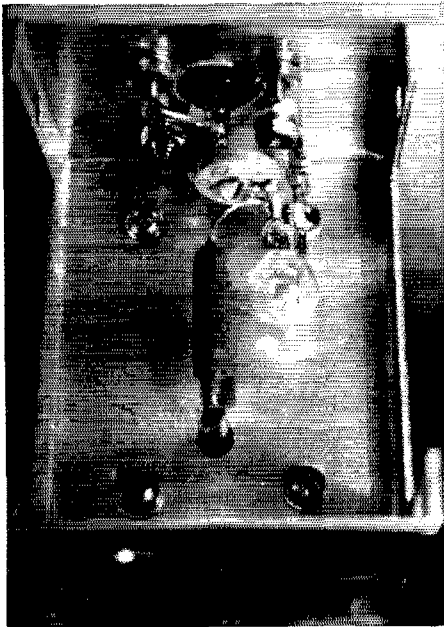


Fig. 2—The noise-generating head of the Monode. Leads between the lamp, C_1 and the coax connector are kept to the shortest possible length. The quiet termination and r.f. filter are in a similar box bolted to the bottom of the one shown.

purely resistive. The value of the lamp voltage is noted, and whenever the unit is to be used the voltage is set at this value. If the Monode noise generator is to be used as a reference for comparison with other noise generators, it is important that the output impedances of all the generators be the same. The best way to make sure that they are the same is to measure all of them at the same time, with the same measuring device, and at the same frequency.

The operating temperature of the filament can be found from Fig. 3. This curve applies to General Electric No. 12 lamps, and may not be applicable to lamps of other than G.E. manufacture.⁵ The excess temperature or excess noise can be calculated by means of previously given formulas. For example, assume that as a result of the impedance adjustment step it was found that the lamp must operate at 8.4 volts in order to give an output impedance of $50 + j0$. With the aid of Fig. 3 the lamp temperature is found to be 2430°K when operated at 8.4 volts. This is the noise temperature. If room, or reference, temperature is 290°K, then the excess temperature is $2430 - 290 = 2140$ °K, and the excess noise in db. is $10 \log_{10} (2140/290) = 8.7$ db.

R_1 should be adjusted to give an impedance of $50 + j0$ when viewed through J_2 . This resistor should be an inherently nonreactive composition type such as the Ohmite "Little Devil."

Using the Monode Generator

In using the Monode as a source of noise for noise-figure measurements of a receiver, the quiet termination of the Monode is first connected to the input of the receiver under test by means of a coaxial cable having x db. loss. (If the separate noise-head construction is used, x is taken as zero.) The output noise power from the receiver is noted; call this reading A . The Monode is then set to its operating voltage, its output is connected to the input of the receiver through the same cable, and the output power of the receiver is noted; call this reading B . The noise figure of the receiver in db. is then found from the formula

$$N.F._{db.} = E.N._{db.} - x - 10 \log_{10} \left(\frac{B}{A} - 1 \right),$$

where $E.N._{db.}$ is the excess noise of the Monode noise generator in db. Note that B and A must be in units of power and not in db.

For example, assume that a coaxial cable with 0.9 db. loss is being used between the Monode noise generator and the receiver; this makes $x = 0.9$ db. Assume that the excess noise of the Monode is 8.7 db. (from the previous example). Further, assume that the receiver noise output was 1 milliwatt with the quiet termination and 4 milliwatts with the Monode connected; this

makes $\frac{B}{A} = 4$. Therefore, the receiver noise

figure is $8.7 - 0.9 - 4.8 = 3.0$ db.

⁵ *Smithsonian Physical Tables*, 9th ed., rev. 1956, Table 85 and Test No. 7824, Miniature Lamp Dept., General Electric Co., Nela Park, 1966.

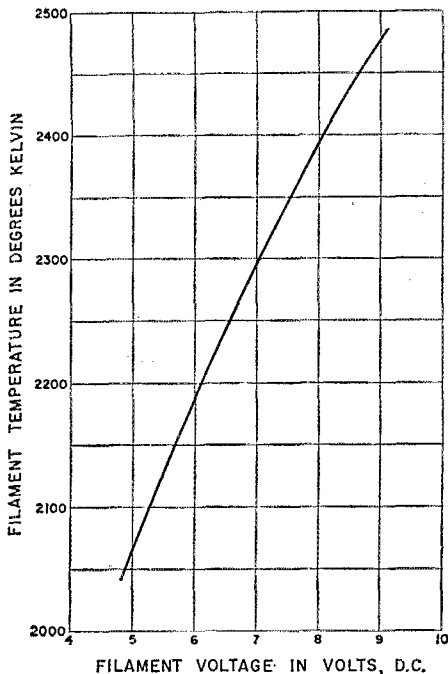


Fig. 3—Filament temperature in degrees Kelvin vs. applied d.c. voltage, G.E. No. 12 pilot lamp.

Concluding Remarks

The following comments are intended to provide a basis for further experimentation, especially at frequencies above 150 Mc.

Skin effect does not significantly increase the a.c. resistance of the lamp filament from the d.c. value, at frequencies up to 150 Mc., because the filament diameter is small (approximately 0.001 inch) and the resistivity of tungsten is relatively high. Therefore, it would be expected that the resistive component of the output impedance as seen from J_2 would be the same as the d.c. filament resistance as calculated by taking the ratio of the lamp voltage and current. However, there is about 1 pf. shunt capacitance across the lamp resulting from the lamp leads, and there is a significant amount of inductance effectively in series with the filament resistance. This inductance is principally a result of the coiled filament and the filament support leads; the total inductance is approximately 0.04 microhenry. As a result of the inductance and capacitance, the resistive portion of the filament impedance, as viewed from J_2 , is increased in magnitude. This increase is significant only at 50 Mc. and above. For the unit pictured in Fig. 2, the d.c. lamp resistance is 45.6 ohms when the output impedance is $50 + j0$ at 1.47 Mc.

The impedance step-up effect was not observed in an earlier version of this unit. The d.c. filament resistance and the output impedance were both 50 ohms. This was considered a bit of good luck until the noise output was found to be too low. It was discovered that the inductor RFC₂

was lossy and, since it was effectively in parallel with the lamp, its associated losses lowered the apparent filament resistance, the output impedance, and the noise temperature. This is why the Ohmite inductors are specified.

A different lamp type might eliminate the impedance transformation problem and the necessity for retuning or rebuilding the Monode noise generator for each different amateur band. An ideal lamp type for noise generation would be one with a straight (not coiled) filament mounted in a small-diameter tubular bulb having the lead-in wires appearing at the opposite ends of the lamp. If the leads are brought out from opposite ends of the bulb, the lamp could be coaxially mounted. This mounting scheme offers the possibility of low stray inductance and capacitance.

I wish to express my appreciation to Mr. Donn R. Hobbs of the Miniature Lamp Department, General Electric Company, Nela Park for many pieces of information regarding miniature lamps.

QST



The second annual "Amateur of the Year in Illinois" award will be presented at the 33rd Hamfest of the Hamfesters Radio Club in August. Nominations with complete facts, figures and details may be submitted prior to June 1, to the club at 6000 S. Tripp Ave., Chicago, Illinois 60629.

The Federal Register shows that of the 76 treaties and other international agreements relating to radio, 41 concern amateur radio exclusively. Additionally, even some of the remaining 35 included amateur radio. (via WØNWX and W1IXO)

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Simple "Tattoo" Control for the HT-37

BY FRED M. RUZICK,* WABGQQ

I HAVE been operating an HT-37 for a year now, and upon reading an article by W6L'VX in an earlier issue of *QST*, describing how he modified his HT-32 for automatic change-over in c.w. operation,¹ I decided to try something similar in my rig. Operating c.w. becomes a real joy because you don't have to throw any switches — just start sending. Upon stopping, the relay will open and switch your antenna from transmitter to receiver.² The addition of push-to-talk control adds the last refinement.

The diagram of the control circuit is shown in Fig. 1. With the controls in the MOX and c.w. positions, and the added potentiometer, R_1 , with its series-connected switch S_1 turned to the OFF position, the operation is unaltered from the original, the operating being controlled by manual standby-to-MOX switching. With R_1 turned to close the switch, R_1 provides a control of the length of relay hold-in. With the first light contact of the key or bug, the blocking bias on the grid of the relay tube V_{15B} (stored in the 0.22- μ f. capacitor C_{85}) is discharged through the low forward resistance of diode V_{14A} , and the VOX relay immediately closes. When the key is opened, however, the 0.22- μ f. capacitor must charge slowly through the high resistance of R_1 and R_2 until a blocking voltage for the relay tube V_{15B} is reached. The adjustment of the potentiometer provides proper "hold" so that the relay remains closed during average sending, but opens promptly when the operator stops

A few simple connections provide automatic change-over control for semibreak-in c.w. operation. Normal functions of the transmitter are not disturbed in the least.

sending. This hold adjustment is made after setting the VOX control, which has a unilateral interaction with it. The added hold control is disconnected in all but the c.w. position, however, and does not affect the VOX hold adjustment.

With this modification, closing the key, or the bug-shortening switch, grounds the VOX diode plate and disables the VOX circuit. This can be very useful when you may have a sudden outburst of noise, say, from your harmonics. Closing the key contacts disables the VOX circuit quickly, and push-to-talk can be used.

Modification Procedure

Mount a 5-megohm potentiometer, R_1 , with switch, S_1 , in the unused hole of the correct size in the rear of the chassis, between SO_7 and the coax output connector.

The main modification is done inside the sideband-generator subassembly shield. Remove this shield to gain access to the function switch.

I used the portion of FS_{1R} that connects Contacts 11 and 12 in c.w. only, without modification. This switch seems to be superfluous, since the key connected through it in c.w. only is connected through OS_{1R} in MOX only, and the key line to which it is connected is grounded through the VOX relay contacts, which are closed in MOX in all positions except c.w. anyway.

Remove the two wires on Contacts 11 and 12 of FS_{1R} and connect the wires together. This will free the contacts needed to connect the -49 volts. Run a wire from SO_4 , Terminal 6, to one of the open switch contacts, 11 or 12. Now run a wire from the other open switch contact through the hole in the sideband shield to the 10-megohm fixed and the 5-megohm variable resistors. From the resistors, run a wire to Pin 2 of the relay tube, V_{15B} . The wiring is completed by making a connection between Pin 7 of the VOX diode, V_{14A} , and the ungrounded side of the key jack.

To add push-to-talk operation, all that is necessary is to substitute a two-prong microphone connector for the original one-prong unit. The second terminal of the two-prong unit is connected to Terminal 6 of P_3 , the grounding of which will provide the push-to-talk operation.

After making the modifications, I have found c.w. operation much more enjoyable, and a high-quality push-to-talk microphone is used to its fullest extent.

QST

*221 North Garland Ave., Dayton, Ohio 45403.

¹ Godwin, "Some Simple HT-32 Modifications," *QST*, February, 1960.

² Campbell, "Tattoo — Automatic C.W. Transmitter Control," *QST*, August, 1956.

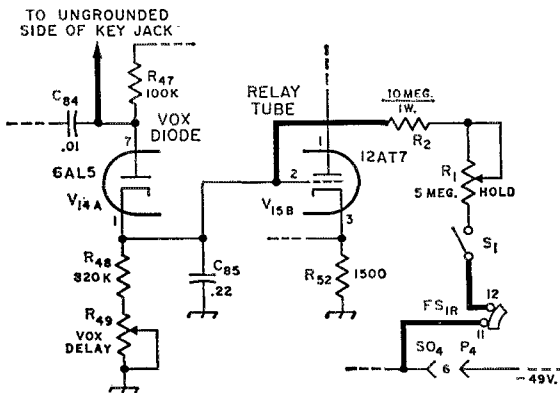


Fig. 1 — Circuit modifications in the HT-37 for "Tattoo" operation. The heavy lines indicate added wiring. Dashed lines indicate connections to original wiring which is not disturbed. Original connections to FS_{1R} , Contacts 11 and 12, are removed and tied together before the new connections shown here are made. R_1 is a linear control with s.p.s.t. switch S_1 attached.

INCREASED FLEXIBILITY WITH THE S/LINE

Provision for either transceive or independent operation is built into the Collins S/Line transmitters and receivers, but the change-over between the two types of operation takes time. With some relatively-simple modifications of the equipment the shift can be made effortless. And in the process, an entirely new feature — control of the receiver by the transmitter v.f.o. — can be added. Here are two articles outlining different methods of attacking the problem. Take your choice!

Independent Frequency Control with the 32S-1 and 75S-3

BY PETER GIANAS,* W8BPE

THE purpose of the S/Line modification to be described is twofold:

1) It eliminates the need to remove and reinstall cables to go from transceive to separate-equipment operation.

2) It enables the operator to use the 32S-1 tuning knob to control the frequency of the receiver. As an example, the 75S-3 can be tuned in the 1.4-Mc. range while operating the 32S-1 in the U. S. portion of the phone band. (So far, this is a normal function of the S/Line.) However, the U. S. portion can be monitored without touching the receiver. The 32S-1 can then be likened to a KWM-2, since it can be used as the transmitter and "receiver." This is the prime purpose of these modifications, i.e., to be able to monitor one's own transmitting frequency for DX operation or "tail-ending" a DX-U. S. QSO, without the necessity for using a second receiver.

The modification consists merely of routing the frequency-determining circuits through relays so the operator can control the receiver either with its own v.f.o. or that of the transmitter. Relays also perform the function of essentially removing the cables for separate-equipment operation. The relays are installed in close proximity to the circuits that are switched. When all relays are de-energized, all circuits are normal.

The operation of the modification, Fig. 1, is as follows: When S_{501} in the control unit is closed, relay K_{501} in the 32S-1 is operated, effectively separating the external cables and thus providing

the "separate-equipment" feature originally accomplished by removing these cables. Opening S_{501} de-energizes K_{501} and restores the equipment to normal transceive operation. When S_{502} is closed, K_{502} in the 32S-1 and relays K_{503} and K_{504} in the 75S-3 are actuated, provided S_{501} also is closed (S_{502} is disconnected from the 115-volt line if S_{501} is open). This puts the 32S-1 in the TRANS-CONTROL position. Contacts K_{502A} restore B-plus to the 32S-1 v.f.o. to be available when receiving in this new mode, since normally the plate supply to the v.f.o. is disconnected by section S9A in the 32S-1 when receiving. Contacts K_{502B} switch the 32S-1 v.f.o. output through the new cable to the receiver at K_{503B} . K_{503A} grounds the output of the 75S-3 v.f.o. in the new mode while K_{503B} picks up the output of the 32S-1 v.f.o.

To prevent out-of-band operation when the 312B5 external v.f.o. is used with the KWM-2, it is necessary for both band-selector switches to be in the same band segment at all times. To eliminate this necessity with the S/Line, K_{504} is wired as shown. When the 75S-3 is in the 14.0-Mc. portion for foreign reception K_{504} automatically switches to the 14.2-Mc.-segment crystal for transmitting. This relay can be omitted, but manual operation of the band-selector switch will then become necessary.

K_{505} in the control unit prevents accidental transmission outside the U. S. phone band if the equipment is not restored to the "separate-equipment" mode before keying the transmitter (normally this would be done, to enable listening

* 2849 Northview Road, Rocky River, Ohio 44116.

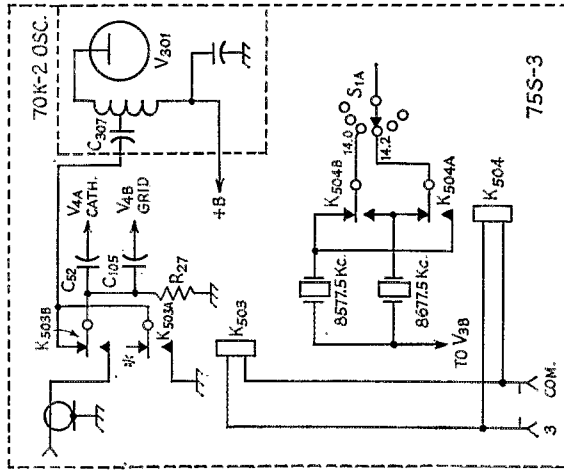
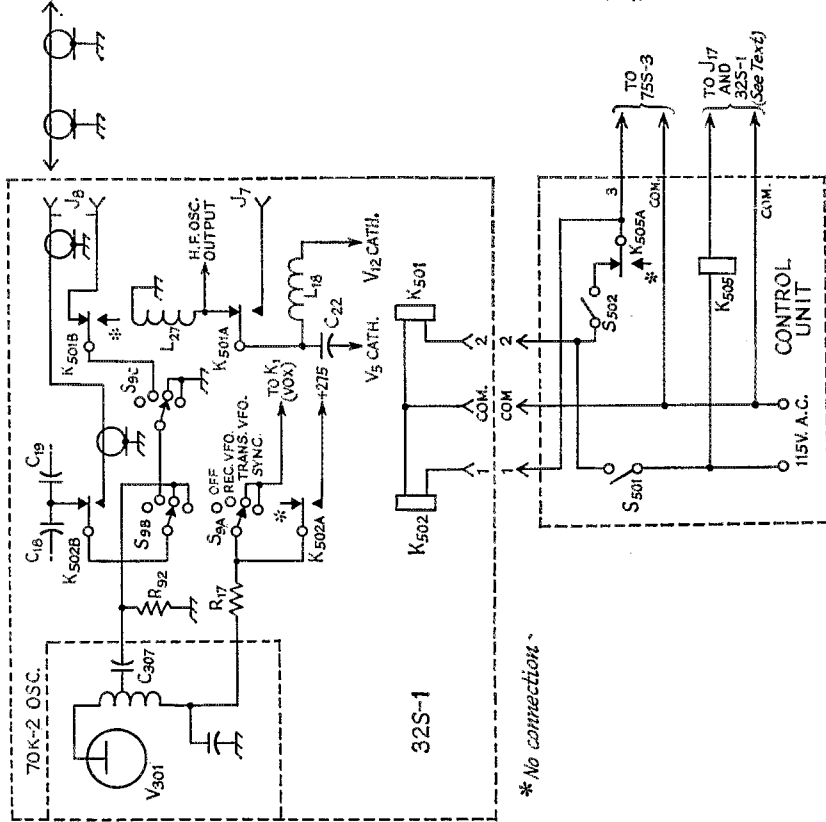


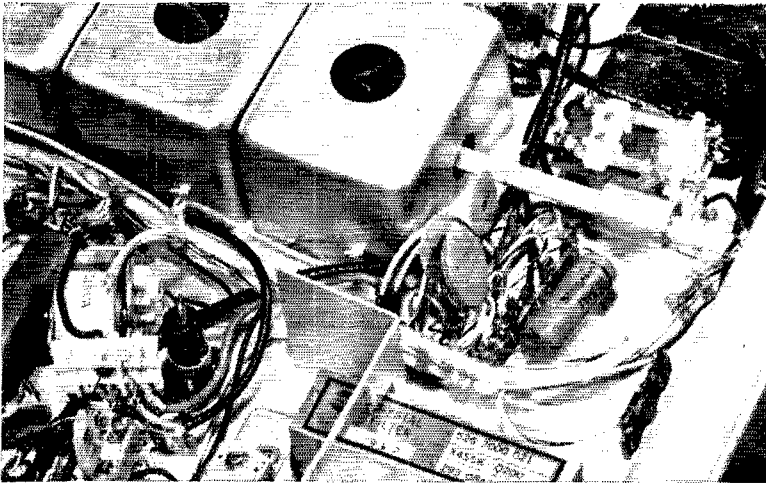
Fig. 1—Circuit changes and control system for selection of transceiver or separate operation of 32S-1 and 75S-3. Added components are identified by numbers beginning with 501; components originally in the equipment bear the manufacturer's designations.

K501-K505, incl.—D.p.d.t. midget relay, 115-volt a.c. coil, ceramic insulation. (Potter and Brumfield type KA11AY suitable).

S501, S502—S.p.s.t. toggle.



* No connection



Bottom view of the 75S-3 with relays installed, K_{503} is at the left, mounted on a bracket cemented to the chassis. K_{504} , at upper right, is fastened to the chassis with a machine screw.

in the foreign portion). K_{505} can be energized by any available pair of relay contacts in the 32S-1 that can be diverted to this purpose: for example, the contacts on K_2 that are connected to J17 for operating an external antenna relay. The ground must be removed from the movable contact of K_2 since K_{505} works off the a.c. line.

The relays in the receiver and transmitter were placed as close as possible to the circuits in question. One additional cable was required, the necessary jacks being placed at the rear of the 32S-1 and 75S-3 in any available space. Existing unused jacks can be used if the leads already on them are moved; in the writer's case, the 6.3, PTT, CONV. OUTPUT and P.A. DISABLE jacks were used.

In working out these changes originally, the use of a cathode follower after the v.f.o. was considered because it might appear to be necessary in view of Collins' use of it when the receiver v.f.o. is the controlling one in transceive. However, there was no indication of any loss of receiver sensitivity on switching back and forth

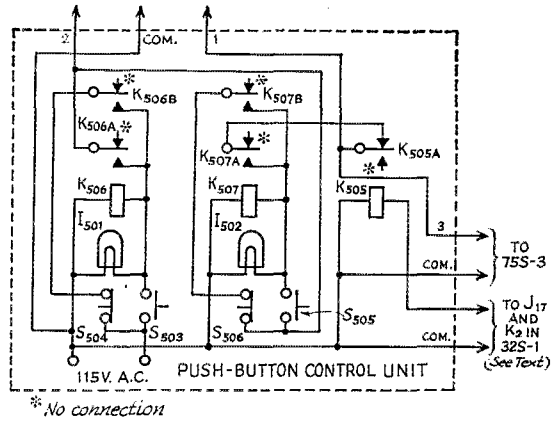


Fig. 2—Alternative control circuit using push buttons.

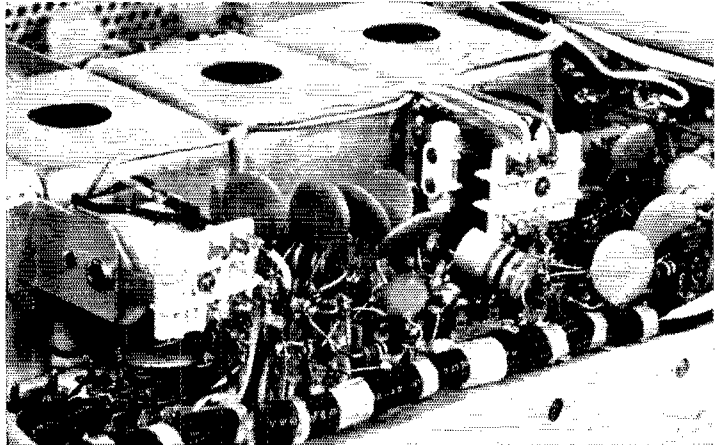
L:01, L502—Pilot lamps, 115 volts.

K_{505} , K_{506} , K_{507} —D.p.d.t. relay, same as in Fig. 1.

S_{503} , S_{505} —Push button, normally open.

S_{504} , S_{506} —Push button, normally closed.

Side view of the 32S-1, showing location of relays designated K_{501} and K_{502} in Fig. 1. Both are mounted on metal brackets cemented to the shield cans.





The push-button control box is a panel-mounted 5 × 7 × 2-inch aluminum box. Control cable to transmitter plugs into the cable socket at the rear.

between the two p.t.o.s, so the cathode follower was not included.

Push-Button Control

In the control unit used by the writer the two switches, S_{501} and S_{502} , in Fig. 1 are replaced by a pair of relays with push-button control. The circuit is shown in Fig. 2. When S_{503} is depressed, K_{506} is energized and stays energized through the latching feature provided by K_{506B} . S_{504} de-energizes K_{506} when pressed momentarily. Similarly, K_{507} is latched "on" through K_{507B} when S_{505} is depressed, and is turned off by momentarily opening the circuit through S_{506} . Pressing S_{504} will release all relays and restore the equipment to normal transceive operation.

QST ————— QST ————— QST

Cross-Band Operation with the 75S-3 and 32S-3

BY ROGER A. NEWLANDER,* WB6AYN

UP to several months ago, I operated a 75S-3 and 32S-3 combination according to Collins' recommended cabling for transceive operation. Anyone who enjoys the luxury of not having to set the transmitter to the other ham's frequency soon leaves his equipment in this configuration all the time.

With the system so connected, the receiver v.f.o., which tunes from 2.5 to 2.7 Mc., also is sent to the transmitter to vary its frequency over a 200-kc. range. The receiver uses a crystal oscillator to establish the 200-kc. band to be used, and this crystal frequency also is sent over to the transmitter so the two units will track. An additional feature is the ability to switch from transceive operation to separate control of the transmitter and receiver within the same 200-kc. range; this is done by switching in the transmitter v.f.o. by means of the FREQUENCY CONTROL switch on the front panel of the transmitter. While this allows the operator to run his transmitter and receiver at different frequencies within the same 200-kc. range, the transmitting frequency cannot be monitored without retuning the receiver on each transmission. Thus it is almost impossible to operate "cross band" effectively. Up to the time I modified the equipment, I used a separate receiver for listening in the "foreign" part of the

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phone band while retaining transceive capability in the U.S. phone band. This, of course, ties up an extra receiver.

The second receiver can be eliminated altogether and the capability of monitoring the transmitting frequency can be achieved if the transmitter v.f.o., on occasion, can be made to control the receiver instead of the other way around. This gives the operator the ability to leave the transmitter FREQUENCY CONTROL in the TRANSMITTER V.F.O. position and control the receiver

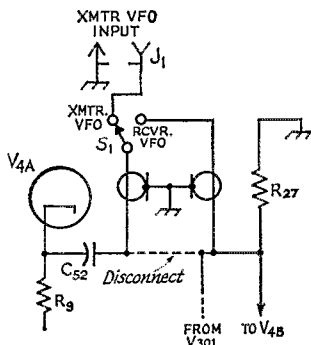


Fig. 1—Modification of the 75S-3 receiver. New components are J_1 , a phono jack, and S_1 , a s.p.d.f. wafer switch.

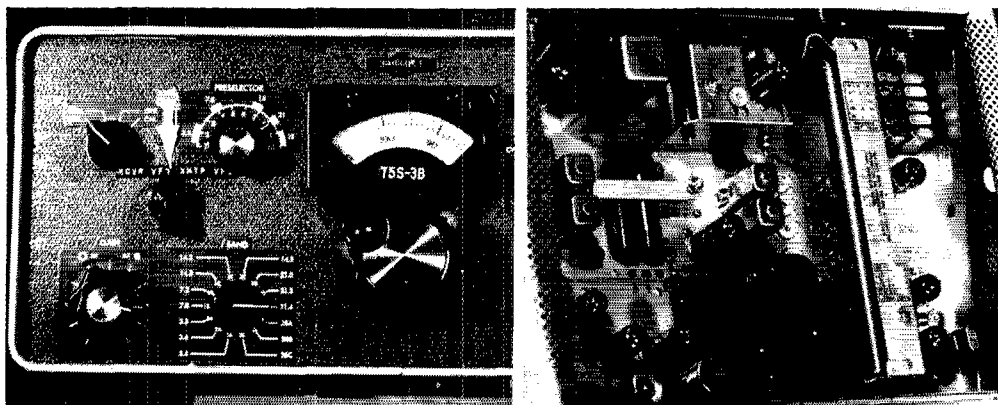


Fig. 2—The new switch in the 75S-3 is mounted below the FUNCTION and PRESELECTION controls, as shown at the left. The phono jack for transmitter-v.f.o. input mounts on a small bracket fastened to the crossbar in the receiver. It is visible at the lower right.

(1) with its own v.f.o. to listen in on the foreign DX, or (2) control it with the transmitter v.f.o. to listen on one's own frequency. Essentially, this amounts to having two independent v.f.o.s in operation. The modification to achieve this consists of piping the transmitter v.f.o. to the receiver and, in the latter piece of equipment, giving the operator the choice of using whichever v.f.o. he wants at any particular time.

It is, of course, desirable to make a modification which will not destroy the looks of the equipment or impair its operation. The following modification does essentially that, with the exception of the switch on the front panel of the receiver. If the extra hole in the receiver panel is not desired, a little ingenuity will find another place for such a switch.

Receiver Changes

The instruction book for the 75S-3 shows that the receiver v.f.o. injects its 2.5- to 2.7-Mc. signal into the cathode of V4A through C52. The signal level for proper conversion should be approximately 2.5 volts r.f., as measured by a

v.t.v.m. probe. It is necessary that the transmitter v.f.o., when used, supply this same voltage to the mixer cathode for optimum conversion; if it does not, there will be a noticeable difference in audio output or S-meter reading when switching between the v.f.o.s. on the same frequency. If a v.t.v.m. is not available a check for equal S-meter readings may be used instead.

The modification that is necessary in the receiver consists of installing a single-pole double-throw switch, S_1 , which connects the cathode of V4A either to C52 or to the new v.f.o. input from the transmitter (Fig. 1). If a wafer switch is used it may be mounted on the front panel as shown in Fig. 2. Any other suitable location may be used. However, it is important to use coaxial cable to and from the switch and to keep the leads as short as possible so as not to reduce the sensitivity of the receiver. RG-174 cable is recommended for wiring inside the receiver and transmitter because of its small diameter. An RCA phono jack may be mounted on the crossbar on the top of the receiver for the transmitter v.f.o. input connection, as is also

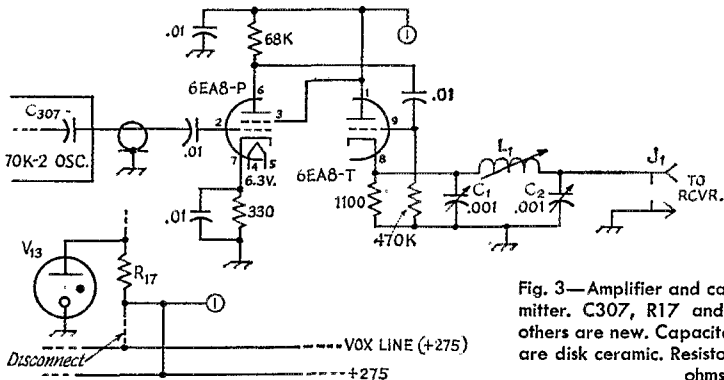


Fig. 3—Amplifier and cathode follower installed in transmitter. C307, R17 and V13 are original components; others are new. Capacitances are in μf .; fixed capacitors are disk ceramic. Resistors are $\frac{1}{2}$ -watt; resistances are in ohms (K = 1000).

J1—Phono jack.
L1—Slug-tuned, 9-18 μh .

C1, C2—Mica trimmer; maximum capacitance approximately 0.001 μf .

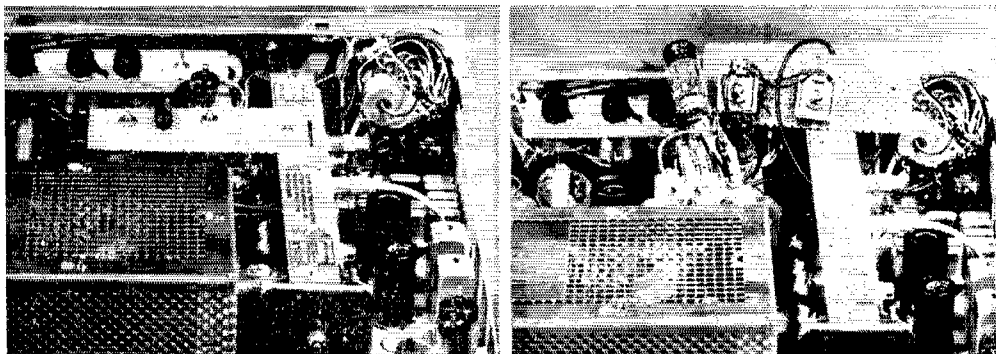


Fig. 4—Amplifier/follower assembly mounted on crossbar in 32S-3, left, and disassembled to show construction, right.

shown in Fig. 2. The chosen v.f.o. frequency is applied through S_1 to the cathode of V4A, using a coaxial lead. That is all there is to the receiver modification.

Transmitter Modification

A modification is necessary in the transmitter as its v.f.o. should not be used as is to drive the receiver. The cathode follower/line driver used in the receiver does not exist in the transmitter, and some means must be used to drive the low-impedance line. At first I experimented with a breadboard cathode follower, but soon found that there was not enough drive to give the 2.5 volts necessary in the receiver. I tried using a 12AT7 with one section as an amplifier and the other as a cathode follower, with good results, but the final circuit, Fig. 3, used a 6EA8 for two reasons: (1) the circuit had proved successful in the receiver as a cathode follower and (2) the triode stage would make a good cathode follower as well as allowing me to use the pentode as an amplifier. The output circuit (as in the receiver) is a pi network using two padder capacitors and a slug-tuned coil. Although fixed values of L and C could be used, I found the adjustable network handy for establishing the proper values and for setting the output level of the transmitter v.f.o. equal to that of the receiver v.f.o. at the cathode of V4A.

Normally, the v.f.o. in the transmitter operates off the regulated voltage from V13 (0A2) only while transmitting. It is therefore necessary to lift the side of R17 normally attached to the VOX-actuated 275-volt line and connect it to the main 275-volt line so that V13 operates all the time. The transmitter v.f.o. is now switched in to control the transmitter whenever the FREQUENCY CONTROL switch is set in the TRANSMITTER v.f.o. position. It will also control the receiver whenever the new receiver v.f.o. CONTROL switch is in the TRANSMITTER v.f.o. position. The same 275 volts may also be used for the 6EA8, and the 6.3-volt supply may be tapped for the filament connection.

The amplifier/cathode follower circuitry was mounted on a Vector turret socket, and by fashioning an L-shaped bracket from my hardware box I fastened the assembly to the flat bar

which is already in the transmitter, as shown in Fig. 4. The two padder capacitors and the variable inductor are mounted on a perforated board and held to the mounting plate by the same screw that holds the turret socket. Final adjustment is made by adjusting the padder capacitors and coil slug to get a 2.5-volt signal on the cathode of V4A when using the transmitter v.f.o. or by the S-meter test of switching back and forth between the receiver and the transmitter v.f.o.s with both tuned to the same frequency.

Typical operation is as follows, using the 40-meter band as an example: With the receiver set to tune between 7.000 and 7.200 Mc. when using its own v.f.o., the transmitter is tuned within the U.S. phone band, using the transmitter v.f.o. When S_1 is in the TRANSMITTER v.f.o. position the transmitter v.f.o. also controls both the receiver and transmitter so that the operator is listening on his transmitting frequency. When the operator wishes to listen on the foreign band, he throws S_1 to RCVR v.f.o. and immediately is in the proper portion of the DX band. He need not throw the switch back to the XMTX v.f.o. position unless he wishes to monitor his own frequency. The modification also is excellent for checking out a new frequency before actually moving to it, and is well worth the small amount of time and money.

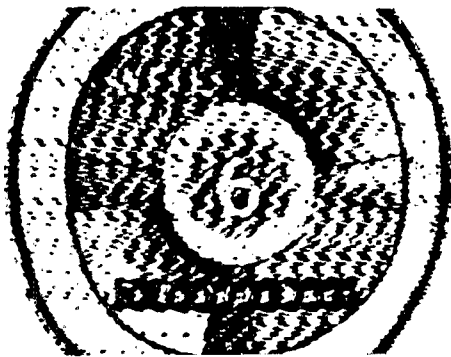
QST

Fifty Years of ARRL

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for one dollar postpaid. Titled *Fifty Years of ARRL*, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic *200 Meters and Down*, a reprint of which is also available from the ARRL for one dollar.

• *Beginner and Novice*

How To Handle TVI



Useful Information On What To Look For

BY LEWIS G. McCOY,* WIICP

If you are one of those hams that have come into amateur radio in the last year or two, you are going to be pleasantly surprised with conditions on the 20-, 15-, and 10-meter bands. Radio propagation on these bands depends to a great extent on the number of spots on the sun. Sunspots go through cycles, from a large number of spots to just a few, taking approximately 11 years to go from peak to peak or from low to low. When the sunspot number is high, world-wide communication becomes common on the above-mentioned bands. At the present time we are on the upswing of sunspots, with the peak predicted in a few years. This in turn will mean increased amateur activity on the higher-frequency bands.

Unfortunately, along with the sweet we have to face the bitter. The bitter in this case is the danger of causing television interference, popularity referred to by hams as TVI. When operating on 20, 15 or 10, the possibility of creating TVI is a great deal more likely than when operating on the lower bands, 160, 80, or 40. It isn't a problem an amateur can duck, and in this article we'll treat the whys and wherefores so you'll be better equipped to face the problem if it affects you.

The Enemy

In this case the "enemy" is simply the television receiver. Some comparisons between your communications receiver and a television set may help show you the problem. In your ham receiver the bandwidth—that portion of the radio spectrum you are hearing—is on the average about five kilocycles. On the other hand, a single television channel is 6000 kilocycles wide. In other words, a single television channel is more than twice as wide as *all* the amateur bands from 160 through 10 meters! Any radio signal that happens to fall in a television channel can cause TVI. Because a television receiver must be a broad-band device to receive television

pictures, it is also easily susceptible to interference from other signals.

There are ways of protecting the set from some of its own failings, and we'll discuss these in a moment. But first let's see where the amateur fits into the picture (no pun intended).

Harmonics

The big problem in TVI is keeping undesired signals from falling in a TV channel. It is one of the characteristics of radio equipment that when we generate a desired radio signal, additional signals also are produced, although not wanted. Such signals are usually referred to as "spurious." Harmonics of our desired signal are classed as spurious signals. Also, parasitic oscillations fall in this same category. A parasitic signal is one that usually bears no direct frequency relationship to the fundamental signal. Harmonics, on the other hand, are always exact multiples of the fundamental signal. For example, if we are transmitting on 21,200 kc. in the 15-meter band, we will find that there will be a harmonic at 42,400 kc., twice the fundamental frequency, another at 63,600 kc., three times the fundamental, and so on. Incidentally, so you won't be confused, the "second" harmonic is the one that is twice the fundamental; there is no "first" harmonic.

Usually, as we go higher and higher in the harmonic order, the harmonics get weaker and weaker. Unfortunately, however, it doesn't take a very strong harmonic to cause interference to a television picture. To give you a rough idea and to visualize the problem, refer to Fig. 1. This shows the low-band TV channels, 2 through 6, and the harmonics from three amateur bands, 20, 15 and 10 meters, that fall in this region. Parasitics are not shown but they could appear anywhere in the region.

Spurious signals are the amateur's responsibility. He must get rid of them or attenuate them to the point where they don't cause interference, by F.C.C. rules.

* Novice Editor

Fundamental Overloading

There is one other important problem which the amateur should be aware of, although it is not directly his fault or responsibility.

When a TV set is operated in the proximity of an amateur station, the fundamental signal of the amateur transmitter can be picked up by the TV set. Even though the amateur signal is far removed in frequency from any TV channel, the TV set can still have interference.

When the strong fundamental signal of the amateur station reaches the r.f. amplifier in the television set (the first stage in the set) the r.f. tube often is not capable of handling the signal. The r.f. stage becomes a harmonic generator, and the harmonics thus generated are fed through the set, causing TVI. Keep in mind that although your station is perfectly clean of spurious output, what the TV set shows is the same as if you were radiating spurious signals. In this case, though, the fault is strictly in the television set; it just doesn't have the ability to handle the strong fundamental signal from your rig. It would be simple to shrug your shoulders and say "So what, it isn't my fault." Unfortunately, we have to get along with television viewers, so we do have obligations.

The cure for fundamental overloading is a more selective front end on the TV set, or a more selective circuit. One device that will solve this problem is called a high-pass filter. A high-pass filter is a combination of capacitors and coils that will permit certain frequencies to pass through but will attenuate others. A high-pass filter for a TV set is usually designed to pass all signals in the TV channels while attenuating any signals below Channel 2. Such a device will prevent your fundamental signal from reaching the front end of the set. The high-pass filter is installed between the antenna terminals on the set and the first stage, usually as close to the TV tuner (front end) as possible.

Cleaning Up Your Spurious Signals

We just described how a high-pass filter works on a TV set to stop fundamental signals, but a high-pass filter will not prevent a harmonic from your rig from getting into the set. Keep in mind that the harmonic will be in the same channel as the TV signal, so we must stop the harmonic at the transmitter.

The opposite of a high-pass filter is a low-pass filter. This is a combination of coils and capacitors that will permit any signals *lower* than its "cut-off" frequency to pass through to the

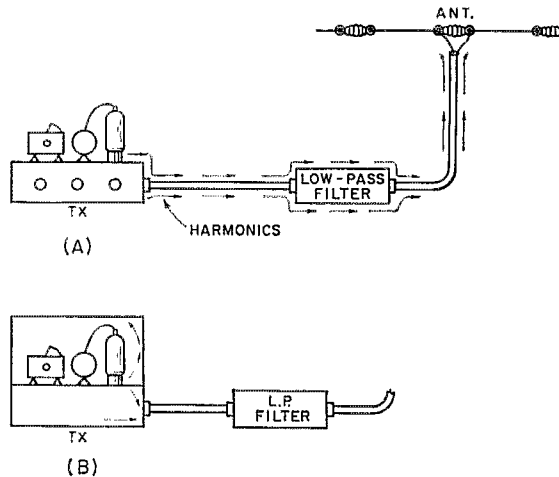


Fig. 2—A—harmonics can escape from the transmitter, flow around the filter and reach the antenna to be radiated. B—a well-shielded rig keeps the harmonics inside the case so the filter has a chance to do a job.

transmitting antenna but will prevent any higher-frequency signals from getting by. Low-pass filters for the 80- through 10-meter bands are usually designed with a cut-off frequency slightly higher than 30 Mc. This permits any ham signal to reach the antenna but stops the harmonics.

However — and this is most important — in order for a low-pass filter to work, the transmitter itself must be tightly shielded so there is no other "escape" route for the harmonics. This means that all circuits that carry any appreciable amounts of r.f. must be shielded up to the antenna terminal. Otherwise, the harmonics can escape by flowing around the filter and up to the antenna to be radiated. Fig. 2 shows an example of this.

Shielding

If you live in an area where TVI is likely to be a problem — you can check this by studying Fig. 1 — on the bands you plan to use, you will want a shielded transmitter to prevent harmonic radiation. If you plan on buying a transmitter there are certain points that should be checked.

Nearly all commercially built rigs come in metal cabinets, but a metal cabinet doesn't necessarily mean the rig is well shielded. If the cabinet has any cracks or large openings, such

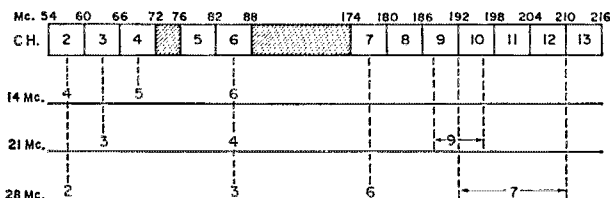


Fig. 1—This chart shows the v.h.f. TV channels and their relation to harmonics from the 20-, 15-, and 10-meter bands.

as meter or dial holes, harmonics can escape and get around a filter. It is possible to get away with large openings for meters if the meter itself is shielded and its leads are bypassed. Areas in a transmitter where r.f. is generated and amplified, particularly the final amplifier, should be tightly shielded. A common method is to use a perforated-metal shield around the amplifier stage. The metal must be free from paint on touching surfaces, otherwise the harmonics can leak out. Clean metal to metal surfaces are a must. Additionally, the chassis should have a bottom plate. These are all points to check if you plan on buying a rig.

When buying a rig, examine it carefully for shielding. Ask to see the instruction manual because this will usually show bottom and top views along with the circuit diagram, and you can check to see if such things as a.c. leads are shielded, or are filtered with chokes and capacitors where the leads leave the transmitter. If you are a newcomer and haven't had any experience in amateur radio, check with other local hams if possible and see what they are using and how they handle the problem. In many radio stores the clerks have little, if any, knowledge about the subject so you may have to depend on local hams or your nearest radio club to help you.

If you are building your own rig and live in an area that has harmonically-related television channels you'll have to follow good shielding and filtering techniques. Every rig has its own problems, and we would recommend a study of the complete chapter on interference in *The Radio Amateur's Handbook*. This chapter treats the entire subject in detail, including construction of both high- and low-pass filters, how to filter leads, and so on.

Some Methods of Testing

The first check to make for harmonics is in your own home. If you have interference on your own set you should, as a first step, install a high-pass filter on the TV set so you'll be sure that fundamental overloading cannot take place. If the antenna terminals are mounted on the back cover of the set, as they are on most models, remove the cover and install the filter as close to the tuner as possible, making sure that you ground the filter case to the chassis of the set. After the filter is installed run the 300-ohm twin-lead from the filter to the antenna terminals. If you just connect the filter on the antenna terminals it may not do a job for you because the 300-ohm lead between the filter and the tuner may pick up enough fundamental to cause TVI.

Once you have the high-pass filter installed, turn on the rig and check the picture. TVI will run all the way from a complete reversal of the blacks and whites (a negative picture) to a herringbone pattern which may have various degrees of intensity depending on the strength of the harmonic and its relation to the video carrier frequency. The video carrier frequency is 1.25 Mc. above the low edge of the channel; for example, Channel 2 is 54 to 60 Mc. and the video

carrier is at 55.25 Mc. The sound carrier is 0.25 Mc. below the high end of the channel. The closer your harmonic is to either of these two frequencies, the more severe the interference is likely to be, and TVI often can be reduced by an appropriate change in transmitting frequency. For example, a third harmonic from your 10-meter rig may cause severe TVI in Channel 6 (82 to 88 Mc.) but if you move your fundamental frequency anywhere above 29.3 Mc. your third harmonic will move completely out of the Channel 6 range. Many amateur 10-meter nets that operate in a Channel 6 area simply move above 29.3 Mc. and forget about TVI. However, the real answer is adequate shielding and filtering.

Getting back to cleaning up your own TVI, the next step is to test the transmitter with a dummy load, one of the shielded variety. Tune up the rig, using the dummy load, and check the harmonically-related channels on the TV set. If there is even the slightest trace of interference you'll have to install a low-pass filter and possibly improve the shielding in the rig. If the picture is clean you can make a further check on harmonic leakage from the transmitter. Take a length of 300-ohm Twin Lead long enough to reach from the rig to the TV set, and solder a one-turn loop of insulated wire, about an inch or so in diameter, between the wires at one end of the Twin Lead. Connect the other end to the TV set's antenna terminals, along with the regular TV antenna. (While it isn't likely, you may find that TV picture is considerably weaker or disappears when the Twin-Lead is connected. So, the Twin-Lead should be slightly shortened or lengthened. What has happened is the pick-up loop and Twin-Lead happens to be a half wave long, or multiple thereof, at the TV channel frequency and is acting as a trap for the signal. Lengthening or shortening the twin-lead by 12 inches will eliminate this problem.)

With the transmitter running into the dummy load, move the loop around the rig, checking all openings, knob shafts, and leads coming out. You can quickly see on the TV screen where the bad spots are in the transmitter. And, as outlined in the *Handbook*, install shielding or correct the leakage as needed. Once you get the rig clean you can put on your transmitting antenna and you should have a clean setup in your own house.

The Neighbors

We would never suggest that you canvas the neighborhood to see if you are causing TVI because this would be looking for trouble! Most TV set owners have no idea of the workings of a TV set. All they know is that they paid good money for the set and it shouldn't "need" anything to get a good picture. Past experience has shown that TV viewers are inclined to blame "that ham down the street" when anything goes wrong, and we do mean anything — ignition noise and any of the host of things that can cause poor TV reception.

This doesn't mean that you should ignore the neighbors. If you have a TVI complaint — and we cannot stress this strongly enough — be polite, courteous, and civil. Many areas have TVI committees formed by local radio clubs. If your area has such a committee by all means contact the group and ask their help. It is better if a disinterested party, one who is not emotionally involved, handles the complaint.

However, in many instances you'll have to handle it yourself. Some amateurs have invited the complainant to visit their stations and then showed that they had no interference when the transmitter was operated. Usually the set owner will ask how come his set has problems, and this is your chance to explain that possibly his set doesn't have adequate rejection of undesired signals. And by undesired, you mean all types of signals, not just amateur. You won't be lying. If his set is subject to fundamental overload from your signal it may not be able to reject other undesired signals. You can tell him that a high-pass filter only costs a few dollars but should be installed by a reliable TV serviceman. If you can possibly help it, don't put the filter in his set yourself — or, for that matter, make any adjustments on the TV sets. If anything goes wrong in the future you are liable to be blamed for it. However, talk to the serviceman and impress on him what is happening, and where the filter should be installed.

Dealing with TV viewers is never easy, so use all the tact you can. Above all, don't lose your temper even though you know you are right!

Other Useful Information

Color TV is becoming more and more popular and all of the cures for black and white TVI hold true for color reception. The only real difference between the two is that TVI with color is prettier! As to color, there are a couple of frequencies worth mentioning that could cause a problem.

The color subcarrier in a color transmission is approximately 3580 kc. above the video carrier. For example, in Channel 2 the video carrier is 55.25 Mc., which puts the color subcarrier frequency at 58.83 Mc. The second harmonic of a 10-meter signal at 29,415 kc. would fall on the same frequency as the color subcarrier. Such a harmonic, if strong enough, would degrade the color picture. So, this 10-meter frequency should be avoided if necessary. Also in Channel 6, avoid the third harmonic of 28,943, and in Channel 4 the fifth harmonic of 14,165 kc. The following harmonics fall on the color subcarrier frequency in the higher channels: Channel 9, the ninth harmonic of 21,233; Channel 10, the ninth harmonic of 21,314; Channel 7, the seventh harmonic of 28,125; and Channel 11, the seventh of 28,975. These are the only ones that need be watched out for.

In some of the more elaborate consoles that combine TV and stereo, audio interference to both TV and stereo might occur due to fundamental-signal pick-up on speaker or a.c. leads. A recent article treated this subject in detail,

and if you run into the problem it would be worthwhile to apply the techniques of bypassing described there.¹

Many amateurs feel that because they are 30 or 40 miles from the nearest TV station that they are in a fringe area. This isn't necessarily true. It probably can be safely assumed that if a TV viewer receives a "snow"-free picture on a regular basis he can't be considered to be in a fringe area. Snow in a TV picture is simply noise which becomes visible in the picture due to the lack of sufficient TV signal strength to override it. If the signal is so weak that only a snowy picture is possible, a very weak harmonic is likely to cause TVI. Under such conditions, the very best of shielding and filtering is a real must. Either that, or operation on bands or frequencies that could cause harmonic TVI should be avoided if possible. We have plenty of bands and frequencies that we can use to avoid TVI problems if it becomes necessary. Just choose a band or frequency where interference cannot occur.

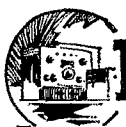
When setting up your station be sure that all connections in the antenna system are good. When tuning up your transmitter do not use more than required grid drive or current to any stage, particularly the final amplifier; overdriving a stage can cause excessive harmonic generation. Your instruction manual should give you the information on how to tune up. If you are using a t.r. switch install the low-pass filter after the t.r. switch — transmitter, t.r. switch, and then filter, in that order. Some t.r. switches can actually generate harmonics, so the low-pass filter should be installed so as to suppress these harmonics.

In many areas, ultra-high-frequency television (u.h.f.) is used. As far as amateurs are concerned, there have been few, if any, harmonic problems with this type of television. In some rare instances, amateurs operating on the v.h.f. bands have run into u.h.f. TVI, but such cases are unusual. We haven't treated amateur v.h.f. operation, here, and there are some TVI problems particularly related to such operation. It is recommended that the *Handbook* or *The Radio Amateur's V.H.F. Manual* be studied if v.h.f. operation is contemplated. QST

¹McCoy, "Hi Fi and Organ Interference," June 1966 QST.

Strays

The 1967 International Mobile Rally will be held June 18 at RAF Alconbury, Huntingdonshire, England. This rally is jointly sponsored by the U. S. Air Force and the Amateur Radio Mobile Society of England. Every effort is made to provide truly international representation. Advance notice is required for booking accommodations in local hotels. Correspondence concerning the event may be sent to the Project Officer, MARS Director AJIAA, International Rally, Box 3234, APO New York, 09238.

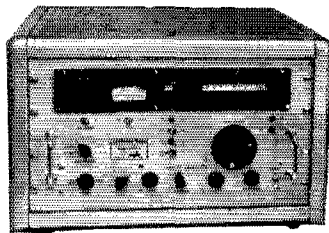


Recent Equipment



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

The ITT Mackay Marine 3010-B Receiver



THE odds are good that most amateurs think their commercial receivers represent the last word in sophisticated communications equipment. After all, the prices are high, the competition is keen, and obviously the communications problems of ham radio can only be solved by the finest gear available. It may come as a slight (non-electrical) shock to learn that such is not the case. Our ham-bands-only receivers are compromises between quality and manufacturing expediency, like just about everything else. If in the course of a day's operation we get jammed by a few loud signals, so what? It isn't a matter of life and death.

On the other hand, the shipboard operator is paid to get the message through. Receivers are built to help him do this, even though he's tied up near a coastal or broadcast station. He can't

afford to have a receiver that can't handle strong signals or that is subject to cross modulation.

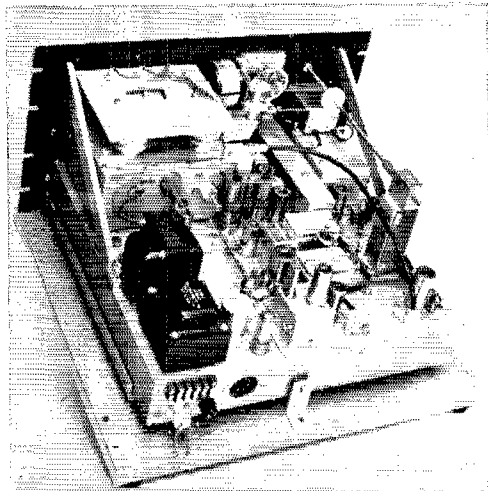
The 3010-B Marine Receiver is being offered to the amateur market. It isn't likely that many hams will buy it, because the price tag is a bit steep. Not for what you get, but for the limited amateur-bands use it might receive. On the other hand, anyone wanting a superb "all-wave" receiver (its range is 70 kc. to 30 Mc.) might well consider it. Any receiver buff should at least learn something about it. If you get a chance to listen to one, take it, even if it means crawling a few miles through snowdrifts or over a hot desert!

Electrical Details

Referring to the block diagram in Fig. 1, the first thing you notice is the numerous filters throughout the receiver. They aren't there for an ad man's sales pitch; they are there to eliminate the "cruddies" one is likely to find in a less-refined multiple-conversion receiver. The first filter is in the antenna circuit, to reject the broadcast band (unless you want to listen to it). This is followed by an input attenuator, a panel-controlled resistance ladder that can introduce as much as 40-db. loss. The input tuning is a single circuit, switched and capacitor-tuned. If the r.f. amplifier tube type number is unfamiliar to you, look up its price and you'll know why you haven't seen it in many ham receivers. The 7788 is an extremely high- g_m tube, run at less than maximum gain in this application.

The r.f. amplifier is followed by a low-pass filter (cut-off frequency of 30 Mc.) and a cathode follower. The mixer is a four-diode ring balanced-mixer configuration, driven by a crystal-controlled local-oscillator signal. Since the basic tuning range of the receiver is 2.0 Mc., the local-oscillator crystals are switched in at 2-Mc. intervals. Note that the only gain between antenna and the first i.f. is in the r.f. amplifier, presumably to reduce chances for cross modulation.

The first i.f. is a 2-Mc. bandpass above the signal frequency, to permit the continuous cover-



Rear view of the 3010-B receiver shows typical heavy construction—those supports to the panel are $\frac{3}{8}$ inch thick! Right-angle drive at right drives crystal-selector switch below chassis; note chain drive to drum indicating bands in use. Square plate to left of drum covers tape reels for dial.

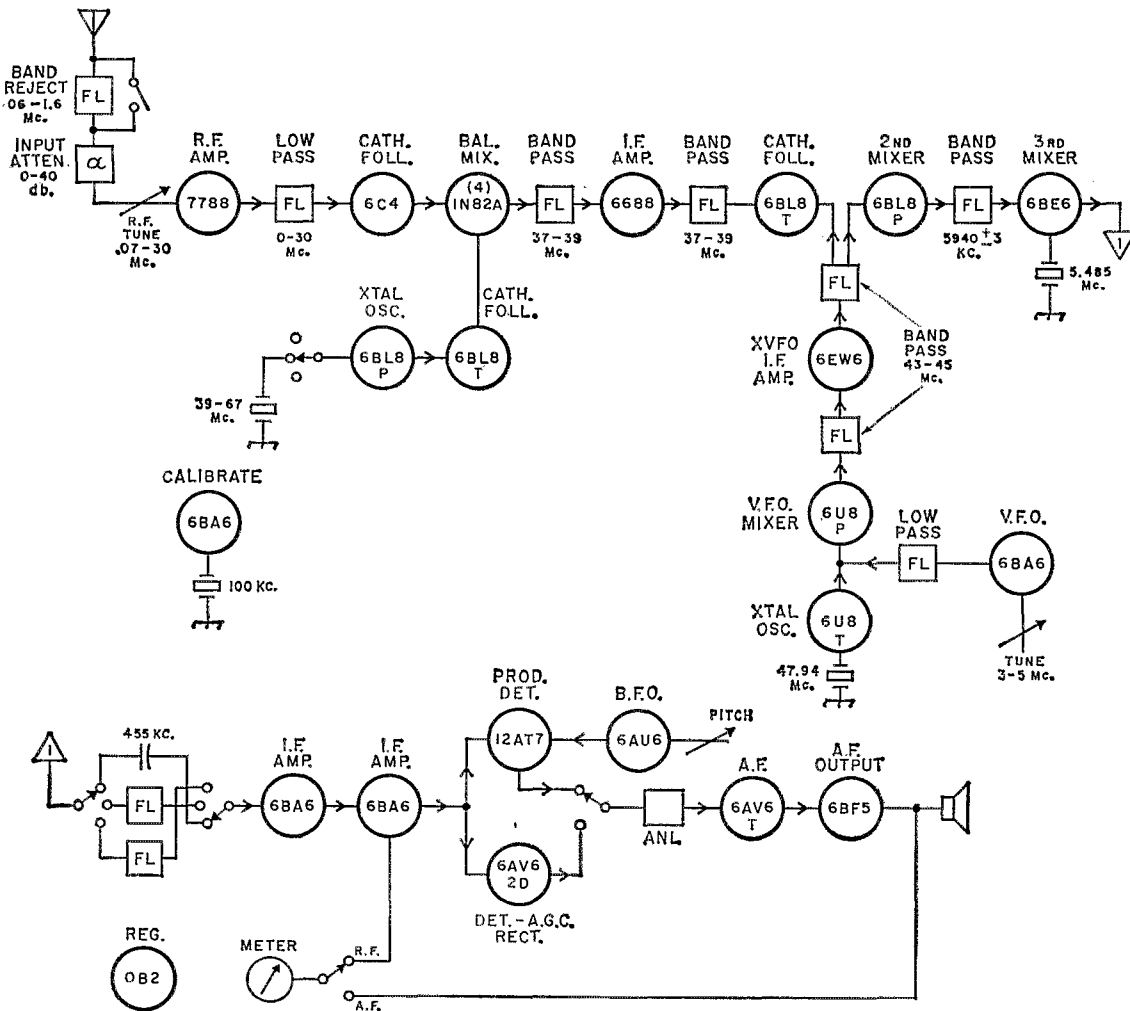


Fig. 1—Block diagram of the Mackay 3010-B Marine Receiver. This multiple-conversion wide-range receiver is unusual in its i.f. sequence and its widespread use of filters.

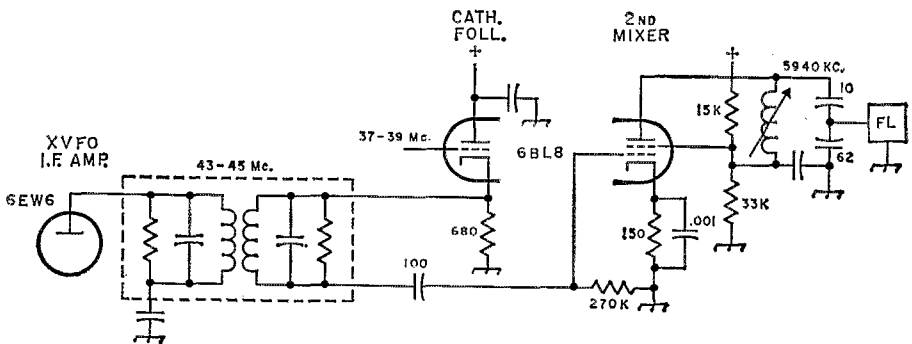


Fig. 2—"Series" mixer injection used at second mixer stage.

age of the receiver without changing intermediate frequencies somewhere along the line. Its amplifier tube, the 6688, is also an uncommon one. It has a high price tag and is a high-reliability type designed for broad-band amplifier use.

The broad-band first i.f. is followed by a 6-kc. wide second i.f. To get there, the second mixer is driven by a local-oscillator signal obtained by frequency conversion of a basic 3- to 5-Mc. tunable oscillator. Note the low-pass filter following the tunable oscillator and the two bandpass filters following the v.f.o. mixer. The apparently peculiar routing of the signal from 6B8L cathode follower through the second 43- to 45-Mc. band-pass filter is to show that series injection of the local oscillator signal is used (see Fig. 2).

The third mixer brings us into more familiar territory; it is a crystal-controlled 6BF6. The third i.f. amplifier has two degrees of selectivity, obtained from mechanical filters. The sample receiver had bandwidths of 3.1 and 0.5 kc. When the filters are switched out, the 6-kc. bandwidth of the 5.94-Mc. crystal-lattice filter sets the bandwidth. Amplification at the 455-kc. third i.f. is obtained from two 6BA6 stages. C.w. and sideband detection is obtained in a 12AT7 product detector, and the two diodes of a 6AV6 serve as envelope detector and a.g.c. rectifier. When switched in, the full a.g.c. voltage is applied to the two 6BA6 i.f. amplifiers and a fraction of it is used on the 7788 r.f. amplifier. Manual gain control is obtained by changing the cathode voltage of the first i.f. amplifier.

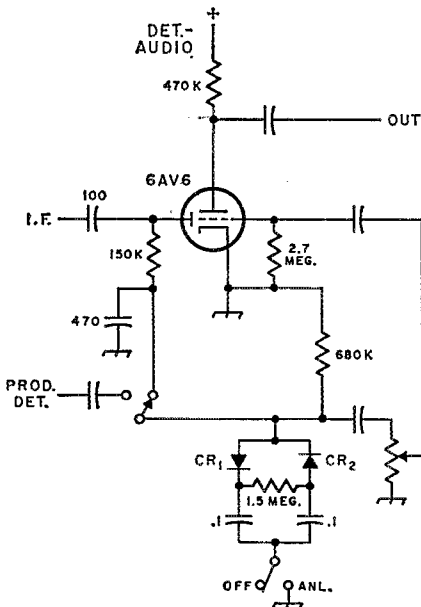
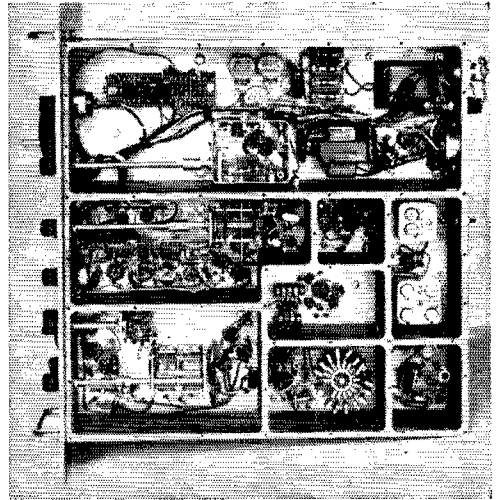


Fig. 3—Automatic noise limiter used ahead of audio amplifier.

CR₁, CR₂—600 p.i.v., 500-ma. silicon (Sarkes-Tarzian F-6).



Removing bottom plate reveals heavy die-cast construction of chassis. Lower-right section houses input attenuator and tuning capacitor. Note shield (cover removed) within left-hand compartment; it houses the b.f.o. components. Lower center compartment houses 455-kc. i.f., where a shield is used between the two sections of the selectivity switch. Upper center section houses two 43-45-Mc. band-pass filters.

The automatic noise limiter consists of two self-biased silicon diodes (see Fig. 3) just ahead of the audio gain control. This limiter reduces the amplitudes of pulse-type noises to approximately that of the signal.

In the audio section, the 6AV6 triode and a 6BF5 tetrode round out the receiver.

Physical

The tuning drive is a large knob giving approximately 100 kc. per revolution. Its scale is a moving tape marked every 2 kc., and 100 kc. averages about 4½ to 5 inches along the tape. Since the 2-Mc. range requires a tape almost 90 inches long, it is not surprising that it is stored on two reels rather than run around the interior of the receiver. A window to the left of the window for the tape reveals the two megacycle segments in use. To read the scale, the operator matches the color of the tape (yellow or green) to the colors in the Mc. window. For example, with the bandswitch set to the 14 and 15 Mc. range, yellow tape indicates the 14-Mc. segment and green tape the 15-Mc. section.

Band changing is sometimes a double-switching action, since the main tuning range (14-15 Mc., 20-21 Mc., etc.) and the input tuning range (8-16 Mc., 16-30 Mc., etc.) may both have to be switched. A knob marked "R.F. TUNE" serves as an input peaking control; it turns a 365-pf. capacitor on the 1-octave ranges starting at 2 Mc. This peaking capacitor has an additional 365-pf. section switched in at lower frequencies to cover the 3-to-1 frequency ranges below 2 Mc.

The tuning meter serves a dual purpose: it can be switched to give an "r.f." reading (a.g.c.

ITT Mackay Marine 3010-B Receiver

Height: 13¼ inches
Width: 21½ inches
Depth: 18 inches
Weight: 45 pounds
Power Requirements: 95 watts, 115 v., 50-60 cycles.
Price Class: under \$1600.
Manufacturer: ITT Mackay Marine, 133 Terminal Avenue, Clark, N.J. 07066

derived) or an "audio" (rectified audio output) indication.

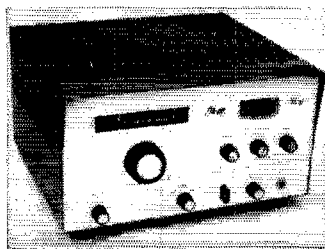
Tuning across the bands, the outstanding

impression is that here is a receiver that doesn't "fold up" in a hurry. The League lab is well situated for giving receivers a rough time (two b.c. stations within two miles, and W1AW 200 yards away), but with the band-rejection filter switched in there was no trouble on 80 meters with the b.c. stations. (Amazing how the b.c. harmonics and "cruddies" disappeared.) On 21 Mc., with W1AW on the air, signals could be copied 50 kc. on either side of the IIq. stations's frequency! Needless to say, this required cranking in most of the input attenuation, but it shows what can be done. A future "Gimmicks and Gadgets" titled "A Low-Z Ladder-Type Attenuator." Watch for it.)

—W1DX

QST ————— QST ————— QST

Squires Sanders 66-er 50-Mc. Transceiver



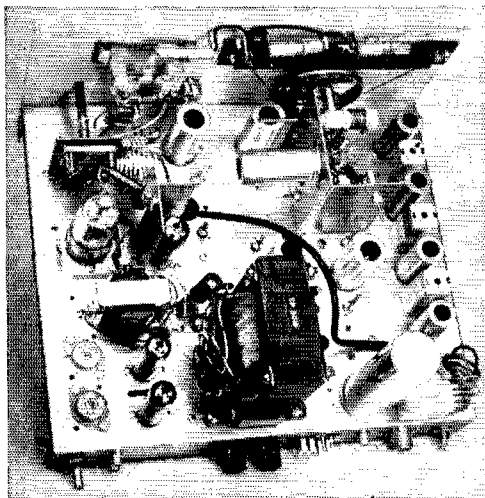
THOUGH the SS 66-er is a successor to the well-known 99-er, a self-contained 50-Mc. a.m. transceiver, it is more like a 22-er. If this 'er business leaves you confused, you're just not familiar with the Squires Sanders line of v.h.f. gear. We were tempted to refer to the QST re-

port on the 22-er (144-Mc. transceiver)¹ and say that the 66-er is "the same thing, except —," because the manufacturer did the main engineering job when he produced that moderately-priced a.m. transceiver for the 2-meter man. The 66-er looks almost identical, but it is an interesting example of how a design for the higher band can be adapted for the lower, with a minimum of effort.

There may be things in the 66-er that would not have been there if it had been the first design project, but the fact that the circuit and layout were originally for 144 makes them all the better for 50. Comparison of the pictures with those of the 22-er in April 1965 QST will show no clearly-visible difference, but the block diagrams show that the tube complements vary considerably. Our 66-er diagram is presented in a slightly different manner from that given for the 22-er in order to point out salient features of the 66-er, and also show some points common to both that were not brought out in the report on the other unit.

The transmitter r.f. lineups are similar, except that one less 12BY7 stage is needed for the lower band. The oscillators are identical, except for the slightly higher crystal frequencies required, 8.334 to 8.666 Mc. for the lower half of the 50-Mc. band. Crystals for 12.5 to 13 and 25 to 26 Mc. may also be used. The oscillator is the triode portion of a 6KES, V_{11A}, with output on 25 to 26 Mc. The pentode section, V_{11B}, doubles to 50 to

¹ "Recent Equipment," QST, April 1965.



Interior view of the SS 66-er. The tunable oscillator for the receiver is connected to the slide-rule dial, upper right. Transmitter circuits are at the upper left. Receiver tuning range is 50 to 52 Mc.

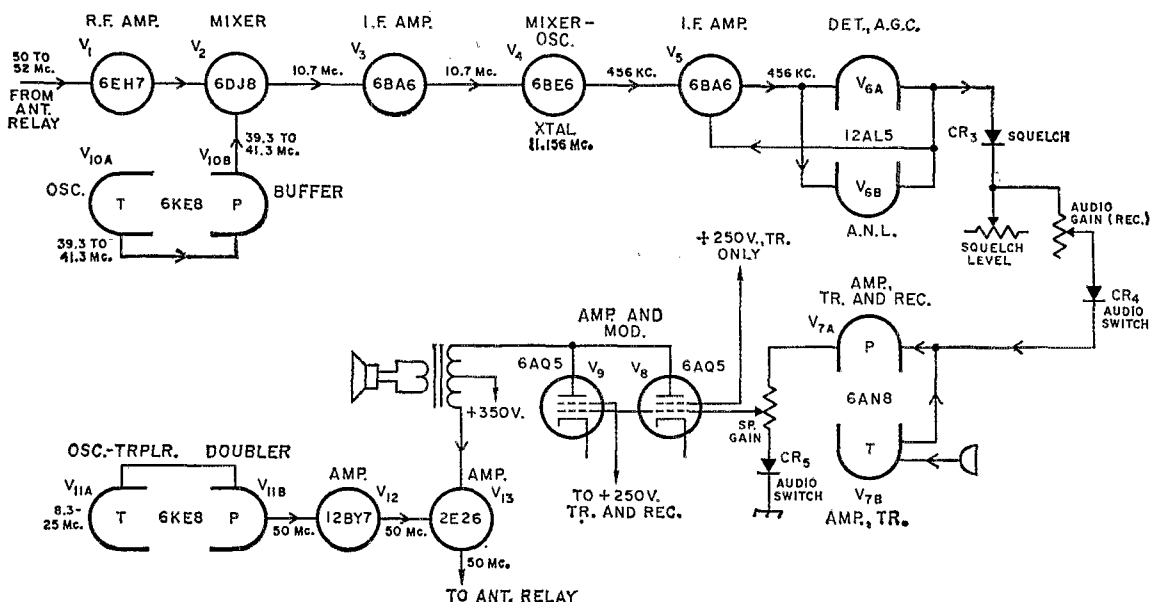


Fig. 1—Block diagram of the Squires-Sanders 66-er. Audio circuits are shown in partial schematic form, to point out unusual features therein.

52 Mc. A 12BY7 amplifier, V₁₂, drives a 2E26 output stage to about 13 watts output. Straight-through operation of the driver helps to keep down radiation of unwanted frequencies, and permits all stages to be operated at a conservative level.

In the receiver, a high-transconductance 6EH7 pentode amplifier, V₁, gives more than adequate gain and noise figure, and is relatively free from overloading compared to the usual triode stages. Its a.g.c. voltage is controlled by a Zener diode (not shown in Fig. 1) which delays application

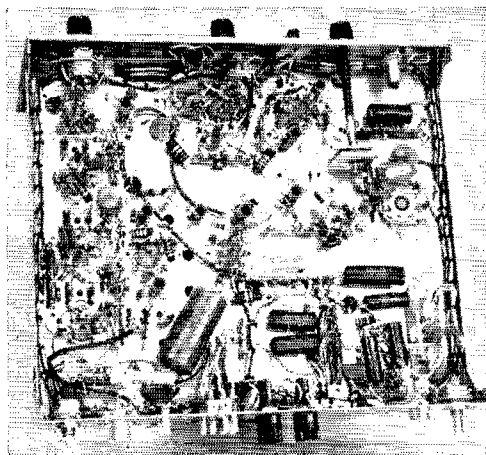
until a comparatively large signal is tuned in. The stage thus operates "wide-open" on weak signals, giving optimum gain and noise figure when these characteristics are needed.

Oscillator injection at 39.3 to 41.3 Mc. is generated in the triode portion of a 6KE8, V₁₀. Its pentode half, a buffer-amplifier, feeds one grid of a 6DJ8 double-triode cathode-coupled mixer, V₂. The signal from the r.f. stage is impressed on the grid of the other triode of V₂.

Output from this first mixer, on 10.7 Mc., is amplified by a 6BA6, V₃, and passed on to a 6BE6 mixer-oscillator, V₄. The oscillator portion is crystal controlled on 11.156 Mc., resulting in 456-ke. output, which is amplified by another 6BA6, V₅. Next comes diode detection, a.g.c. and noise limiter action in a 12AL5, V₆.

Audio circuits of units of this kind seldom call for much discussion, but trust Squires Sanders to come up with interesting ideas, even in the audio. Detector output goes to the pentode of a 6AN8, V_{7A}. The triode, V_{7B}, is a speech amplifier, and its output also goes through the pentode section. The separate gain controls for receiving audio and speech amplification are isolated from one another by diode switches, CR₄ and CR₅ in Fig. 1. Bias voltages on these diodes are switched by the send-receive circuitry. The receiver squelch circuit is essentially the same as that described in the 22-er report.

A novel power-saving feature is found in the power audio stage. Two 6AQ5s, V₈ and V₉, are connected in parallel, but V₈ is disabled during receiving by removing its screen voltage. There is plenty of audio output from V₉ for receiving purposes.



Bottom of the 66-er. S-meter and speech gain controls are on the rear chassis wall, along with two fuse holders, coaxial fitting for antenna connection, and jacks for speaker, accessory control and external transmitter control.

**Squires Sanders 66-er 50-Mc.
A.M. Transceiver**

Height: 6¼ inches.

Width: 12 inches.

Depth: 12 inches

Weight: 19 lb.

Power Requirements: 115 volts a.c. or
13 volts d.c.; 50 watts receive, 85 watts
transmit.

Price Class: \$250.

Manufacturer: Squires-Sanders, Inc.,
Millington, N. J. 07946.

The all-solid-state power supply works on either 115 volts a.c. or 13 volts d.c., depending on which cable plug is used. The cable and plug for a.c. service are supplied. A.d.c. plug is also included, but you hook up your own cable, wiring it according to whether your car is positive or negative ground. Negative is now standard in this country, but some foreign and older U. S. cars may be the other way around.

The 66-er is remarkably free from spurious responses in receiving and from unwanted-frequency output in transmitting. The 456-ke. image (912 ke. above the desired signal) was about 50 db. down on the unit tested. Several other and weaker responses were found by searching with a tunable signal generator, but they were very far down. No in-band spurious signals have been heard at the writer's high location, where the strong signals of nearby f.m. and TV stations cause havoc in some v.h.f. receivers.

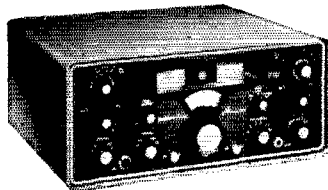
The transmitter employs band-pass coupling between the oscillator and doubler stages, and link coupling between the doubler and driver. An impedance-matching circuit between the driver and final grid circuits offers increased

selectivity at the desired transmitter output frequency. With these precautions, the 66-er should be about as free of transmitter-caused TVI as it is possible for a 50-Mc. a.m. rig to be.

The speaker is mounted on the rear wall of the case, with its cone facing the left side. No baffle is provided and weak-signal readability suffers from the lack of lows resulting from this. As an experiment, we attached a small baffle to the speaker, and noted an appreciable improvement. This cannot be carried too far, however, as a large baffle area would restrict the flow of air through the case perforations. The speaker is connected to a phono jack on the case, and a patch cord is used to connect to the output transformer, via another jack on the back of the chassis. This makes use of a better-quality external speaker a simple matter, and this is highly recommended for either mobile or home-station use.

The 66-er has provision for use with the maker's Apollo Linear, without modification of either unit. —W1HDQ

Next Month



Hallicrafters SR-2000 Transceiver

Strays



"A Complete Two-Band Station for the V.H.F. Beginner" — a reprint of four articles that appeared in July, August, September, and October, 1961 *QST's* — is still available for 50¢ (no stamps, please) from the ARRL, 225 Main Street, Newington, Connecticut 06111.

—♦♦♦—
The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

W1MCG (right) is presented the Individual Naval Reserve Radio Station "Sweepstakes '66 Trophy" by Rear Adm. Means Johnston, Jr., Commandant, First Naval District. The trophy was awarded for Ed's valuable communications assistance, skill and professional competence. (Official U.S. Navy Photograph by PHI T.A. Jefferies, USN.)

TVI PREVENTION — a New Method

BY RALPH A. MARINO,* W1MRW

Of all the problems that face the radio amateur, the one that is most feared because of its bad effect on public relations is the interference of amateur signals to television signals. This situation, known as TVI, may be the result of a number of different conditions. Three of the most common causes of this difficulty are inadequacies in the TV circuitry, misadjustment of the amateur transmitter, and rectification in poorly bonded joints. There are other causes of this problem but they all tend to have the same result of giving the whole of amateur radio a bad name. Until now there has been almost nothing done to solve this problem on a massive scale; that is, each source of interference has been successfully dealt with but to deal with them all at once has been thought to be an impossibility. Recently, however, I have developed a new method of TVI prevention that successfully eliminates even the possibilities of interference. The new method of TVI prevention should solve everyone's problems.

This method called Synchronization Control (SC) gets right to the heart of TVI prevention by taking advantage of a well known but little utilized fact about TV picture transmission. Rather than first generating a signal that may cause TVI, a well adjusted SC unit will give complete protection before the signal even leaves the transmitter. So well does this unit work that even with transmitter mistuning, overloading or what-have-you, near-by TV sets will never show that you are on the air!

To understand how the unit works, a simple review of the action of a picture tube is in order here. As is well known, the inside face of the tube is coated with a substance that glows when the electron stream from the cathode strikes it. While this stream or beam is flashing across the screen its intensity is varied by the incoming video signal. If an unwanted signal appears at the same time (such as from an amateur transmitter) then the unwanted signal will vary the beam along with the desired one. This may produce a herringbone pattern, a crawling line, or any of a number of other of undesirable effects on the screen.

The circuits that move the beam across the face of the tube are generally of no concern or interest to the amateur (unless he happens to be watching TV himself at the time). There is one factor, however, that is of great significance in the prevention of TVI. As the beam returns

from the left to the right hand side of the screen it is blanked out. In other words it leaves no trace as it returns to the starting point. This means that no signal, of any amplitude or phase, can have any effect on the picture during the portion of time that the beam spends in returning. An amateur signal present in the TV at this time will go unnoticed, undetected and will produce no interference.

The beam's return is set by the incoming TV signal itself. They are "locked" together or are in synchronization. The stability of the sync signal is set by the TV transmitter and is the same for all channels 2 through 83. The SC unit is a further adaptation of the principle of synchronization to amateur radio. This means that if SC is used and properly adjusted there will be no interference on any channel, on any set, from any transmitter that may be used.

The first step in the adjustment of the SC system is to sample the output of the sync generator of any TV set that is "locked" onto a transmitted picture signal. When this is done it will be found that one has a sawtooth wave with a frequency equal to the number of return trips the electron beam makes across the tube — that is, about 15 kc. Fig. 1 shows the connections to be made to the sync generator and the recommended cathode-follower amplifier to keep from overloading the TV circuits. This amplifier also provides a modest boost in power to bring the signal through the shielded cable and to the SC unit proper.

The SC Unit

As should be clear from the name of the unit itself, the SC works by synchronizing the output

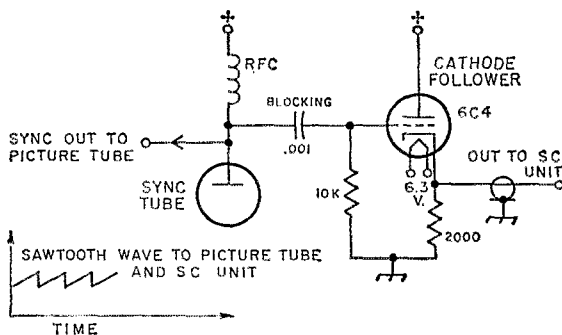


Fig. 1

* 63 Seventh St., Turners Falls, Mass. 01376

of the transmitter to those times when the picture tube beam is blanked. By restricting output to those times no interference will result. Even a full kilowatt running right next to the TV will not produce even a shadow of a flicker with a properly adjusted SC unit. The transmitter output is always zero except for some fifteen thousand times per second when the beam is cut off.

There are a number of suitable ways to synchronize the output of the transmitter and each amateur will have to find the method that best suits his pocketbook and his junk box:

1) Relays — After the sync level has been amplified to a sufficient amount of power a relay may be operated by the output of the SC unit. Naturally, care must be taken to insure that the relay is closed during the proper intervals of the sync cycle or the transmitter will be on when it should be off and vice-versa. Some provision should be included in each SC unit. A serious problem may be in finding a relay that will key at the proper speed but those who are familiar with the surplus market assure me that suitable relays may occasionally be found, and at a reasonable price.

2) Synchronous motors — An old electric clock can provide the heart of an excellent SC unit. A rotating contact is attached to the shaft of the motor, the motor is run by the power pulses from the SC and when it is up to the sync frequency it will turn the transmitter on during the proper time intervals. Probably a stroboscope of the type used in automobile-ignition timing will be useful in the final adjustment of this unit. One disadvantage of this particular system is the wait for the motor speed to equal the sync frequency. Once this is achieved the motor will hold its timing quite well, however.

3) All-electronic SC — Even though most amateurs have the skill to make the above mechanical constructions, they will probably be even more interested in an all-electronic SC unit. There are many possible varieties and variations of this unit but the simplicity of the model described below makes it a good one for those who have no previous experience with SC units.

In Fig. 2 we have a block diagram showing the general location of the unit in a typical rig. In my case the SC unit was built right into the

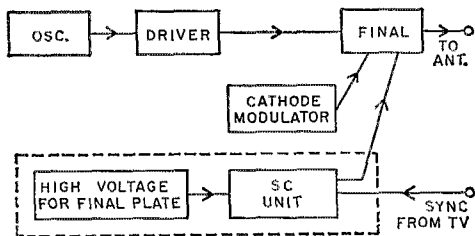


Fig. 2

power supply for the final but for commercial or already constructed equipment it may go "out-board" just as well.

An Electronic SC

The unit is simple from an electrical point of view, consisting of a phase adjusting network and a 6C4 connected as a shorting switch. As can be quickly seen from Fig. 3 the plate goes to the B-plus, the cathode to ground, and the grid is transformer-coupled to the sync-phase adjusting network.

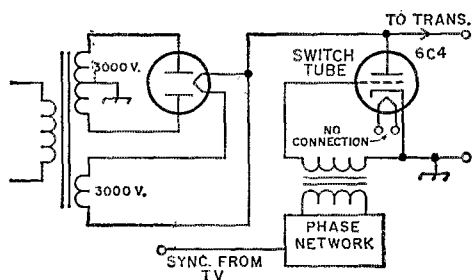


Fig. 3

There are some features of this unit that deserve a little consideration. First, no filtering is needed for the plate supply because the sync-power pulses are so short that hum or shifting voltage levels are no problem. As it turns out, the plate bypass provides plenty of filtering for this circuit anyway. The transformer is able to handle the extra load of the switch tube because of the short duty cycle. One further point is that no filament supply is needed for the 6C4 in this configuration. Naturally such a small tube could not, under ordinary circumstances, be operated with a plate voltage of 3000 volts. By not heating the filament the current is held to safe level. In a way we have gas tube performance here because the very small number of gas molecules remaining in the tube are ionized by the plate supply and this provides the electron stream that is controlled by the grid. The very short duty cycle allows the published ratings to be exceeded without harm.

During operation, the 6C4 draws no current during the time the TV picture tube electron beam is blanked. As soon as it starts across the screen again, the tube conducts and short-circuits the final plate power supply, reducing the transmitter output to zero. When the far edge of the screen is reached the 6C4 stops conducting and full power is restored. This cycle continues then at the TV picture tube-sync rate, eliminating even the possibility of interference as there is no output at any time the picture may be disturbed.

At first it might be thought that cutting the output to zero at the sync frequency (about 15,000 cps) might produce a strong high-pitched whistle which would overload the ham receiver

(Continued on page 142)

Technical Correspondence

TM 11-4000

Technical Editor, *QST*:

Any serious amateur must have a certain minimum amount of theoretical knowledge as well as practical experience in his hobby. Amateurs with limited budgets should acquaint themselves with the publications of the Department of Defense in the radio and kindred fields; fortunately, in many respects military communications gear and amateur communications equipment are similar. Government Printing Office Price Lists Nos. 19, 63 and 82, free for the asking, list available technical books.

In particular, TM 11-4000, *Trouble Shooting and Repair of Radio Equipment*, is highly recommended to the newcomers and the old timers alike.

The book consists of thirteen chapters and an index. The chapter headings, descriptive of their contents, are Introduction; Cautions; Test Equipment; General Troubleshooting; Troubleshooting Vehicular Installations; Troubleshooting Receivers; Troubleshooting A.M. Transmitters; Receiver Alignment; Repairs and Adjustment; Final Check-up; Radio Procedures, and Troubleshooting Transistorized Equipment. At two bucks for a copy, this is a value hard to beat! — *Mark D. Bedrossyan, W2FIS, 1607 Holly Blvd., Manasquan Park, N.J. 08736.*

FREQUENCY CHECK

Technical Editor, *QST*:

You might be interested in the method we use at K6JZR/WA6D00 to set and monitor a transmitter frequency; we find it especially satisfactory for MARS work.

Using an LM-13 as an "additive" meter, we zero the oscillator on the auxiliary crystal check point

nearest the desired operating frequency, and keep it there. Then we adjust a reliable audio oscillator to the difference between the desired operating frequency and the crystal check-point frequency. Applying the LM's output and the audio oscillator's output to the horizontal and vertical amplifiers, respectively, of a cheap scope, we get a straight horizontal line pattern so long as the LM stays in zero beat at the check point; this is, of course, a check on any drift in the LM, since crystal drift is checked separately by a receiver tuned to WWV and also picking up the LM's crystal.

When the transmitter is keyed on, we adjust its v.f.o. so the beat from the LM produces an elliptical pattern on the scope. Any subsequent change in the scope pattern can readily be traced to its source. The direction of the deviation of the transmitter from the auxiliary check point is determined by normal use of the LM-13. — *Kenneth M. Durkee, K6JZR/AFA6JZR, 113 Sonora Ave., Danville, Calif. 94526.*

RELAYLESS IAMBIMATIC ADAPTER FOR THE KEYS

Technical Editor, *QST*:

The article written by K8OCO in January *QST* describing his Iambimatic keyer was long awaited here. I have heard several c.w. operators say they were using double paddles, and the idea always sounded good to me.

I immediately built an adapter for my Heathkit HD-10 keyer, but in the process I eliminated the relay. Positive 10 volts appears at the paddle of this keyer, and so I used Fig. 1. This Iambimatic adapter will work perfectly at any speed, since there is no time lag from a relay. The voltages are taken directly from the keyer.

Here is the way the circuit works. If the dash lever is pressed, Q_1 will conduct, putting a negative signal on the base of Q_3 . This allows Q_3 to conduct and ground the dash contact, thus making dashes. It does not matter if the trigger signal is applied, as the circuit is not yet a flip-flop. If the dot lever is closed, Q_2 will conduct, the dot contact will be grounded through CR_3 , and dots will be generated. The conduction of Q_2 at this time has no effect on the operation of Q_3 .

Now, if both levers are pressed, Q_1 and Q_2 will act as a flip-flop and Q_4 will feed the negative triggering spike at the end of each dot or dash. So, if a dash is made first, Q_1 and Q_3 will be conducting and, at the end of the dash, Q_4 will feed the negative trigger through R_1 and C_1 , which causes the flip-flop to change its state. Now Q_2 conducts and Q_1 and Q_3 are cut off, so the dash contact is opened. But

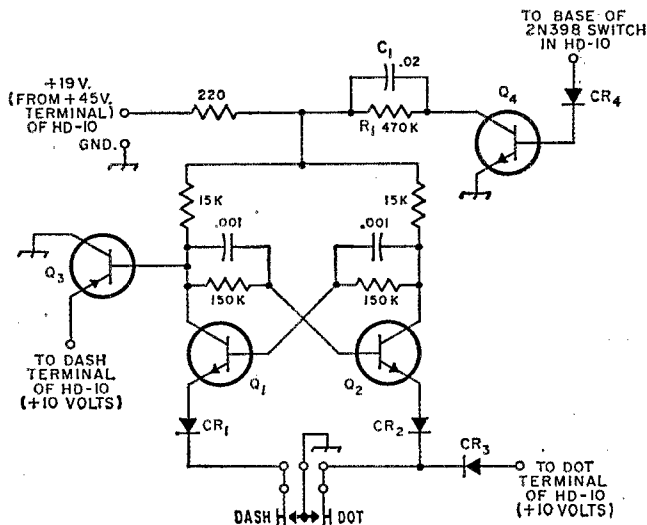
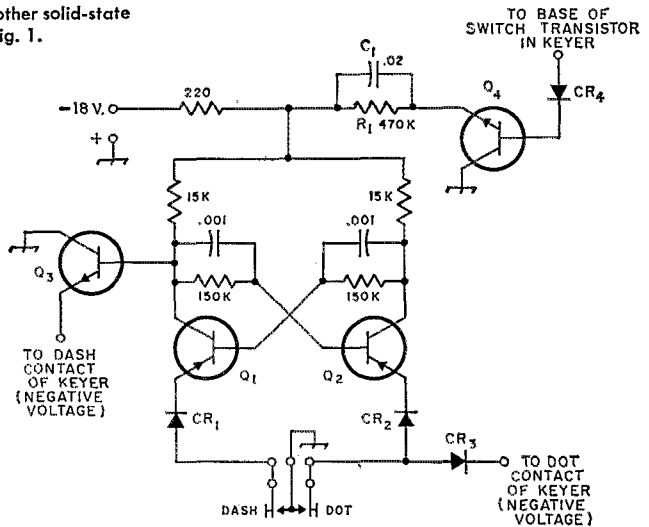


Fig. 1—Circuit of the Iambimatic adapter for the HD-10. Resistances are in ohms (K = 1000), and capacitances are in microfarads. Diodes are 100-p.i.v. silicon. P-n-p transistors are G.E. GE-2, or Motorola HEP-51. N-p-n transistors are G.E. GE-10, or Motorola HEP-33.

Fig. 2—Circuit of lambimatic adapter for other solid-state keyers. Components are as in Fig. 1.



since the dot lever is still closed, the next character will be a dot. At the end of the dot, the negative spike trigger will cause the flip-flop to change again, and Q_2 will be cut off, Q_1 and Q_3 will conduct, and a dash will be made. So the lambimatic circuit will produce alternate dots and dashes in the keyer output, as long as both paddles are held closed.

This circuit should work with any of the currently-popular solid-state keyers. If your keyer uses an n-p-n transistor for cathode keying, then you'll have to change Q_4 to a p-n-p, and ground the collector instead of the emitter, and also reverse CR_4 .

For those of you who have negative voltage at your paddle terminals, I believe the circuit in Fig. 2 which, although it hasn't been tried here, should work just as well. Again, if you are using an n-p-n output transistor in your keyer, you will have to change Q_4 to a p-n-p, ground the collector, and reverse CR_4 . You can troubleshoot this circuit easily with a v.o.m., since you're looking only for highs and lows.

We have K8OCO to thank for this excellent addition to our keyers. If you have never tried a squeeze paddle, I guarantee you'll wonder how you ever got along without it. If you work the paddle correctly, you'll get perfectly-spaced letters that sound just like a WIAW tape.

The total cost of all new parts was less than \$10.00, and the adapter took about two hours to build. The n-p-n transistors that I used are Motorola HEP-53, and the p-n-ps are HEP-51. The silicon diodes are 100-p.i.v. at four for a dollar. If you really care about how your fist sounds, this circuit is worth every cent.—Robert Heydt, WB3IWX, 8 Trianna St., Belmont, N. Y.

STILL MORE ON THE I-177

Technical Editor, *QST*:

I refer to the latest series of Technical Correspondence items concerning the I-177 tube tester (February 1967 issue). First, a little "Feedback" on Mr. DeMeis' correspondence. I note one omission. The socket referenced in his Fig. 2 is the "E" socket. Further, I found that his steps (7) and above required the use of Pins 8 and 3, rather than 8 and 5.

Second, a further series of questions now is raised on calibration, since Mr. Schleicher indicates that a different a.c. grid voltage is used on the Hickok 6005. Added to this, I find that the I-177 diagram shows a 4.7-volt winding, whereas the I-177B shows 5.0 volts. Mr. DeMeis indicates that, with the R pot at 0, the voltage should read 5 ± 0.3 . Hence it is possible that the circuit diagram is in error.

An additional note on Mr. DeMeis' article concerns the modification circuit shown for increasing the G_m range. This is apparently for the TV-7 tester, since the I-177 circuit includes a 15,000- μ mho range, and the range resistors are connected as shunts across the series-connected dual sections of the L pot (which is in parallel with the meter). For 30,000 μ mhos, a third shunt of low resistance value would be required (no shunt is used for the 3000- μ mho range). I have not yet attempted to calculate the value of the additional shunt.—Irving Mayer, WSZEB, 572 Wayne Drive, Fairborn, Ohio 45324.



Alabama—The Birminghamfest will be held this year on April 29 and 30. Further details can be obtained from the Birmingham Club, P.O. Box 603, Birmingham, Alabama.

Arkansas—The Eureka Springs Hamfest will be held again this year on May 6 and 7.

Illinois—The Rock River Radio Club will hold their first annual spring Hamfest April 23 at the Lee County 4-H Center, located one mile east of junction U. S. 30 and 52 near Amboy, Illinois. A cordial invitation is extended to all hams, CBers, electronic hobbyists, and commercial exhibi-

tors. Hours: 9:00 A.M. to 5:00 P.M. Lunch, refreshments, and unlimited parking. Advance ticket donation \$1.00, \$1.50 at the door. For additional information and advance tickets, contact Charles Randall, W9LDU, Dixon, Ill. 61021.

Illinois—The Sterling-Rock Falls ARS is sponsoring a Hamfest at the Sterling Coliseum in Sterling, Ill. on Sunday April 2.

Illinois—The Kishwaukee Radio Club will hold its annual Ham and Equipment Swapfest in the Hopkins Park Shelter House in DeKalb, Ill., on Sunday, May 7. Come one come all and buy, sell, or swap equipment or just eyeball QSO with fellow hams.

Indiana—Don't forget the NEIRC banquet April 1 at Waterloo, Ind.

Indiana—The IRCC meeting will be held in Indianapolis at Butler University on April 2.

Kansas — The Jayhawk Amateur Radio Society announces a Hamfest and joint ARRL Section meeting to be held April 23 at Wyandotte County Park, just East of Ag. hall of Fame, Bonner Springs, Kansas. Free hot dogs, chips, and drinks. Gifts for ladies and amateurs. Registration \$1.50. Auction, swap table, YL tour, cooking demonstration, fashion show, DX, equipment displays, closed-circuit TV, novice attractions, and more. Talk-in on 3920 kc., 30.14 Mc. and 146.94 Mc. For more information contact K6BXF, 3045 North 72nd, Kansas City, Kansas 66109, tel. 299-1128.

Kansas — The Fourteenth Hamfest of Hi Plains ARC will be Sunday, May 21 at the grade school in Plains.

Louisiana — The Baton Rouge ARC Hamfest will be held May 6 and 7. There will be a banquet Saturday night, and an all-day picnic Sunday.

Maryland — The B & O/C & O Railroads ARC will have their 8th Annual Banquet at Gannon's Restaurant, 3111 Frederick Ave., Baltimore, Md. on April 29. Registration at 4:30 p.m. and dinner at 6:00 p.m. Tickets are \$4.00 each and may be purchased from W. T. Helier, W3BVL, 7388 B & O Central Bldg., Baltimore, Md. 21201.

New Jersey — East Coast VHF Society Dinner and tree Hamfest, April 8. For details write WA2WEB.

New York — The American Red Cross Emergency Radio Club is holding a hamfest on Sunday, April 30 between the hours of 12 noon and 6:00 p.m. at the club headquarters at the Central Queens Chapter of the American Red Cross at 90-07 166 St., Jamaica, N. Y.

New York — The Radio Amateurs of Greater Syracuse presents its annual Central New York Hamfest on Saturday, April 8, 1:00 to 9:00 p.m. at the crossroads of N. Y. State, Northway Inn, intersection of Interstate Rte. 81 and N.Y.S. Thoroughway Exit 36, Stuart Meyer, W2GHK will present his latest DXpedition show that all are sure to enjoy. On the air ATV demonstration, c.w. and technical contests, movies, ham gear displays and swap shop, special activities for the YLs and XYLs. Full course roast beef banquet completes the day's activities. Capacity is limited so please pre-register. \$5.75 covers registration and banquet. Mail checks payable to Radio Amateurs of Greater Syra-

cuse, P.O. Box 88, Liverpool, N. Y. 13088 or contact W2YRL.

New York — The Rockaway ARC Spring Auction will take place Friday evening April 14 at 8:00 p.m. at the American Irish Hall on Beach Channel Drive (at Beach 81st St.) in Rockaway Beach. Doors open at 6:00 p.m. for items to sell. One dollar donation at door. For further information contact RARC, P.O. Box 205 Rockaway Park, N. Y. 11694.

New York — The Southern Tier Radio Clubs will be holding their eighth Annual Dinner and Hamfest on Saturday, April 15, at St. John's Memorial Center in Johnson City. Tickets and reservations are available from John Bull, 221 Oscar Terrace, West Corners, Endicott, N. Y., or Joe Kuntz, 4852 Marshal Drive, Endwell, N. Y. Tickets are \$4.00 for adults and \$2.00 for children under 12. All reservations for tickets must be in by April 12. No tickets will be sold at the door. The doors will open at 5:00 p.m. and dinner will be served at 7:00 p.m. We will have a speaker and displays.

Ohio — All day Saturday, April 29, the Indian Hills Radio Club will host greater Cleveland area hams and friends at the Alliance of Poles Hall, 6968 Broadway Ave. (near Fleet and Rt. 21, Willow Freeway.) This large hall will allow an all indoor affair with ample space to sit and renew contacts with Cleveland area hams. Old fashioned goodwill and sociability is the theme of the day. Donations at the door are \$1.00 and tickets to an inexpensive buffet dinner at 7:00 p.m. are \$2.00. Contact K8SEV, 13213 Shaw Ave., Cleveland, Ohio 44112.

Ohio — The big 1967 Dayton Hamvention, sponsored by the Dayton ARA, will be held Saturday, April 15, at the Wampler Arena Center at Dayton. Speakers, exhibits, forums, hidden transmitter hunts, banquet, festivities for the XYLs and YLs, flea market and more. For additional information and map write Dayton Hamvention, P.O. Box 44, Dayton, Ohio 45401.

Pennsylvania — On April 15, the Mobile Sixers Radio Club will hold their 8th Annual Banquet. This will be at Walber's on the Delaware at 7:00 p.m. For more information write Bill Sargent, K3ZLL, 15 Cobblestone Dr., Paoli, Pa. 19301.

QST

ARRL NEW ENGLAND DIVISION CONVENTION

Swampscott, Mass.

April 22 & 23

The New England Division Convention will be held in the New Ocean House Hotel at Swampscott, Massachusetts April 23 and 24. Among the key speakers is FCC official William Grenfell, W4GF. Also scheduled to speak are Stu Meyer, W2GHK; Father Daniel Linehan, W1HWK; NASA representative Dr. Fred Neiman, WA1-DBM, with the latest on the Apollo program, and Bruce Kelley, W2ICE with the Antique Wireless Association presentation. Technical talks and meetings are scheduled for v.h.f., DX, QCWA, and numerous other phases of amateur radio. Other activities will be similar to those which have been so popular in past years. A complete and separate program has been planned for the ladies. The banquet is on Saturday night this year and will be combined with an evening of professional entertainment and dancing.

League President Robert Denniston, W0NWX, and New England Division Director Robert York Chapman, W1QV, will be hosts at the Sunday morning ARRL Forum. FCC exams are also scheduled for Sunday morning.

Talk-in station W1LEL/1 will operate both days on 75, 40 and 20 meter s.s.b., and on 10 and 6 meter a.m.

Early-bird discount tickets may be obtained

until April 7 from John McCormick, W1KCO, Berkley St., Taunton, Maine. Banquet and dance tickets are \$6.50 per person; registrations are \$3 each, \$4 at the door. Please make checks payable to: Federation of Eastern Massachusetts Amateur Radio Associations (FEMARA). Room reservations at the New Ocean House Hotel are: Single, \$10; Double \$15, and Triple \$18. Requests should be made directly to the hotel.

QST

COMING A.R.R.L. CONVENTIONS

April 22-23, 1967 — New England Division, Swampscott, Massachusetts

May 27-28, 1967 — Dakota Division, Minneapolis, Minnesota

June 2-4, 1967 — Oregon State, Portland

June 24-25, 1967 — Midwest Division, North Platte, Nebraska

June 30, July 1-2, 1967 — ARRL National, Montreal, Quebec

July 1-2, 1967 — West Virginia State, Jackson's Mill

July 7-8, 1967 — Central Division, Milwaukee, Wisconsin

July 14-16, 1967 — Alaska State, Anchorage

September 9, 1967 — Louisville Ham Convention, Louisville, Kentucky

October 27-29, 1967 — Ontario Province, Ottawa, Ontario



Hints and Kinks

For the Experimenter



EMERGENCY COAX CONNECTOR

MANY times a ham wishes to connect two lengths of coax together but doesn't have the proper type connector. On the other hand, coax chassis fittings can be joined together to make a connector. In order to weatherproof the unit shown in Fig. 1, the two inner pins were first soldered together; then a piece of copper flashing was formed around the chassis fittings and soldered at all open points. When used outdoors, the entire connection can be taped to seal off the joints from moisture. — *W1ICP*

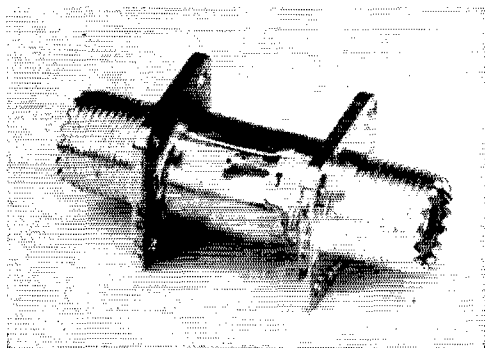


Fig. 1.—Emergency coax connector made from two SO-239 chassis fittings and a scrap of copper flashing.

DETERMINING TRANSISTOR BETA

AN ohmmeter can be used to determine a transistor's amplification factor, beta, replacing methods for this purpose in which a microammeter is normally used. As shown in Fig. 3, the voltage is taken from the battery in the ohmmeter. The measurement is done as follows. After the ohmmeter is zeroed, its positive lead is connected to the emitter and its negative lead to the collector of the transistor being tested. One at a time, resistors R_1 and R_2 are switched in series with the base and the collector. As the resistance in series with the base changes, the resistance of the collector-to-emitter path also changes. The value of the collector-to-emitter resistance is read on the ohmmeter for each position of switch S_1 . The amplification factor of the transistor is then found from the formula:

$$B = \frac{\Delta R_b}{\Delta R_c} \approx \frac{R_2 - R_1}{R_{ce2} - R_{ce1}}$$

where B is the amplification factor of the transistor, and R_{ce1} and R_{ce2} are the resistances of the collector-to-emitter path when, respectively, R_1 and R_2 are switched in series with the base

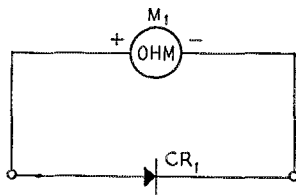


Fig. 2.—Circuit for determining the polarity of ohmmeter leads. If the ohmmeter, M_1 , reads 2000 ohms or less, the polarity of the leads is as shown. CR_1 is any diode whose cathode end is known.

and collector. Resistance of the transistor's base-to-emitter junction is not accounted for since its influence is negligible for practical purposes.

The circuit shown in Fig. 3 is for p-n-p transistors. For determining the beta of n-p-n types, you must shift the polarity of the ohmmeter. The polarity of the test leads can be found if you connect them to any diode as shown in Fig. 2. If the instrument indicates a resistance of less than 2000 ohms, the polarity of the test leads is the same as in Fig. 2.

To find the beta of transistors, the method described has been used with ohmmeters switched to the "X 100" and "X 1000" ranges. Other measuring ranges give different variations in collector current, and the beta is changed accordingly. On lower measuring ranges, I_c and beta tend to grow bigger. Therefore, depending on whether the collector current in the intended circuit will be large or small, you can choose the most suitable measuring range of the ohmmeter.

When the beta of a low-power transistor is measured, the ohmmeter should not be switched to the very lowest ranges, since in this case the

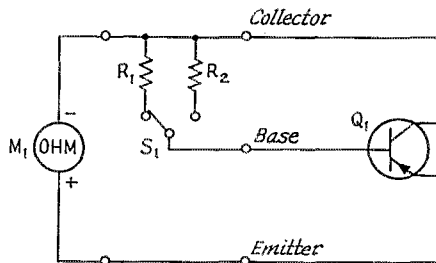


Fig. 3.—Beta checker for p-n-p transistors. N-p-n types can be tested by reversing the polarity of the ohmmeter. M_1 —Ohmmeter.

Q_1 —P-n-p transistor. Reverse ohmmeter polarity for n-p-n types.

R_1 —10,000 ohms, 1/2-watt composition.

R_2 —110,000 ohms, 1/2-watt composition.

S_1 —S.p.d.t. toggle or slide switch.

collector current can grow very quickly and destroy the transistor.

Also it should be mentioned that, if nothing happens to the ohmmeter when you switch the resistors, R_1 and R_2 , in series with the base and collector, the transistor is defective. — *From a translation by Gunnar Lind, SM7DZIW, of an article by V. Babaev that appeared in the June 1966 issue of the U.S.S.R. publication Radio.*

M.C.W. WITH A CODE-PRACTICE OSCILLATOR AND A THROAT MIKE

ONE convenient device that can be used with a phone rig to obtain m.c.w., provided the transmitter uses a carbon-button mike, consists of a transistorized code-practice oscillator with a throat microphone wrapped around it. I use two such gadgets with a pair of 420-Mc. modulated-oscillator transmitters. Each transmitter is combined with a superregenerative receiver in a hand-held transceiver.

The m.c.w. apparatus is shown in Fig. 4. The code-practice oscillator has a speaker and is battery powered. Two suitable oscillators are the Eico 706 and the Calrad CO-5. The throat microphone is a war surplus T-30-Q with two carbon elements that are designed to rest on the user's neck near the Adam's apple. Since the microphone cable was rather short, I extended it by adding a three-foot length of audio cable. I soldered one end of the audio cable to a Switchcraft JJ-048 extension jack to accommodate the PL-291 plug on the microphone cable. I connected the other end of the audio cable to a Cinch-Jones P-304-CCT plug to match the microphone-input fitting on my transceiver.

To make the m.c.w. apparatus, tighten the microphone belt so that the throat mike will fit snugly when attached to the code-practice oscillator. Then slip the T-30-Q over the oscillator, letting the carbon elements rest on the speaker grille or the edge of the grille and the case, whichever location permits a louder tone to reach the throat microphone. The installation is completed by attaching the microphone connector to the transmitter, and a telegraph key to the oscillator.

If by chance, the device described above overmodulates your transmitter, the carbon elements may be placed elsewhere on the code-practice oscillator case, so that the tone reaching them will not be quite so intense. A layer or two of cloth, placed between the oscillator case and the carbon elements, may be helpful. — *William C. Bakewell, WB6GHB/6*

METAL SPACERS

AN excellent source of chrome-plated spacers of various diameters is an old or broken auto-radio antenna. The needed diameter spacers may be cut from the appropriate telescoping section, and one antenna will provide many, many spacers. — *William T. Holt, K9HWM/W1ANZ*

ADDING CONTROLS WITHOUT ADDING HOLES

IF you desire to add controls, such as vernier tuning or sideband gain, to your commercial transceiver, you can usually do so, without drilling any new holes, by using potentiometers from Clarostat's Uni-Tite series of concentric controls. These controls come in all the standard values from 200 ohms up. Either a push-pull or turn type switch can be added to a set of these potentiometers. If desired, you can stack a wire-wound and a carbon control plus a switch. By using concentric potentiometers, it is possible in many cases to double the number of controls on the front panel without ever touching a drill. A source of appropriate knobs for concentric controls can be found in Raytheon's 400 series. — *Dave Ingram, K4TWJ*

TIE TABS

THE plastic-coated wire tie tabs that are now being used to seal bread wrappers make excellent material for tying up cable assemblies, small rolls of wire and a multitude of other items around the ham shack. Don't throw the tie tabs out. You'll be surprised at the many uses that can be found for them. — *Robert A. Manning, K1YSD*

WIRE SOURCE

A HANDY source for No. 14 through No. 6 solid copper wire is the wire sold for house wiring. Most hardware and Sears stores stock two-conductor plastic covered wire and it can be purchased in any length required. — *W1CPC*

TVI TIP

WHEN using a transceiver with an external speaker, possible TVI can be prevented by inserting at the set an r.f. choke in series with each of the speaker leads. Otherwise the speaker leads might become radiating antennas. — *Richard Mollentine, WA0KKC*

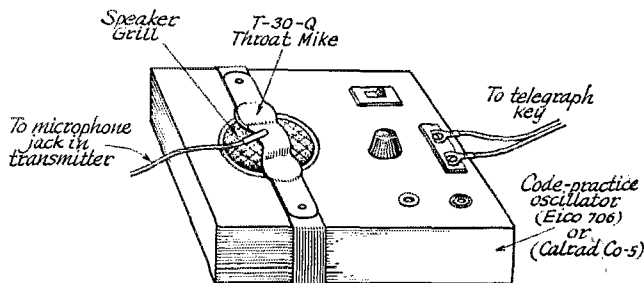


Fig. 4—WB6GBH's system for m.c.w. operation of his modulated-oscillator transmitter.

20,000 QSLs

NOTHING, no nothing, can elate the DXer more than coming home after a hard day at the office to find QSL cards from his DX contacts in the mail box. And nothing can deflate him more than not finding the particular card he needs for a certain award.

Tens of thousands of hams around the globe are DXers, sending hundreds of thousands of QSLs each year. Because of the heavy burden of supplying QSLs, many foreign stations simply can not afford, in terms of time and finances, to QSL direct each QSO. In the United States and Canada under League sponsorship, and many other countries through their own national societies, QSL bureaus have been established to aid in the orderly, economical flow of cards between DXers.

All ARRL QSL Bureaus are volunteer operated. The amateurs working the bureaus do so for no salary or fee, giving up time they themselves could use for operating. Only the cooperation of each DXer can keep the system operating economically and effectively.

The ARRL W2-K2 QSL Bureau, operated by the North Jersey DX Association, is one of the busiest in the U. S. Bureau chairman Vic Ulrich, WA2DIG, says the bureau handles 20,000 cards a month, but that a system has been developed keeping the chore to a minimum while assuring fast, accurate delivery. The NJDXA has 46 members, 28 of whom have volunteered to work in the bureau and divide the work by suffix letters of the alphabet.

Once a week the incoming cards are collected from the Ridgewood, New Jersey, post office and taken to the bureau located in the basement of a professional building. The bureau quarters are not elaborate; in fact the room is only about ten feet square, but it is well-equipped to handle a heavy flow of QSL cards. Along the walls are four sorting racks, each having pigeon holes for each letter of the alphabet. Thus four club members can sort at the same time, separating two thousand cards per hour according to the first letter



W2PXR sorts his letter cards in his shack.



NJDXA members W2VCZ, WA2ELS and W2ZTV sort cards in ARRL W2-K2 QSL Bureau.

of the suffix. Universal use of block printing in the filling-out of QSL cards by amateurs would reduce sorting errors and shorten the time bureau personnel have to spend on the job.

After the preliminary sorting, cards are wrapped in individual packets and taken to the next club meeting for distribution. The member assigned to each suffix letter then takes his share of the cards home for final processing — sorting by second letter, then by third, and then mailing the cards to the amateurs.

The Amateur-User's Part

As standard ARRL QSL bureau procedure, amateurs are requested to submit stamped, self-addressed envelopes (4½ × 9½ inch "business" or 5 by 8 inch manila envelopes) with the call printed in block letters in the upper left hand corner. Unfortunately, many amateurs send non-standard envelopes which are hard to handle; varying amounts of postage are used on the envelopes, too.

To help solve these problems, the W2 Bureau encourages the use of the envelope-credit system. Instead of an s.a.s.e., the "customer" sends a dollar for which he receives 12 credits. The bureau manager records the sums taken in, and at club meetings he hands the letter-men lists of the credits which each enters on a card file for the individual amateur. Envelopes measuring 4½ by 6¾ inches are furnished by the club, already printed with the bureau's return address and space for indicating the remaining credits the user has on file. The special envelope has been found to accept most QSL cards without folding, and a standard size makes for higher efficiency.

The letter-man addresses the envelopes, affixing a five-cent stamp for an ounce of QSLs (eight or ten cards), records the credits used and places the filled envelope in the mail. No envelope is mailed with fewer than four cards; all others are sent each month.

Amateurs preferring the standard system may send in their own stamped envelopes, but most

now use the credit system. In the case of cards arriving for amateurs having neither envelopes nor credits on file, the bureau mails a notice stating that cards for him are on hand and asking for his s.a.s.e. or participation in the credit system.

Simple arithmetic reveals that 12 credits amount to 60 cents in postage; what happens to the other 40 cents? It goes for purchasing and printing the envelopes, for file cabinets and sorting racks, for mailing of notices to non-cooperating hams, and for other miscellaneous expenses of the bureau. Only certain basic items, such as forwarding of missent QSL cards and post office box rent, are presently being paid out of League funds.



April 1942

The cover this month shows an amateur doing his stint at watching for aircraft, mike, earphones, portable rig and binoculars. It's quite inspirational.

. . . The Editor points out the need for radio amateurs and technicians in the enormously expanding program of electronics relating to the war effort. We now know, of course, that electronic technology expanded at a fantastic rate and ultimately led to our present space effort. Elsewhere is noted the needs of the various services. George Bailey, president of ARRL is the man to contact. He's in the middle of things in Washington.

. . . The FCC has started issuing amateur licenses again, the government and Army and Navy recognizing that an FCC ticket attests to useful proficiency. The civil defense program is still somewhat bogged down but some progress is being reported.

. . . In the interest of listening between the ham bands, Don Mix, W1TS describes a converter for the ham who has only a communications receiver

The central question for the myriad grateful users of the QSL bureau system seems to be: "I sure appreciate the bureau, but why does someone take on such headaches?" In the case of the North Jersey DX Assn., the answer lies partly in the avid interest they have on anything connected with DX. Of the 46 members, 17 are currently on the DXCC Honor Roll! Many of the members enjoy seeing cards come in for the friendly competitors they meet in pile-ups. Sorting-time gives members a chance to be sociable and swap late information and tall tales as they work.

Whatever the reason, the rest of us are certainly glad we have them on the job; the DX game would not be the same without the ARRL QSL Bureaus! — *W1DVE*

limited to our bands. Many hams were to make good use of such tuners for the services later on.

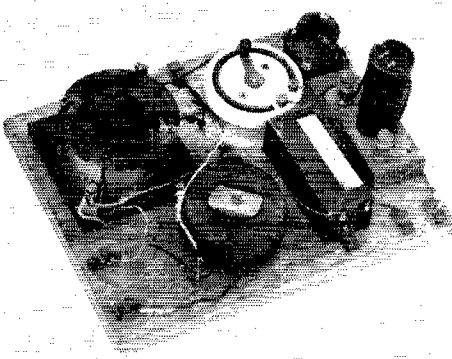
. . . The story of the Providence, R.I. mobile radio patrol is well told by the Rev. Charles F. Mahoney, W1BBA, and Perry O. Briggs, W1BCF. It was, at first, a very frustrating experience but soon ways were found to legally get the system going. Twenty-six Providence radio amateurs were sworn in as policemen. The network, using *u.h.f.*, was highly successful, even though the control station had a power of 3 watts.

. . . The versatile Vernon Chambers, W1JEQ, now comes up with a pack set on 112 Mc. for defense work. This is the one shown on the cover. It is not a transceiver but does use a super-regen receiver. Doesn't seem too difficult to build, either.

. . . Clint DeSoto, Asst. Editor takes a look at the communication possibilities of the induction field, "the field that stays at home." He remarks that Dr. Mahlon Loomis used the induction field in his 1865 experiments over a distance of eighteen miles. Personally, this writer believes that Loomis employed true electromagnetic radiation. You should read up on Loomis. Very interesting.

. . . Fred Parsons, W2EXM writes about old WCC. He has made a scale model of the station, complete with a miniature spark coil in transmitter house! Visitors to Cape Cod should go to South Wellfleet and see what is left of the famous station together with the scale model presently displayed. We have a couple of relics here in the Museum.—*W1ANA*

From the Museum of Amateur Radio



This month we have another exciting piece of old gear to describe. Without reading further, we wonder how many old timers will recognize it. Not many; relatively few people ever saw it. The picture shows Major Edwin H. Armstrong's original breadboard lash-up of a low-frequency oscillator for his superregenerative receiver. The circuit resembles that shown in Fig. 11 of the *Proc. I.R.E.* for August 1922. The inductance is a toroid with two windings and the tuning capacitor is a British Marconi solid-dielectric variable. The vertical tube contains a choke and the fixed capacitor is for blocking. The frequency is about 12 kc. We are indebted to Mr. Richard S. Perkin, Chairman of the Board, The Perkin Elmer Corporation for this unique gift. It was given to him by Mrs. Armstrong after the death of the inventor.

— *W1ANA*, Curator

FCC's Chairman Looks at Amateur Radio



Guest of Honor at the 11th annual dinner of the Washington Chapter, QCWA, FCC Chairman Rosel H. Hyde spoke briefly to the assembly with a message we believe of deep interest to every amateur.

PRESIDENT Robinson (W3RE), members of the Quarter Century Wireless Association, distinguished guests:

It is indeed a great pleasure to meet once again with the QCWA. This Association certainly qualifies as one of the most distinguished and most unique. To be eligible for the status of membership one must have been an active amateur for at least 25 years. One could be born, grow up, produce offspring and acquire various degrees, such as Doctor of Philosophy, in less time. But I understand that the elite of the elite are the "older members"—those with 50 or more years as amateurs.

Somehow the word "amateur" as applied to you and particularly to this latter group strikes me as anomalous or as evidence of exceeding modesty. While I am equally sure you would not want to be called "professionals," certainly that term would much better describe your level of competence. Perhaps this dichotomy also accounts for the absence of the term "hams" and the choice of "wireless" in your title as best descriptive of your group.

Whatever the case, it is a real honor to be with you. Although I am not myself a "ham," or even an honorary "ham," I have had a long and pleasant official association with the amateur service. I am proud of this association and of the remarkable record of responsibility and dedication which characterizes amateur radio.

In accepting your kind invitation I was assured that I would not be expected to present an address. In keeping with this admonition, what I shall have to say for the next few minutes will be most informal and in the nature of sharing a few thoughts.

I am aware that the Commission's deliberations in the "incentive licensing proceeding" are of paramount interest these days. Since it is a pending matter I must of course restrict my comments. But there are some aspects which I believe I may discuss which ought to be mentioned at this time.

First, the Commission has not, since issuing the proposal, taken a single step itself toward official consideration of this matter, in spite of rumors to the contrary. The Commission's staff has examined all of the comments and counter-proposals, is en-

gaged in drafting its recommendations, and the matter is shaping up for early consideration.

Second, since there seems to have been some misunderstanding, it might be helpful to discuss some of the basic reasoning behind the Commission's action in initiating the proceedings.

You can best characterize this proceeding as an indication that the Commission believes in encouraging improvement in the quality of the amateur service—on a voluntary basis! This objective is not only desirable from the personal viewpoint of many amateurs but it may also be extremely beneficial to our national commitment to this service in the light of international developments.

New and emerging countries have new and emerging communications requirements that must be met someplace in the spectrum. Therefore, every existing service needs clearly to justify the spectrum space allocated to it. Without adequate justification, someone may lose at least some of what they now have.

As of now, I don't think there is any question about the amateur service having justified every single kilocycle of spectrum space allocated to it. And I know you share this view.

Let's look briefly at the service record.

Almost every major natural disaster in the last thirty-five years or more has seen the amateur at his best. I need only refer to the recent Alaskan earthquake to illustrate this point. It is the amateur who time and again has served as the backbone of essential emergency communications which are so important in the first few hours or days of such a disaster.

It was the amateur who pioneered the use of the high frequency spectrum. In fact, he was forced to go into this once-called "useless" part of the spectrum—only to end up proving its usefulness and practicability for long-distance international communications.

Amateurs developed many of the essential circuit techniques used in the past and in modern-day communications. In many cases, where they may not have invented the circuits amateurs put them to practical and universal use. Super-regeneration,

f.m., scatter communications, moon-bounce and single-sideband are only a few of the examples.

It was the amateur to whom our government turned in two World Wars and other conflicts for vast numbers of trained communications experts and well-qualified technicians and engineers.

It is the amateur today who handles a large share of very important personal messages between our soldiers overseas and their families at home.

The Eye Bank Net, The Amateur Radio Emergency Corps, RACES and other similar groups are so well-known that I really need no more than mention the names to bring to mind the tremendous public service jobs that they are doing.

And, most recently and on a personal and most tragic note, I learned last Sunday, first via the amateur service, of the untimely death in Geneva of Mr. Sarwate, the Secretary General of the International Telecommunications Union.

We know the important public benefits of amateur radio. You know it is well supported by your Government. But you also should know that this kind of support is not universal. In fact, in some parts of the world the governments look upon the service as non-essential. These countries must be convinced that amateur radio is a national resource of great value. The support of these countries is essential to ensure the continued availability of sufficient spectrum space in which the service may continue to thrive and develop. In this connection, it is significant to note that we now have reciprocal agreements with 21 nations under which our amateurs may operate in those countries and vice versa.


Thus, in large part, the question of incentive licensing is designed to give further recognition of our commitment to the amateur service, and our desire to demonstrate to the nations of the world that continued allocation of frequencies to this service is vitally important.

In this connection, I would note the somewhat disturbing trend of a lessening of interest in the amateur service, at least numerically. Any decrease in the number of amateurs could tend to undermine the importance of this service to the nation and the necessity for these frequencies internationally. Statistics seem to suggest for reasons not fully understood some lack of interest in the amateur service by our youngsters who, as you know better than I, must be attracted if the QCWA concept is to be maintained. While the rate of fall off is not alarming it does require our earnest attention.

May I, therefore, suggest that the Quarter Century Wireless Association seek to stimulate interest in this service, particularly in our youth. Many youngsters today are intrigued by the use of communications equipment which is reasonably inexpensive, readily available and requires either no license or examination. By channeling their interests into the amateur service, youngsters can develop a lifetime hobby — can enlarge their educational horizons and often can make use of their talent in developing a career in engineering or other related fields.

The government relies on its amateur "network" in times of emergency and otherwise. Unique among all of our licensees, yours is almost entirely a self-policing, self-regulated group. You have that admirable quality known as *esprit de corps*. You have a real opportunity to develop in the youth of America the ideals of pioneers such as are represented here tonight.

In closing let me assure you that whatever the docket number may be, the objective of the Federal Communications Commission in relation to amateur radio is to improve the status of the amateur service in the public interest.

I appreciate your "CQ." Thank you for "seeking me" so that we might chat informally. 

Stays

WHEN ground was broken in mid-January for the new half-million dollar Corpus Christi (Texas) Museum, one of the major exhibits to be featured at the opening next fall was well into the planning stage. It will be an exhibit of the development of radio communications from primitive stages in the late 1890s, the introduction of the vacuum tube, and into the late 1930s.

The exhibit is part of the personal collection of T. Frank Smith, Sr., W5VA. The collection includes 16 complete stations. The woodwork of the units has been carefully restored and, where necessary, the apparatus has been rewired. Each is in perfect working order. Some pieces bear the magical names of the pioneers of radio: Marconi, De Forrest, Armstrong, Jenkins and Fleming.

One of Smith's most prized possessions is a duplicate of the Westinghouse type T.F. transmitter and receiver with which he worked his first major DX with an Australian amateur.

Museum Director Heine said that Smith's collection is particularly important in today's "throw-away generation" where the national tendency is to discard valuable pieces of history in favor of the latest model.

— Fred Bonavita, W7JLX/5



Aalbert Heine (l.) examines an earphone from a 1908 radio station as T. Frank Smith, Sr., W5VA, explains the set-up to him. A Ford Model T spark coil is visible at the upper right of the apparatus.

A Public Service Function — Football Score Network

BY HARRY T. FLASHER,* W8KFF

A very unique public service function has been provided in the Dayton, Ohio area by amateur radio. Each Friday evening during football season, portable stations are set up at various high school games for immediate distribution of scores through what we call the "Football Score Network." This article explains the operation, discusses problems encountered, describes the equipment used and attempts to give an overall insight of the function.

The network, which is on two meters, is controlled from a fixed location which acts as a clearing station. As each quarter ends, stations located at the games report the scores in a predetermined manner. The net control then announces the score for all other stations. In many instances, the stations at a given location can copy scores directly from other games due to the excellent range which we experienced. At the games, the operator lists all scores and periodically passes them to the public address announcer and any b.c. station giving coverage to the game. The press box personnel are always interested in many games and quite often request up-dated information. Generally we give the information at quarter ends as confusion exists with rapidly changing scores and since on peak nights we approach saturation on the frequency. As many as 15 games have been covered in one evening. In addition, we provide major league baseball scores earlier in the season.

A typical exchange between the games station, W8SJT/8, and the Net Control station, W8IPT, follows:

W8IPT, this is W8SJT/8 at game 2.

W8SJT/8, this is W8IPT, go ahead.

Game number 2, Fairmont East 7, Fairmont West 7 at the end of the first quarter.

W8IPT, W8SJT/8 is clear.

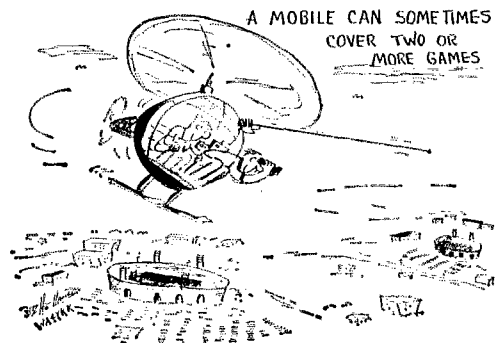
Attention all stations. Game number 2, Fairmont East 7, Fairmont West 7 at the end of the first quarter. W8SJT/8 this is W8IPT in the football net clear.

Each game is numbered for the benefit of recording scores. The visitor score is given first. If net control should repeat a score incorrectly, the game station comes back in with the correction. Each operator maintains a log sheet.

The net control sometimes experiences trouble maintaining communications with all stations as we serve an area having a radius of approximately 30 miles. We found that, although the net control station can reach all locations by

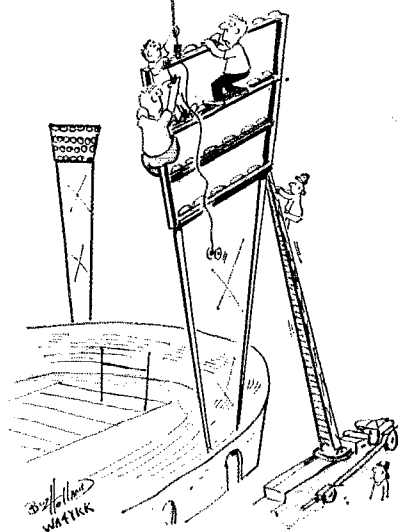
using a rotary beam, it misses stations attempting to call in and some of the game stations are unable to copy all announced scores, thus causing unnecessary delays in distributing scores. This led to the use of an alternate control station. However, this did not solve the problem sufficiently because, while in communication with game stations, the alternate control might miss picking up some scores from the regular net control. Also, each handling of a score increases the chance for error. There is the added difficulty in frequency selection for the alternate. Sharing the same frequency adds confusion and delays the regular control station from taking and announcing scores. We finally settled on a plan by which the control station uses two beam antennas pointing in different directions. Two transmitters are used, and are on different frequencies. Receiving is on one frequency with a receiver on each antenna.

To provide additional scores, we have other fixed stations monitoring games not covered in person but which are announced on the commercial b.c. radio frequencies. These stations call in scores in a manner similar to those actually at the football stadiums. We have several operators with mobile equipment who do not have sufficient time to go to a game for its duration, but who mobile in at half time or toward the end of a game, reporting the current score and carrying all available scores to the press box. A mobile can sometimes cover two or more games as the half time break provides time to drive to another game. Low-band equipment is used into more distant locations for away-game scores. All of this helps us achieve our goal of providing as many scores to the game locations as possible.



* RR #2, Box 167H, Piqua, Ohio 45356.

THE FIRE DEPARTMENT
GRACIOUSLY ASSISTED
WITH THEIR LADDERS.



We use two meters for the net. Generally, a halo antenna on top of the press box provides more than adequate range; however, at many locations we have installed antennas high up on the floodlight pole nearest the press box. In one instance we called on the fire department and they graciously assisted with their ladders. About the only real technical problem at the games involved interference with the public address systems. These problems were cleared up by the usual methods.¹ Many of the rigs used at

¹ McCoy, "Hi-Fi and Electronic Organ Interference," *QST*, June 1966.

games are Gonset Communicators. These units are part of the local RACES operation and this also provides us with a basic frequency in general use. "Twoers" and other transceiver types of equipment are used at the balance of game locations.

We found that approaching the athletic director of each school with a good sound sales pitch won us the opportunity to provide the service. After the net had been in operation for several weeks, we received requests for the service from locations which had not been contacted. However the director may not know whom to contact, so it is best to go to him. We request space in the press box, even standing in a corner. After we have been in several times a permanent seat is generally provided, along with a free pass to gain admittance and permission for the public address announcer to give amateur radio recognition when he announces the scores for the crowd.

Several local b.c. radio stations have given us excellent publicity and have had our operator explain our function for their listening audience during pre-game and half-time shows. We have also had newspaper coverage.

In addition to the game scores, the net has provided some special services. At one game, the officials didn't show up, so using our network the athletic director made an appeal to other nearby locations and immediately found substitutes. The starting of that game was delayed only a few minutes. At another location the public address system failed and our amateur promptly procured needed parts from his home nearby, and made the repair before game time.

Future local plans include expansion of nets in surrounding areas and net-control interchange of scores of interest. We also hope to place a unit at the local newspaper office to provide a Dial-A-Score Service.

A similar operation could be used to cover basketball games — even college football and basketball games by low-band operation. **QST**

Strays

Henry S. Shaw, W1JK

Henry S. Shaw, W1JK, whose name regrettably is among those in Silent Keys in this issue, will be recalled as the author of the very first article on crystal control of transmitters — an article which appeared in July 1924 *QST*, and which was reprinted in our "QST Classics" series in the April 1966 issue. A pioneer "ham," his pre-WWI interest in amateur radio led him to join the General Radio Company early in its existence, and for many years he was Chairman of its Board of Directors.

While in Japan, W8KDS received the traditional amateur radio hospitality from members of the Hokkaido Radio Club in Kushiro. On departure, Paul was presented with a picture autographed by club members. Shown standing (l. to r.) are JA8ABT, JA8BOL, JA8GY, and JA8AAP. Kneeling is Paul, W8KDS.



AMATEUR RADIO PUBLIC SERVICE CORPS

CONDUCTED BY GEORGE HART,* WINJM

Take Me to Your Leader

SINCE the inclusion of RACES as a part of ARPSC, we have received many questions from the rank and file amateur regarding which is which and who does what. "Who appoints the radio officer?" one asks. "Now that AREC is a part of RACES (or the other way around), do I report to the EC or the RO?" asks another. "Our EC says we can't do anything without the radio officer's permission, is this right?" is another typical question.

Let's see if we can't get such matters straightened out. There are three divisions of ARPSC. In order of seniority they are the Amateur Radio Emergency Corps (AREC), the National Traffic System (NTS) and the Radio Amateur Civil Emergency Service (RACES). If you have a copy of the Operating Manual, the diagram on page 81 tells you much. The same diagram is on page 2 of the recently-revised Public Service Manual. But let's take one division at a time and talk about its leadership and who selects them.

The AREC is the oldest, and the emergency coordinators who head it up are appointed by the elected section communications managers of the League, whose names and addresses are found on page 6 of this and every issue of *QST*. The SCMs usually appoint section emergency coordinators to take charge of this phase of section activity. When a section amateur applies for EC appointment, he usually submits his application first to the SEC who then, if he approves, forwards it to the SCM. The SCM then notifies headquarters of the appointment on a standard card form. This is usually the way it's done. The exact procedure can vary from section to section.

ECs usually have areas of jurisdiction encompassing cities or counties, and they are undoubtedly the most important appointee in the AREC. Note that the EC is not the leader of any specialty group. He heads up all emergency preparedness activities within his area of jurisdiction, whether it be h.f. or v.h.f., phone, c.w. or RTTY. In the larger organizations he designates assistants for specialized phases of the work, such as band groups, v.h.f. groups, served agency groups, etc. The bigger the organization he has, naturally, the more assistants he needs. The EC is the supervisor, through his assistants if any, of local emergency nets. In small organizations there will probably be only one net; in larger groups there may be as many as half a dozen, in which case coordination between and among them becomes a problem. The idea is

somewhere along the line to make liaison with a section net of the National Traffic System.

And this leads us to the next division. NTS is a system of nets designed to handle recorded message traffic in standard form from place to place outside the local areas of EC jurisdiction. Unlike the AREC, it is not just an emergency preparedness system; it operates every day, on a routine basis. The local emergency net supervised by the EC is the common link between these two divisions of ARPSC. At section level, the SCM appoints route managers (c.w. and RTTY) and phone activities managers (all voice modes) to organize and operate section nets and in general coordinate routine traffic-handling matters within the section. Usually the RM or PAM serves as net manager at section level, but sometimes they designate someone to serve in this capacity instead. A mandatory function of NTS section nets is to provide liaison to NTS region nets, operating over an area of greater coverage, such as a call district. Operating over an even greater area are the NTS area nets. And binding the area nets together is the Transcontinental Corps, with three directors, one for each NTS area. All managers of region and area nets and directors of the TCC are appointed by the ARRL Communications Manager. So much for NTS.

That leaves RACES. Unlike the other two divisions, RACES is not implemented by the League. All the League can do is recognize it as a division of ARPSC and coordinate with its government-directed officials — national, regional, state and local — to the maximum extent possible. Just as the SCMs of ARRL head up



Caught in front of the Utah Mobile C.D. Communications Center: W7NFT, Utah State Communications officer; K7SOT, Utah State Radio Officer; W7YDW, Utah State Radio Maintenance Officer. The Center is fully equipped for RACES as well as other agency communications facilities.

* Communications Manager.



On Dec. 15 this station was set up in the Mayor's Reception Room at the City Hall in Philadelphia, Pa., to originate messages to service men overseas. Shown operating the transceiver is WA3AYQ. Others, left to right, are SEC W3ELI, Commissioner Wise, RO/EC W3PST, Councilman Giordano, Registrar of Wills Walsh, and K3WEU. City of Philadelphia photo.

activity at section level, c.d. directors head up c.d. activity at state and local level, and the c.d. directors appoint the RACES radio officers. The League has nothing to do with its internal organization, nor directly with the supervision or implementation of RACES. However, the RO and his alternate are invariably amateurs, and RACES is an amateur service, so we think of RACES as one of "our" services to the public.

Quite often, RACES and AREC exist in the same community or county, or in overlapping jurisdictions, and sometimes this causes what can best be described as a "conflict of interest" among local amateurs. The headquarters has no panacea for the resolution of difficulties that might arise from such a situation (wish we did), but usually they can be worked out locally by a proper understanding between officials. For example, RACES might confine itself to c.d. matters and AREC to non-c.d. matters such as working for the Red Cross, for example. Or, the two may combine to form a RACES-AREC group with the EC/RO the same man, or two different persons acting as each others' assistants, depending on the type of activity involved in any specific activation. Or, they may partially overlap and work together; often, the c.d. people are willing enough to have c.d. equipment used by bona fide AREC groups, given the required degree of maturity and responsibility. There is no conflict between AREC and RACES and none should be allowed to develop. If we fight with RACES, we are fighting with ourselves. —WINJM.

Diary of the AREC

At 10:45 P.M. on Oct. 13, VE2BWS was advised of an explosion at a chemical plant in Ville LaSalle, Que. Firing up on two meters, he found VE2s BXW and DCF on the air, the former acting as NCS and the latter on his way to the disaster scene. Upon arrival as close as he could get, he advised that conditions were bad and that spectators were in danger. VE2BWS thereupon loaded two walkie-talkies and a portable base station in his mobile unit and took off for the disaster site.

After talking his way through three police barricades,

using his AREC card, he finally arrived at a final stop beyond which only police, fire and medical vehicles were allowed to pass. He took the portable base station and proceeded on foot.

At the fire site, he found telephone and power lines down and set up his base station about 300 yards from the fire. Time was midnight. With an 18-inch whip, the rig triggered and fully operated repeater station VE2MT. Reporting to VE2BXW, it was disclosed that VE2BNL was on his way to the site, VE2ANH was taking up his station at the hospital where the injured were being taken, and there were many other stations standing by. VE2BWS started to handle traffic. Some of the communications conducted were: (1) A call to Canadian Pacific Railroad headquarters (via VE2SH) to dispatch an engine to remove some tank cars in danger of blowing up. (2) A news dispatch (via VE2SH) to relieve a "hold press" situation. (3) Information supplied to radio station CFMB (via VE2XO) from their reporter at the scene. (4) Casualty lists (via VE2ANH) (5) Welfare traffic for relatives of employees (6) News dispatches for the *Montreal Star* (7) Traffic for Civil Protection headquarters (via VE2KM) who had only walkie-talkies at the scene.

The base station was closed down at 1:30 A.M. and activity continued from VE2BNL/mobile, which operated until 4:00 A.M. An outstanding bit of public service by Canadian AREC members.

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Two more reports have been received regarding amateur participation in the Belmond, Iowa, tornado, Oct. 14 — unfortunately too late to be included in the March *QST* wrapup.

From Story County Acting EC W0JIG comes an excellent report indicating participation by 29 members of the AREC from 0600 GMT Oct. 15 to approximately 0000 GMT Oct. 18. As soon as it became apparent that a communications emergency existed, the Iowa 75 Meter Phone Net was activated on 3970. The Story County organization was mobilized as soon as the situation had been assessed by W0JIG, WA0EYG and W0PFP. All Story County AREC members with six-meter capability were alerted, as were local law enforcement agencies and the Red Cross. Unable to get any specific request for assistance, it was then decided to send six amateurs operating four mobile units to Belmond. The amateurs thus dispatched were W0PFP, W0KAX, K0KPG, K0YLO, WA0EYG and W0JIG. Upon arrival at Belmond, they were immediately put to work handling health and welfare traffic on six meter f.m. The following morning, however, a local six-meter a.m. net was established and the functions were split into health and welfare traffic handling and handling some necessary communication for the National Guard, whose own equipment appeared inadequate for the purpose.

W0PFP reports separately on the same operation, and adds that cooperation to avoid QRM on 3970 was excellent. He also quotes one official as saying "you people get more results out of a \$50 radio than we get out of our \$5,000 ones." Equipment isn't everything; a lot of know-how has to go into any efficient operation.

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During the period Nov. 6 to Nov. 12, 1966, the small logging town of Johnsdale, Calif. was smashed and flooded for several days by continuous rain. All communications and power were out and the population was left without food, water and other necessities — and having to deal with a raging flood situation at the same time. K6CKL, in the disaster area, succeeded in making contact with WB6DJV, and traffic commenced flowing and continued for 49 solid hours. Communications with the disaster area were maintained for Kern and Inyo County sheriff's departments, Red Cross, Civil Defense, and Johnsdale Lumber Company offices in Bakersfield, Los Angeles and Kernville. K6CKL was on emergency power, using car batteries, and operated for two days and nights without sleep. WB6DJV took the traffic on 2 meters and relayed it on 40 c.w. W7PCY offered to stand by for as long as needed to handle any of the traffic. K6VSK and K6VPH kept Porterville represented. WB6DXX and WB6KOH relayed some traffic on s.s.b. when it piled up too high. K6APE and WA6RTI also assisted. Kern County was really in an emergency. — WB6DJV.

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The blizzard of Nov. 27 in upper Michigan left many highways blocked and impassable and telephone lines

down between all cities. Intermittent power failures throughout the peninsula further complicated the situation. Messages of inquiry after the hundreds of stranded motorists and travelers were handled by amateur radio, mostly through the facilities of the Upper Peninsula Net, with WASSLP as net control. Amateur stations active were WA8IHC at Manistique, W8CQR at Houghton, K8TNZ and WA8TVQ at Marquette, K1DEU/8 at Sault Ste. Marie, W8LSZ in Escanaba and W8OQH of Cedarville for St. Ignace and Straits area. WA8PII did an outstanding job of handling traffic between the Detroit area and the Upper Peninsula.

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 A flood in the Owens Valley area of Inyo County, Calif., isolated Olancha and other Southern Inyo County communities on Dec. 4-6. On Dec. 6, WA6GQJ contacted W6IZF on 7255 kc. and received traffic for Cartego and alerted 3925 kc. Fish Net frequency, W6CPP, W6TDW, W6ZKP and W6DUF. W6IHK, Big Creek, received traffic from W6PWE to Kernville and passed same by microwave. All stations stood by until phone lines were repaired and communications restored. The "Knuckleheads" consisting of K6MWK, W6DLI, W6PWE, W6PDL, W6BAST and WA6GQJ were also a valuable link during the emergency. Damage was done to the Los Angeles Aqueduct, roads and the Southern Pacific Railroad, all of whom were served by the amateurs. — WA6GQJ.

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 Amateurs were called out in North Vancouver, B. C., on Dec. 17 to serve civil defense, which was active in flood operations. New EC VE7PF alerted his AREC group on the way to c.d. headquarters, so that after he arrived there was no time lost in instructing them where to go and what to do. After issuing instructions, he established a base station and was in operation on 144.3 Mc. by the time the first mobile arrived on station. The primary need for communication was in dispatching and directing pump crews, for many basements were flooded. VE7FB "rode shotgun" with the truck carrying pumps and crews, providing them with communication. There were four crews and five mobiles in operation. The operation started at 2030, ended at 0300. City and fire department crews were also active, but a head engineer opined that the c.d. group had by far the best system. — VE7FB.

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 Amateur radio functioned after an airplane crashed in Bogota, Colombia, on Dec. 20. When no other communication was possible, W8JEY was able to obtain information on their daughter's condition for worried parents in his town. Stations at the other end of the circuit were WB6LMF/HK, HK3LZ and HK3BFZ. — W8JEY.

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 On Jan. 23, the Southeastern Conn. AREC unit and the Ledyard, Conn., RACES combined on an emergency communications exercise concerning a lost child. Ledyard RO K1MRL was alerted by the c.d. director and called his alternate, K1SRF. EC W1GEA and W1NDX were also called and operated on the AREC frequency of 29.0 Mc. K1SRF served as the personal station of the resident state trooper in Ledyard, while K1MRL went on patrol. W1LCJ heard the call for mobiles and reported in, as did K1GL, and both were assigned to the scene to relay progress of the search parties. The two missing 8-year-old boys were found at about midnight and returned to their homes, unharmed but tired. — K1SRF.

Shortly after the noon hour on Jan. 24, a tornado struck Orrick, Mo., ripping through the high school. The PHD Net in neighboring Clay County was activated and provided emergency communications. K8IQS and K8SPE took the e.d. mobile van to Orrick with the Clay County c.d. director. WA8KUH operated the c.d. station at Liberty. Emergency traffic consisted of requests for emergency equipment needed in Orrick. Five additional members of the PHD Net, AREC and RACES took part. — WA8FLL, EC Clay County, Mo.

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 A snowstorm of almost unprecedented severity hit Illinois and Michigan and other midwestern areas in late January, isolating many areas in which amateur radio was able to come to the rescue. We have a number of reports.

One report comes from W8YAN in Michigan. The Michigan Post Office Net, one of the few regularly-scheduled daytime section nets in operation according to PAM W8YAN, operated from 1545Z to 1852Z. Immediate liaisons were set up with the Calhoun County Severe Weather Net on six meters. Net controls were WA8IAQ on the 75-meter net and WA8CZJ on the six-meter net. Between the two of them, they covered the entire state. The 75-meter operation dealt primarily with reassurances of safety and notices of inability to get home. The six-meter operation, with the NCS at Battle Creek in the approximate center of the heaviest storm area, met on 50.7 Mc., which is normally used for calling and emergency work in the area. Many stations were QNI both nets. "Sno-gos" were dispatched between Battle Creek and the Marshall sheriff's office to rescue persons stranded on the I-94 freeway, to get food and drugs to emergency locations, etc. Local BC stations were furnished with phone numbers of local amateurs to contact with emergency needs, which were then coordinated by radio, freeing overloaded telephone facilities. Traffic was both recorded and "command" type, but all traffic between 75 and 6 meters was on a "formal" basis. Much of the operation's success was attributed to strict net procedures imposed and enforced by both NCSs. PAM W8YAN says there was 23.6 inches of snow with drifts as high as 7 feet.

The Calhoun County, Mich., Emergency Weather Net went into operation at 1420 GMT on Jan. 27 and was cleared at 2400 GMT, according to EC WA8LRB. The NCS was WA8CZJ. K8UCQ notified the sheriff's department that the amateurs had actuated the net. Messages were handled for and about stranded motorists on I-94. WA8ORY notified local BC stations that amateurs would send and receive messages and also dispatched snowmobiles for food, medicine and other necessities. Contact was also maintained with traffic nets in Illinois, Indiana and long-haul Michigan facilities. A total of 29 stations were in the six-meter weather net.

W8SXL, EC and RO for McLean County, Ill., reports 19 stations active on 160 and 16 on 2 meters during the storm, with many more who reported in and then remained silent because they were not needed. Good contact was established with 12 cities or towns in the immediate area and much traffic was handled, some of it in the form of telephone calls to let people know their folks were holed up and safe from the elements. WA9BKB was the means by which the only news for a local paper got out of Clinton. The local broadcast station at Bloomington suspended regular programming and handled similar calls for the area, coordinating their operation with the amateurs. Nice work by the McClean County AREC/RACES gang.



These distinguished gentlemen are all members of the Amateur Services Sub-Committee of the Texas State Industry Advisory Committee. Left to right, they are W5DVC (comms. inspector), W5VCE, (Houston comms. officer), W5VW (KTRK-TV engineer), W5LLS (MARS director), W5OWD (comms. center supervisor), W5TQN (c.d. comms. officer), Mr Layne (state c.d. coordinator), K5TRY (chairman).

Another group of amateurs carried on communications for the Illinois Central Railroad. W9KXXN started things off in Clinton when the storm started, maintaining contact with the dispatchers office in Chicago through WA9CNY. WA9LHU took over the following day and continued operation right up to a late hour Saturday, Jan. 23. Overseeing the operation was W9PEK, c.d. radio officer. At least 40 sets of orders were relayed, keeping control of trains going to Freeport, and in addition many messages were handled for individuals.

W9UHD, EC/RO for Douglas County, reports the county was virtually blacked out in both power and telephone service. RACES was in action from Thursday, Jan. 26, until Saturday, Jan. 28, operating continuously on emergency power, serving communications to the entire county and through the mutual aid system at Champaign-Urbana civil defense. When the sheriff's office lost their entire system, RACES was there to assist, and they stood by to handle long distance emergency calls when the telephone company lost its microwave system. About ten amateurs were in action.

W9BUB reports that the Chicago FM Amateur Repeater of the Society Radio Operators (SRO/CFAR) was active on Feb. 1 feeding radio stations with reports on road conditions via W9KTB and W9KUJ. Mobiles on their way home covered Chicago north side, north suburbs and northwest suburbs.

Sonoma County, Calif., amateurs operated emergency circuits from Guerneville, Calif., during the Jan. 21-22 flood emergency on the Russian River. The circuits were opened at 4 P.M. on Jan. 21 from Guerneville and Monte Rio to the Santa Rosa c.d. headquarters, and continued in operation until 8 A.M. Jan. 22. About 20 amateurs participated.

On Jan. 25, amateurs of Tulsa County, Okla., provided emergency communication when a tornado struck Owasso, just north of Tulsa. Mobile units were actually on the way to the area, at the request of the weather bureau, when the funnel struck. Communications for c.d. and Red Cross were maintained most of the night and all the following day as many trained mobile unit operators were sent to the area. Fifteen amateurs participated. — *K5ZCJ, SEC Okla.*

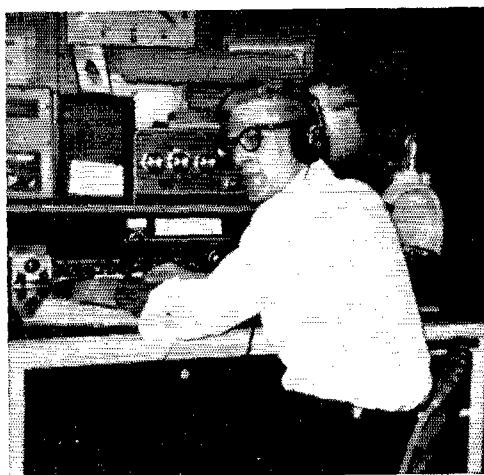
On Feb. 12, W8AKU/mobile came upon an auto accident in Canton, Ohio. Police were on the scene, but W8AKU was asked to inform the son of the injured couple of the accident and advise him that his parents were on their way to the hospital. A call on 2-meter f.m. on the calling frequency was answered by WA8NDB and the son duly informed of the unfortunate incident. — *K8DHF, EC Stark County, Ohio.*

Forty-three SEC reports were received for December activities, representing 17,304 AREC members, a drop both in total reports (2) and in AREC members (about two thousand) from the same month in 1965. Sections reporting: Alberta, E. Mass., S.N.J., Kans., NYC-LI, Mo., Ohio, Colo., Que., N. Tex., N.H., N.N.J., Ga., S. Tex., Orange, Ark., Ala., Sask., Manitoba, Wash., Ore., Ill., Utah, N.C., Va., Tenn., Okla., Del., Conn., E. Fla., W. Pa., E. Pa., Nevada, Mont., Mich., San D., Ky., S.C.V., Sac. V., S. Dak., Nebr., San F., B.C.

We received 557 SEC reports from 66 different sections in 1966, a good increase over 1965. We were also pleasantly surprised to count *twenty-six* sections with a 100% reporting record for 1966, six more than 1965! Several sections missed only one report, which is 100% for practical, but not statistical purposes. In accordance with usual custom, we list herewith the 100% sections, with number of consecutive 100% years in parentheses: E. Fla. (15); NYC-LI (13); Mich. (8); S. Tex. (8); S. Dak. (7); Wash. (7); Nevada (6); Alberta (5); Ala. (4); N.C. (4); N.N.J. (4); Mo. (3); E. Pa. (2); Ohio (2); Sask. (2); E. Mass.; Ga.; Okla., Mont., B.C., Orange, Colo. W. Pa., Ala., Del., San F. Missing only one report were Ore., Sac. V., Conn., Utah, Ky., Manitoba, Kans. Sections submitting *no* SEC reports for 1966 are Vt., West Mass., Alaska, Idaho, S.C., C.Z., Ariz. and W.I.

National Traffic System

On Feb. 4, the Eastern Area Staff of the National Traffic System met at ARRL headquarters (which happened to be



Here's K8NPT, who on Jan. 29 intercepted a call from HH9DL regarding a fire on the vessel *Brandenburg*, bound from Haiti to Bremen, Germany. It seems there is no commercial communication from the island on Sundays. K8NPT relayed the information by telephone to the Hamburg American Steamship Co. in New York. He was later called by UPI and an ABC television station for further information.

convenient) for a total in-session time of about ten hours. EAS is a group consisting of managers of the six NTS region nets in the NTS Eastern Area, the area net manager, the TCC director and three members-at-large elected by the foregoing. Their function is to discuss operational policy matters having general application to all NTS nets and make recommendations regarding them to the ARRL Communications Manager. There is also a Pacific Area Staff, and a Central Area Staff is in the process of formation, but neither of these has had a formal meeting as yet.

Many NTS topics were discussed during the conference. We cannot here give you anything approaching a complete rundown, but let's try to cover some of the highlights.

One subject raised was the overall feeling of loyalty to the system on the part of NTSers. It was observed that many NTS participants, at whatever level, are primarily concerned with the welfare of their own nets and only secondarily with the overall system aspect. There was some question whether or not this is desirable, or should it be the other way around? If the latter, what methods can be used to instill in all NTSers a greater feeling of concern for the system aspect as against the common feeling of adherence to a particular net? Or is this indeed desirable? Do you have an opinion?

The debate became quite heated at times on the subject of the setting up of liaisons between NTS at various levels. As you know, NTS is a system instead of a hodge podge only because of the liaison among the nets at various levels — local, section, region and area, and the inter-area function performed by the Transcontinental Corps; so the liaison function is a most important one. The principal topic of discussion revolved around who (i.e., what net official and at what level) is responsible for designating the liaison stations, how many should be sent and what their functions should be.

There was some extended debate on the subject of NTS statistics, particularly as concerns their significance and usefulness are now presented.

Various aspects of the Simulated Emergency Test as it applies to NTS were discussed in detail, especially how realistic it can be made and the usefulness inherent in extensive planning for it. There was also talk about changing the date to get away from the World Series, football games, the hurricane season and Canadian Thanksgiving. How would a date late in January grab you?

Those who have felt that the upper echelons of NTS are a bunch of c.w. diehards would have been surprised at the Sunday morning session, during which it was generally agreed that there is great need for more phone operators

and phone nets in NTS. The system has never been a strictly-c.w. system and was never intended to be, but it has been true through the years that because most of the medium and long-haul echelons of necessity operate on c.w. there has been a tendency to favor c.w. at the section level. The fact is that at this level c.w. cannot effect anywhere near the coverage that can be afforded on phone. Since liaison from section to region is required, and since most phone operators cannot provide such liaison, it is up to the c.w. operators to do so, by reporting into and being a part of section NTS phone nets for this purpose. How about that?

These are just a few of the 20-odd topics raised for discussion at the 11-man conference. These and others will be fodder for this column in the future. We want the ideas to keep coming, to make NTS the tightest and most efficient operation in ham radio — so let's have yours. — W1NJM.

January reports:

Net	Sessions	Traffic	Rate	Average	Representation (%)
EAN.....	31	1697	1.158	54.7	96.2
CAN.....	31	1273	.969	41.0	100.0
PAN.....	31	1241	.889	40.0	97.8
1RN.....	62	459	.303	7.4	88.0
2RN.....	59	568	.679	9.2	97.3
3RN.....	62	644	.497	10.4	99.5
4RN.....	60	580	.407	9.6	94.7
RN5.....	62	698	.371	11.3	89.8
RN6.....	62	1087	.625	17.5	100.0
RN7.....	31	557	.481	16.6	70.2 ¹
8RN.....	62	547	.374	8.8	99.0
9RN.....	29	534	.708	18.4	100.0 ¹
TEN.....	62	878	.750	14.1	80.4
ECN.....	31	153	.279	4.9	86.0 ¹
TWN.....	31	300	.383	9.7	76.8 ¹
Sections ²	2746	14,615		5.3	
TCC-Eastern.....	122 ³	738			
TCC-Central.....	93 ³	688			
TCC-Pacific.....	133 ³	935			
Summary.....	3452	28,192	EAN 7.5	79.7	
Record.....	2981	25,982	1.019	12.5	....

¹ Region net representation based on one session per day.

² Section nets reporting (87): Kans. CW; OZK (Ark.); NYC-LI VHF, NYC-LI Phone; Vt.-N.H.; Wolverine SSB (Mich.); FMTN (Fla.); KYN (Ky.); NCNL, NCNE (N.C.); Ark. Razorback SSB; GN, W. Fla. Phone, QFN, (Fla.); WVN (W. Va.); SCN (S.C.); Alberta SSB; RISP (R.I.); KSSN (Pa.); VFN (Va.); PHD (Mo.); EMPKN (Ky.); Mich 6 Meter; PTN (Me.); GSN (Ga.); OPEN (Okla.); YO (Wyo.); QIN (Ind.); WPA & EPA (Pa.); VSB (Early & Late) (Va.); PTTN (Pa.); HINN (Coto.); SCN (Calif.); BUN (Utah); Miss. SSB; WBSN, BEN, (Wis.); CFPN (Conn.); BSN (Ore.); AEND, AENO, AENM, AENH, AEND, AENB, AENR, AENT (Ala.); MDDS, MDD (Mid. Del.); WVPN (W.Va.); EMNN (E. Mass.); OSN (Ohio); GBN (Ont.); N.C. SSB; LAN (La.); OLN (Ohio); WSN (Wash.); QMN (Mich.); NCN (Calif.); GTN (Ga.); NYS (N.Y.); BN (Ohio); NCSSB (N.C.); MSN, MJN (Minn.); VN (Va.); NJPTEN, NJN (N.J.); MNN (Mo.); SoCal 6 (Calif.); Ohio SSB, Iowa 75 Phone; Tenn CW; ILN (Ill.); Tenn. SSB; TPN & ETPN (Tenn.); VSN (Va.); MEPN & MTN (Manitoba); EMN (Mass.); EPA Emerx. Phone & Traffic; MON (Mo.); NLS (NYC-LI).

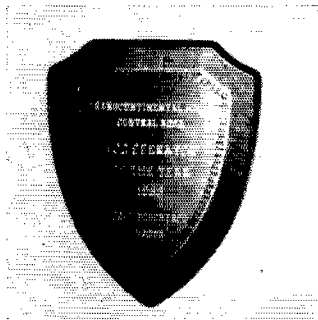
³ TCC functions performed, not counted as net sessions.

Phew! Quite a chore, compiling the above statistics. What a terrific response of section and local nets! Note that we broke old records by a mile in number of sessions, in traffic handled and in rate. Representation went down considerably. This is calculated on the basis of what the nets *should* do, not on what they are doing; that is, every region net *should* have two sessions per night, but in actual fact four of them are meeting only once per night. The representation is based on two sessions per night, and those only meeting once are 50% representation or less for this statistic. Region nets should meet between the area net and the next section net, otherwise there is no way for traffic to get from area to section level.

We want to acknowledge receipt at headquarters of a number of very fine net bulletins. Every region and area net manager and TCC director issues a bulletin from time to time, but just with January reports we received printed

bulletins from EAN, RN6, 9RN, TCC-Central and TCC-Pacific — all five of them most interesting and full of information. K1WJD looks askance at many of our statistics and thinks we ought to include liaison representatives both from lower and to higher echelons in our percentage representation figures. Any comment from the rest of you on this? W9DYG promises a new CAN Bulletin soon. W6VNVQ announces a 13-week QNI requirement to earn a PAN certificate. WA2GQZ reports that diversion of traffic around 2RN seems to have dropped off, because there has been a sharp rise in activity. Traffic fell off on 3RN after the holidays, as usual. W5DTR reports K5N5 for K5IBZ, while the latter had a two-week checkup in the hospital. WB6BBO issued net certificates to W6EMS, WB6KIL and WB6PCQ. Alaska is being represented on RN7 via out-of-net skeds between KL7AIZ and W7KZ-W7UU on 20 meters. Now if only they had Montana! W8CHT has issued 8RN certificates to W3s HZX CKZ DAE ELW EU HQL HZA IWF NAL RYP. K3s KMQ LGA TFF, W13s JXM OCG PIM PMN. W9QLW started a second session of 9RN in March, bringing 9RN into full conformity with NTS procedures. TEN's January report is the best in over three years, sez proud Net Manager W8LGG. Certificates were earned by K8MRI and WA8HUD. K7NHL is having his troubles on RN7; but, he says, it's all fun.

Transcontinental Corps. W3EML has issued TCC certificates to W1s BGD EFW NJM, K1WJD, W2s GVH SEI, K2s RYH SSX, W43s BLV UFI/4 UPC WBA/5, WB2OHK, W3s EML NEM, K3MVO, W4s DVT HJS ZM, W3s CHT RYP, K8KMQ, WA8CFJ. W47JY announces the 1966 award for the "TCC-Central-Operator-



of-the-Year" went to W9DYG (see out). Runner-up was W9CXY. W7DZX says that the month on TCC-Pacific would have been a real good one, if it wasn't for W7DZX.

January reports:

Area	Functions	% Successful	Traffic	Out-of-Net Traffic
Eastern	122	91.8	1863	738
Central	93	95.7	1408	688
Pacific	123	92.7	1870	935
Summary	338	93.2	5141	2361

TCC roster: Eastern Area (W3EML, Dir.) — W1s BGD EFW NJM K1WJD W2s GVH SEI K2s RYH SSX W43s BLV UFI/4 EPC WBA/5, WB2OHK, W3s EML NEM MVO, WA3EEQ, W4s DVT HJS ZM, W3s CHT RYP K3s KMQ LGA W8CFJ, Central Area (W9DYG, Dir.) — W40GG K4DZM WA4WWT W5s GHP KRX, WA5JOL, W2s CXY DYK JUK QLW VAY ZYK WA9NFS, W0s LCX TDR YC, K8AEM, WA0MLE, Pacific Area (W7DZX, Dir.) — W3s TYM VNQ EOT HC IPW BGF EMS IDY, K6s AJU LRN, WA6ROF, WB6HVA, W7s HMA DZX ZIV, WA7EBR.

Net Reports:

Net	Sessions	Check-ins	Traffic
75-Meter Interstate SSB	31	1156	400
20-Meter Interstate SSB	20	435	2467
Mike Farad E & T	57	537	371
Hit & Bounce	31	446	492
North American SSB	26	776	643
7290	42	1530	715

QST

How To Stop Traffic At The County Fair

BY HARVEY KJAR,* WASFUE

WHEN The Lima Area Amateur Radio Club was preparing its exhibition station for the Allen County Fair, one of the members asked if I could make some large photos for the booth. Feeling that the prints would be difficult to display effectively, I decided to prepare a slide program to be shown by rear projection for continuous showing.

After considering the type of slides that were available from the other members and my own collection it appeared that they would require a lot of explaining to mean anything to the non-ham viewer. In a last minute panic, a letter was sent to League Headquarters requesting a suitable slide show. A prompt reply advised that their slide shows were all booked up but recommended the motion picture "Hams Wide World." So the film was ordered, a sound projector promoted, and a few details of the original plan changed.

Rear projection is not used much but is just the thing for showing film or slides in the limited depth of a fair booth or similar area. The screen is placed at the front of the booth with the projector adjacent or below it and aimed at a mirror in the back of the booth. The mirror is aimed to reflect the image to the back of the screen. This setup doubles the available lens-to-screen distance and gives four times the picture area. It also puts the picture up close to the audience where it will get better attention.

A fine rear-projection screen can be made from a 1 X 2-inch wood frame-work covered with draftsman's tracing cloth or tracing film. Paint the frame flat black and attach the covering with a stapler with the dull side facing the audience. Finish it off by binding the edges with black plastic electrical tape.

The motion picture format has an aspect ratio of 4 to 3, for slides it is 3 to 2. A standard size for

* 1056 1/2 W. Market St.,
Lima, Ohio 45805

The Lima Area A.R.C. booth at the county fair. The projection system described in the text can be seen at the left. The mirror is just above the left end of the console. Space for the display was provided by the Metropolitan Bank of Lima, Ohio.

tracing cloth seems to be the 30-inch roll. My screen ended up being 30 X 24-inches overall, which is a good size for the purpose.

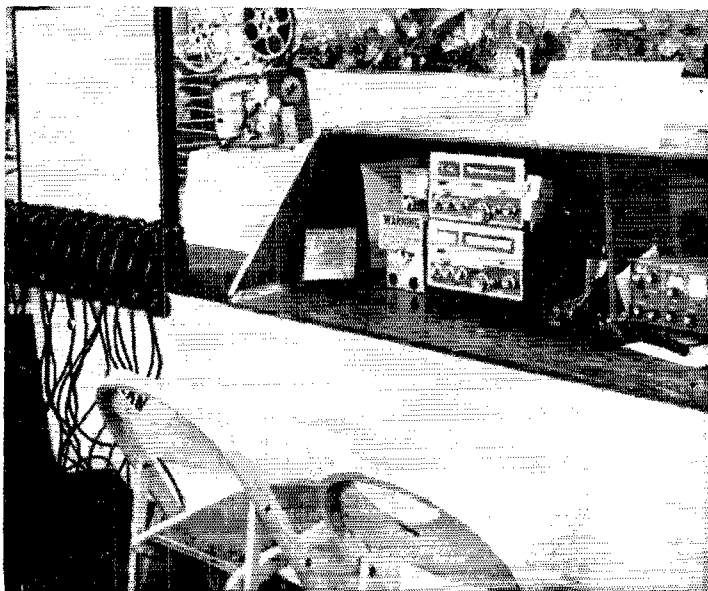
You will need a good plate-glass mirror with dimensions one half those of the screen. Mount it on a piece of plywood and attach a bracket with a hole taped 1/4"-20. Now the mirror can be attached to a photo tripod which makes for easy adjustment and aiming.

Since the Fair Secretary takes a dim view of loud speakers in the Merchant's Building, twelve surplus telephone handsets were borrowed from Fair Radio Sales (two club members work there). The phones were all connected in parallel and tied to the speaker terminals of the projector. The phones required so little power that the speaker was just loud enough for the operator to tell that the darn thing was working.

This is the second time I have used this type of projection setup at a fair and both times it has been a traffic stopper.

Experience indicated that it would have been better to have mounted the phones 2 or 3 feet in front of the screen. It is time well spent to untangle the cords after each show. "Hams Wide World" runs about 25 minutes and something about half that length would hold the audience attention better.

If you want to have fun at the fair, just build this rig then stand around and watch while the people try to figure out how the picture gets where it is, and what the push-to-talk switches on the telephones are for. At least once during each performance, some kid is sure to pick up two phones and say, "look! stereo." QST



Peruvian Adventure

Ham Radio To The Rescue

BY BILL J. PAYET, S. J.,* OA4BQ

On July 28, 1966, another priest and I left Lima by bus with 32 high school seniors for a graduation trip. Our destination was Iquitos, Peru, some 1000 miles away to the north and east, an outpost of civilization not far from the very heart of the Amazon jungle. The trip involves scaling the snow-covered Andes Mountain Range and descending to the jungle plateau to the east. From there we planned to travel by water the rest of the way.

It took us three days to climb 15,000 feet up over the Andes snowfields and down to the jungle plateau city of Pucallpa on the Ucayali River. It was 600 miles from Lima and we traveled over rough dirt roads, spotted with potholes.

Once in Pucallpa we set up the ham rig, a Raytheon SBE SB-34 transistorized transceiver we had borrowed from a local ham, OA4OS. We hooked it up to a 12-volt truck battery, and tied the 20- and 40-meter dipoles to two neighboring trees. We worked several hams all over Peru — some more than 1,000 miles away — getting excellent signal reports.

After a five-day stay in town, we boarded the ship *Yurimaguas*. She was a 90-foot ship and was carrying 150 tons of cargo. She also carried 180 passengers, one hundred of them minors and all were packed in like sardines. We left port at 10 A.M. and headed downriver for a five-day voyage. Looking back, I am sometimes tempted to call the shipboard diet *simple*; this is an understatement, however, and doesn't do justice to such fare. The food was *rough*: a hot-water dish the crew called soup, plus beans and rice. This was followed by green bananas boiled in water.

* P.O. Box 5111, Lima, Peru.



The ordeal over, the author and some of the rescued students enjoy the flight back home aboard the PBY Catalina aircraft.



The author, OA4BQ (r.) aboard the ship *Yurimaguas*. Antennas were strung from the main mast to a water pipe on the stern. The SB-34 transceiver is sitting atop its suitcase in operating position.

Boiling was too good for these bananas, we decided — they had no flavor whatsoever. There were only 40 beds on board. This made it impossible to walk on either of the two decks at night. They were a solid hodge-podge of suitcases, cargo, and people asleep.

I do not believe there has ever been a mobile rig sailing down the jungle rivers of the OAS area, nor will there be another for a long time. We recognized that this was a unique expedition in the annals of ham radio. Accordingly, we raised our dipoles on the main mast in the bow and tied the other end on a water pipe on the stern, forming a 45-degree vertical angle. We used the vessel's own power, which was generated by a diesel engine.

The rest of the passengers seemed to regard the rig as something of a madman's toy. Their attitude changed rapidly, however, as the week's events unfolded. The morning of Monday, August 8, our ship quietly slid over a sand bar and broke its rudder. Being under way, the ship veered, turning on its axis — and promptly got stranded on another sand bar. The captain ordered the engine reversed at full speed, but it was no use. We had broached and were stuck in the middle of the river, 200 yards away from either shore.

What now? The captain informed us that the only way out would be to send his small outboard boat down river all the way to our destination, Iquitos, a 30-hour trip. In Iquitos, they would try to get a tug to come to our rescue. It would be a four-day up-river trip for the tug, which would then take three more days to tow us to our destination. This meant more than a week in all, and the loss of our airline tickets.

Our main concern, however, was food. The captain said we would be fed during the first 24 hours, but that after that we would be on our own. We had beans for an additional day, and rice for a couple more. There were plenty of bananas, all as green as a golf course in spring. One of the passengers was a doctor, and for this we were grateful. Nevertheless, the prospect of so

(Continued on page 150)



"But . . . But . . . But, Ma'am¹"

BY WILLIAM R. CLARK,* W5AUB

QRX, George, the landline is ringing . . . Hello . . . Yes Ma'am, I am an amateur radio operator . . . No Ma'am, I didn't know that I was interfering with your television set, but . . . but . . . Ma'am, would you please excuse me for just a moment, I'll be right back . . .

George, some nut just called with another TVI complaint so I'd better say 73 . . . Yeah, see you tomorrow night, W5AUB clear and QRT . . .

Hello, Ma'am, I'm back . . . What's that, Ma'am? . . . Did I say that? . . . Yes Ma'am, I'm very sorry that I said that. If I had known that your telephone was right by your TV set I wouldn't have said it . . . No Ma'am, I'm not trying to be a smart alec, I'm sort of a dumb alec . . . You're right Ma'am, that's not very funny . . . Yes Ma'am, I apologize . . . Ma'am . . . Could we? . . . Yes Ma'am, could we? . . . You're right, Ma'am, my mother would be very ashamed if she knew that I was talking disrespectful to an old lady . . . but Ma'am, I didn't mean it that way . . . but . . . but . . . Please Ma'am, could we just talk about your problem? . . . Yes, Ma'am, could we call it our problem? . . . If it will make you feel any better we will call it my problem . . . Yes, Ma'am, . . . No Ma'am . . . Yes, Ma'am, sometimes an improperly turned transmitter will transmit a signal into the television band but sometimes . . . Yes, but sometimes . . . Please Ma'am, did you realize that an old TV set can tune in a signal in the amateur bands . . . brand

new . . . \$750.00 . . . Yes Ma'am, that should be just about as good as money can buy . . . but . . . but . . . but . . . Yes, Ma'am. I know you have the right to report me to the FCC . . . Well Ma'am, would you believe that I have been reported to the FCC six times and everytime I was cleared? . . . Would you believe three times? . . . once? . . . Yes Ma'am, you're right. My mother would be ashamed of me . . . No Ma'am, I won't make any more bad jokes . . . Your son, John Smith, No Ma'am, I don't know him . . . With the FCC in Kingsville . . . You don't say? . . . Is that what he told you to do . . . Ma'am . . . but . . . Please . . . Please Ma'am, may I say something? . . . No Ma'am it won't be another smart remark . . . Yes, Ma'am, . . . Just this, I am very sorry but through my rudeness and poor taste I have gotten this conversation off to a very bad start, would you mind hanging up and calling again . . .

Hello . . . Yes Ma'am, I am an amateur radio operator . . . No Ma'am, I didn't know that I was interfering with your television set but I am certainly glad you called it to my attention . . . Yes Ma'am, it is possible, but a young lady with such a nice voice probably has a brand-new \$750.00 set . . . You do, well it's probably in my old broken-down transmitter . . . Yes, Ma'am, I will check it out very carefully and try my best to correct my trouble . . . Yes Ma'am, thank you for calling . . . It was a pleasure to talk to you, too . . . Give my regards to John . . . If it happens again you just let me know . . . Goodnight, Ma'am.

QST

* 3261 Austin St., Corpus Christi, Texas 78404
¹ From Vol. III, No. 2 (March 1966) *W5MS Bulletin*



Happenings of the Month

Alex Reid, VE2BE

With the greatest regret we record the passing on January 27, 1967, of Alex Reid, VE2BE, Honorary Vice President of ARRL and a member of its Board of Directors from January 1, 1930 until his election as a vice president on May 13, 1960.

Alex was first licensed in 1919 with the call BE, later changed to 2BE and then VE2BE. His first rig, a rotary spark gap, was followed by a quenched gap transmitter. In the early twenties he switched to a tube rig using 202s, and contested honors for the first Canada/England amateur work with 2TA. In 1925 Alex relayed news of a Jack Dempsey prize fight from Australia.



Alex Reid, VE2BE

After serving as president of the Montreal & District Radio Club, Alex was elected ARRL Section Communications Manager for Quebec Province in 1927. In 1930, he was elected as Canadian General Manager of ARRL under which title he continued to serve until the name was changed in 1951 under the League's present Articles of Association, carrying on thereafter as director from the Canadian Division. Some small indication of the esteem in which amateurs held him were the 25th, 30th and 35th Anniversary testimonials held in his honor. On the first occasion the Canadian amateurs presented their director with a 20-A sideband transmitter and on the last an NCX-3.

In government circles, too, Alex was highly respected. In the late twenties, he was appointed as a part-time radio inspector. He was a member of the prestigious Canadian Radio Technical Planning Board since its inception at the start of World War II, and he was a member of Canada's

delegation to the International Telecommunications Union conferences at Atlantic City, 1947 and Geneva, 1959.

In the business world, Alex joined the Hartt and Adair Coal Co. as a clerk and worked his way up to president. Since his retirement he had been quite active on the air, as for instance in the "Professional Loafers Net" on 3790 kc. Indeed, it has been reported that Alex was on the air only hours before he died.

To Alex's widow Jackie, the former Lora Jackson, and to the amateurs of Montreal and of Canada we extend the sincere condolences of League officers and members everywhere. Perhaps our feelings are best summed up by Past President Herbert Hoover, Jr., W6ZH:

"It was with the deepest possible regret that I heard the news of Alex Reid's death.

"He was kind, friendly and sincere; and he earned the affectionate respect of all who came in contact with him.

"The contributions he made during his lifetime to amateur radio and the League were legion. Yet he did things in such a quiet, modest way he seldom got the credit for his accomplishments — except among a very few who had the privilege of working with him.

"He will be greatly missed, and I trust the League will act appropriately to see that his name will be always honored as one of its staunchest and most effective supporters."

CYCLES PER SECOND IN CANADA

The Department of Transport in Canada has released the following statement concerning Canada's use of Hertz for cycles per second:

"The CCIR at the XIth Plenary Assembly, Oslo 1966, adopted the Hertz and multiplicative prefixes as now apply to cycles per second. Following this trend, the Department of Transport is adopting the term Hertz in place of cycles per second as a frequency unit for use in general correspondence. For the time being however, in all correspondence relating to Canadian legislation such as, for instance, the Radio Act, cycles per second will be retained to designate frequency because under General Radio Regulations, Part I, Section 7 and Part II, Section 11, only definitions adopted by ITU are recognized. The Department expects that this exception will continue only until the ITU adopts the term Hertz at a World Radio Conference."

Our appreciation to the Canadian Radio Technical Planning Board and ARRL Director Eaton for this information.

FCC ANNUAL REPORT

The Annual Report of FCC for fiscal 1966 and a December 30 statement by Chairman Rosel H. Hyde contain much information of interest. The year-end paper, for instance, mentions the amateur moonbounce record set on November 28 when K2MWA/2 in New Jersey and VK2ATN in Birchipp, Australia were in contact on 144 Mc. for six minutes.

The Annual Report, while not providing any previews of FCC decisions on incentive licensing, indicated that Docket 15928 and the 1959 Extra Class Inquiry, Docket 12912, would be dealt with in a single Commission document. The report says in part:

"The major problems concern the contemplated qualifications for the advanced grades of Licenses: what additional privileges, if any, should be afforded the holders of the present Advanced grade licenses, and the privileges to be granted the holders of the preferential grade licenses."

The reports show that FCC issued 17,000 official notices for on-the-air violations of its rules in all radio services, an increase of 20%. The monitors also detected some 1500 unlicensed stations, furnished 600 emergency radio bearings to ships and aircraft and solved about 2800 major interference cases.

The Commission-sponsored National Industry Advisory Committee (NIAC) adopted interim emergency plans in a number of services and confirmed the Radio Amateur Civil Emergency Service (RACES) in this role. Separately, RACES was made a permanent part of the amateur service.



Governor Paul Laxalt of Nevada signed the year's first Amateur Radio Week proclamation, the week of January 1-7, to coincide with an amateur gathering at the Hotel Sahara. Left to right, Nevada SEC WA7BEU, Boulder City EC W7BIF, the Governor and W7PBV, SCM of Nevada.

BRITISH COLUMBIA LICENSE PLATES

From the Victoria Short Wave Club comes the welcome news that the Province of British Columbia will no longer require payment of a five-dollar service charge for amateur call-letter license plates. Jim Smith, 3C7FO, is now license plate coordinator, and applications for 1968 plates are being accepted now.

NATIONAL CONVENTION ACCOMMODATIONS

The National Convention Committee has secured some additional accommodations, in moderate and low-priced brackets, for the convention in Montreal June 30, July 1 and 2.

Convention headquarters is the Hotel Bonaventure, where rates are \$21 for a single and \$26 for a double. Children under 18, sharing a room with parents, are free.

The Kennedy Apartment Hotel features 2½ room suites accommodating four persons; minimum rate is \$30.

The Motel Lafayette is \$22 per day, single or double, with extra cots at \$4.

Rooms in inspected and approved private homes range from \$8 to \$10, double occupancy, depending upon location, comfort and parking facilities.

A trailer park and camp is located 8 miles from Expo '67 on Route 9. Rates are \$3 for tents, \$4 for trailer tents and \$5 for trailers. Running water, baby sitters, restaurant, telephones and bus service every half hour to the Expo grounds are features of "Camping Valle Air." For reservations at this facility only, write or call Mr. O. Godbout, 742 Colonel Jones St., Ste. Foy, Quebec (phone 653-7360).

Marina facilities are also available. Write to the address below for further information.

All reservation requests except the trailer park go to Mr. Doug Shaw, VE2BSX, 7401 Mount Avenue, Montreal 16, P. Q., Canada — before June 1, 1967, please.



Jean Shepherd, K2ORS, whose wit sparkles forth nightly on WOR-New York, and who did an uproariously funny stand-up bit on amateur radio at the 1966 Hudson Convention, celebrated the latter occasion with the release of a book of amusing, sometimes acid, reminiscences, *In God We Trust—All Others Pay Cash*. The book, published by Doubleday & Co. totals 264 pages and sells for \$4.50



Godley Receives VWOA Award

At its Forty-Second Annual Memorial Awards Banquet held in New York City on February 25, 1967, the Veteran Wireless Operators Association presented Paul F. Godley with its De Forest Audion Award for outstanding achievement in the field of research and development. Prominent in the list of citations were his development of early amateur equipment (is there an old old-timer who doesn't fondly recall the Paragon receiver?) and that never-to-be-forgotten Transatlantic Test expedition in 1921, sponsored by ARRL, when he achieved the first overseas reception of U. S. amateur signals. In the photograph above, taken after the presentation, "Paragon Paul" is the fourth from the left. Others, left to right, are Clarence D. Tuska, co-founder of ARRL, Arthur Batcheller, retired chief of the FCC New York office, Hatton C. Wilks (W2BC-W1BC), VWOA President, George Grammer (W1DF), representing ARRL on this occasion, Frank T. King, VWOA Assistant Secretary, Patrick O'Keefe, Editor of the VWOA publications, and Richard S. Egolf (W2WX).

EXECUTIVE COMMITTEE MEETING

Minutes of Executive Committee Meeting

No. 314

February 11, 1967

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the Headquarters office of the League in Newington, Connecticut, at 9:38 A.M. on February 11, 1967. Present: President Robert W. Denniston, W0NWV, in the Chair; First Vice President W. M. Groves, W5NW; Directors Charles G. Compton, W9BUO, Gilbert L. Crossley, W3YA, Noel B. Eaton, VE3CJ, and Carl L. Smith, W9BWJ; and General Manager John Huntoon, W1LVQ. Also present were Director Robert York Chapman, W1QV; Director Harry J. Dannals, W2TUK; General Counsel Robert M. Booth, Jr., W3PS; and Assistant General Manager Richard L. Baldwin, W1LKE.

The General Manager reported on a preliminary financial statement of the operations of the League in 1966, and the matter received extended discussion.

A tentative budget submitted by Project Oscar, Inc. for its 1967 operations was examined and appeared satisfactory as concerns proposed League monetary support.

At the request of New England Division Vice Director Bigelow Green, W1EAE, the Committee examined his recent change of employment as against the eligibility requirements for his office; the Committee found no conflict.

At the request of the Committee, Communications Manager George Hart, W1NJM, joined the meeting. Extensive discussion ensued concerning the possibility of designating a common channel in the 28-Mc. amateur band to facilitate low-power a.m. operations such as converted CB equipment. On motion of Mr. Smith, the following resolution was unanimously ADOPTED:

WHEREAS, the initial response to the February 1967 QST article concerning conversion of CB equip-

ment for use on the amateur 10-meter band has produced considerable interest with the membership; and

WHEREAS, the use of a common frequency above 29.0 Mc. by low-power transmitters using the a.m. mode will greatly facilitate amateur operation in the 10-meter band, and

WHEREAS, the selection of a recommended frequency will encourage monitoring and usage both locally and on a League-wide basis; now, therefore, BE IT RESOLVED, that ARRL encourages amateurs generally to employ 29.6 Mc. as a common frequency, particularly for low-powered a.m. communication.

The Committee recessed for luncheon at 12:45 P.M., reconvening at 1:45 P.M. with all persons hereinbefore mentioned in attendance except Messrs. Chapman and Hart.

On motion of Mr. Eaton, after discussion, unanimously VOTED that the League make available to individual members and clubs, at the approximate cost of production and mailing, extra copies of the Stanford Research Institute study of the Amateur Radio Service.

The General Counsel reported on the status of various Washington and legal matters.

On motion of Mr. Groves, unanimously VOTED that the League records its affirmative position in the matter of IARU Proposals 119 and 120, concerning applications for membership from the Faroese Amateur Radio Society and the Malta Amateur Radio Society.

On motion of Mr. Crossley, unanimously VOTED to approve the holding of an Oregon State Convention in Portland on June 2-4, 1967; a West Virginia State Convention in Jackson's Mill on July 1-2, 1967; and an Ontario Province Convention in Ottawa on October 27-29, 1967.

On motion of Mr. Crossley, affiliation was unanimously GRANTED to the following societies:

- The Amateur Radio Club of McGill University
Montreal, Que., Can.
- Amateur Radio Club of St. John's College
High School Washington, D. C.
- Amateur Radio Square Club Cleveland, Ohio
- Boulder High School Amateur Radio Club Boulder, Colo.
- Central Kentucky Amateur Radio Club
Campbellsville, Ky.
- Conestoga High School Amateur Radio Club Berwyn, Pa.
- Golden Triangle DX Club Seminole, Fla.
- Hastings High School Amateur Radio Club
Hastings-on-Hudson, N. Y.
- Kaiser Employees Amateur Radio Club Phoenix, Ariz.
- Lamesa Amateur Radio Club Lamesa, Texas
- Lewiston Clarkston Amateur Radio Club, Inc.
Lewiston, Idaho
- Metuchen YMCA Radio Club Metuchen, N. J.
- Minnetonka High School Amateur Radio Club
Excelsior, Minn.
- Moncton Area Amateur Radio Club Moncton, N.B., Can.
- North Alabama DX Club Huntsville, Ala.
- North Arkansas Amateur Radio Society Harrison, Ark.
- Opposum Amateur Radio Club Wantagh, N. Y.
- Overlook Radio Society Kingston, N. Y.
- Ozone Amateur Radio Club Pearl River, La.
- Penn Jersey Young Ladies Radio Club
King of Prussia, Pa.
- The Phillips Exeter Academy Radio Club Exeter, N. H.
- Red River Valley Amateur Radio Club
Gainesville, Texas
- Shorefront YM-YWHA Amateur Radio Club
Brooklyn, N. Y.
- Strongsville High School Amateur Radio Club
Strongsville, Ohio
- Viking Amateur Radio Society Waseca, Minn.
- Virginia Amateur Radio Association Richmond, Va.
- Wisconsin Rapids Amateur Radio Club
Wisconsin Rapids, Wis.
- Young Amateurs of Quebec (YAQ) Montreal, Que., Can.

In the course of its meeting the Committee discussed, without formal action, the 1967 National Convention, DXpeditions, group life insurance, RACES operations, and membership development.

There being no further business, the Committee adjourned, at 6:50 P.M.

JOHN HUNTOON
Secretary



I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION

ISRAELI OPERATING CHANGES

The October, 1966 IARU column carried news about amateur radio in Israel. Since the article by Philip M. Kane, 4X4UQ, appeared there have been several changes in procedures.

OM Kane says U.S. amateurs are now receiving reciprocal operating permits on the same basis as their Israeli counterparts in the U.S.—one year (renewable) or to the end of the license term, whichever occurs first. The grading remains the same: Novice Class and Technician Class licensees receive Grade "C" privileges here, General Class and Conditional Class holders receive Grade "B" privileges, and Extra Class and Advanced Class licensees get Class "A" privileges. Operation under such a permit is with the "home call" with the addition of /4X.

Amateurs who are intending to settle in the country can receive an Israeli license and call sign by passing the appropriate technical examination for the grades outlined above (except for Grade "C" which will be granted without further examination) credit being granted for the FCC code examination. In addition, a license of one grade lower than indicated may be granted without further examination. For further information, the applicant should contact the Ministry of Posts directly.

The Frequency, License, and Legislation Section of the Engineering Services, Ministry of Posts, is located in the Shalom Tower Building, Tel Aviv. However, the mail address for all correspondence with the Section is Ministry of Posts, Engineering Services-Frequency, License, and Legislation Section, General Post Office, Jerusalem. The former Tel Aviv post office box address is no longer valid.

In general, the Customs on completed instruments for amateur stations (or for kits to build them) is 15% of the total value (this is true for transmitters, receivers, antennas, etc. but there are many "small print" sections of the Customs Regulations which are applied in each individual case). In all instances of clearance of radio equipment (including receivers and walkie-talkies not subject to licensing in the U.S.) the Customs authorities require a specific approval-release from the Ministry of Posts (the same section that deals with licensing) before the goods may be cleared into the country. For the purposes of this approval, the recipient is required to supply to the Ministry of Posts the following: date and port of arrival; name of ship or airline; manifest, bill-of-lading, or import license numbers (as applicable), and a complete description of the goods to be released.

For a tourist coming to the country, equipment accompanying the amateur will be held at Customs until the approval-release is obtained. When the equipment is released, a notation will be made in the amateur's passport that upon leaving the country he is responsible for removing the equipment or paying the required duties and fees.

For an amateur coming to Israel for a stay exceeding three months, (in Temporary Resident, Permanent Resident, or Immigrant status) the procedure is a bit more complicated. The individual concerned will file a Customs Declaration within one month of his arrival or change from Tourist status, and if he intends to clear radio equipment duty-free he must list it on his declaration. Then, when the equipment arrives, he must obtain the approval-release as mentioned, and in addition, may be required by the Customs to post a guarantee bond for the amount of the customs and fees. Additional information as to the procedure and the mechanics may be obtained from the Association of Americans and Canadians in Israel (AACI), 53a Hayarkon Street, Tel Aviv or from AACI branches in the U. S. and Canada.

An agreement has been signed between Israel and Canada permitting third-party traffic between amateur stations of these countries. It should be emphasized that a U. S. station operating in Israel under the reciprocity agreement is bound by the third-party restrictions of an Israeli station (i.e., with U. S. or Canadian stations only).

(Continued on page 140)



U.S. Ambassador to Iran (EP3AM) and Mrs. Armin H. Meyer recently held a dinner in Tehran for amateur radio enthusiasts. The guest of honor was Bill Leonard, W2SKE. Pictured left to right are W2SKE, EP3AM, EP2RV, EP3RO, EP2BQ, EP2GF and EP2AX.



Correspondence From Members -

The publishers of *QST* assume no responsibility for statements made herein by correspondents.

DROP DEAD

¶ When I saw the editorial in February *QST*, I was shocked. I admit when I was a novice some years ago I was in disagreement with the ARRL. But, in time I found that it was the best amateur organization available.

My feeling about incentive licensing is that I do not completely go along with it but I can see its good and bad points. I believe, instead of cutting the phone band, it should be expanded and thus expansion should be for extra class only. As everyone knows the bands are very crowded now and by cutting, they will only become more crowded. — *Lloyd Pennell, WB3GHR, Linden, N. J.*

¶ This is the first time incentive licensing was really brought out clear and concise. My compliments on all that was said!

I personally endorse all that was said and I'm sure that some of the unhappy amateurs would too now if they took the time to read it! As we all know misconceptions can get started in a big hurry and take years to clear up.

Again my thanks for a tremendous editorial and I'm glad that I have been an ARRL member for "only" 18 years. — *Ernest Blind, W7DDQ, Bremerton, Wash.*

¶ I would not worry about the individuals that mail unsigned letters. In the first place they are not desirable people to have in any organization and are to be pitied for being a weak character. — *W. Lee Beckley, W0SRK, Hartley, Iowa.*

¶ You state that the FCC's proposal is to divide the bands, one half for the upgraded license and the other half for the present general license. This is not true. The FCC's proposal gives the entire band for the upgraded license and half of the band for the present general license. A vast difference. Half the band will be expected to handle all general traffic as well as all advance traffic to generals.

Even if the bands were to be divided in two equal parts, much harm will result. It has been a well known fact in the telephone industry that two trunk groups of equal size cannot handle as many calls as can be handled if the trunks are put in one large group. The same is true for radio frequencies.

I feel that you are ignoring good engineering practices and are distorting facts in your zeal to help a few even if it hurts many. — *James A. Nieddeck, W3MRW, Bethlehem, Pa.*

¶ You're right! I'm talking about your italicized paragraph heads in the Editorial (Feb.). Every one of them comes from a man, or men, of non-think status. We have all met the kind, not only in amateur radio, who love to sound off to make up for their secretly realized lacks of knowledge in hopes that noise of anger will impress others. — *Temple Nieter, W9YLD, Evanston, Illinois.*

MORE DB

¶ Periodically one sees, in *QST* and elsewhere, interesting and illuminating estimates of the effective power ratios among the various modes of transmission — e.g., c.w. 0 db., s.s.b. — 17 db, etc.

Admirable though these pioneering efforts have been, they can now be superseded by a General Law of Transmission Mode Power Ratios. I have developed this Law during 22 years of amateur operation, some of it in contests, during no part of which have I run more than 20 watts input. This Law is to the aforementioned estimates as the Theory of Relativity is to Newtonian mechanics, and furthermore it rhymes, which is an aid to remembering which Relativity can hardly claim. As every scientific law ought, this one is a perfect and infallible predictor of the actual situations which arise. It is:

If they need you,
They can read you,

— *Frank Gue, VE3DPC, Burlington, Ont., Canada.*

TECHNICAL STUDY GROUPS CONTINUED

¶ As an active amateur interested in advanced communication techniques, I have watched the "Correspondence from Members" with an eye toward seeing views of other amateurs on technical advancement. The letter from OM Kirsch, W3QOT, in February *QST*, contains a laudable suggestion — technical study groups.

Experience as a member of an active organization has proven to me that a group effort on a large scale project is the best way. I would like to cast my vote in favor of initiating an organized program of technical study groups within the League.

Based on qualification and stated interest, groups throughout the world could work independently in the many areas amateur radio encompasses. One group might work on high speed information transmission for use by the traffic men. Another might work with in-band duplexing which could be of use in several areas. Still another might work on a pre-detection recording system or an automatic tracking system for the satellite enthusiasts.

There are, in fact, somewhat similar groups working presently on their own in such areas as slow-scan TV on 14 Mc., moonbounce, and microwave communications.

I believe that League financial aid is by no means a mandatory item. The League through *QST* would be a clearing house for the ideas and a forum for the results of these study groups. A prerequisite, however, to any technical program the League might undertake would be a determination of what is "state-of-the-art" in amateur radio.

Finally, I am sure such a program, well organized and selectively administered, would become another feather in the League's cap. It would be a clear demonstration of the League's ability to supply the constructive leadership so badly needed if amateurs

are to extend their horizons in the light of the complexity of today's electronics. — *David B. Collins, K2LME, Tenafly, N. J.*

¶ With the danger to some of our high-frequency allocations it appears that greater emphasis should be placed on technical activities involving research, and experimental work in the u.h.f. and microwave portions of the spectrum. We seemingly have a relatively high proportion of communicator type operations (hobby categories of activities) which would be extremely difficult to successfully defend as justifiable utilization of facilities in the category of world domain. That we so occupy ourselves when there yet remains much experimental and developmental work in the area of space communications and satellite relay, seems to be a poor utilization of the majority membership of our fraternity.

It appears timely that we initiate a policy of special emphasis on technical development and experimental work to ultimately restore the image of the average amateur as a qualified technician and make him a valuable contributor to development of the state-of-the-art in microwave equipment for space and satellite communications. This is in reality, not a new area of activity for us, but merely a return to the pursuits that earned for the pioneer amateur an enviable place in the history of radio development.

Briefly, a plan should be implemented to greatly expand our efforts on a group study or experimental basis, somewhat on the order of engineers chapters and special research groups operating at the local level. The nearest approach seen in amateur work is the moonbounce clubs and the Oscar satellite program. These are small beginnings and this type of work should be tremendously accelerated. The ARRL policy should primarily be that of stimulating the efforts of public spirited amateurs with the required technical and administrative background who would staff these study and experimental projects groups. They would also attract interested recruits from the beginner level of technical capability who would ultimately become expert technicians or engineers.

These groups should be organized in every urban area to perform a level of technical training and experimental work on a par with the overall technical and administrative capability of the group. With proper backing, a program of this kind could generate a tremendous surge of design, construction, and experimental activity that could have a very gratifying effect on the prestige and good will of the electronics world for the League.

Ultimately, these groups could assume the responsibility for all amateur communications facilities, with the full load of communications channels transferred from the high frequency part of the spectrum, to v.h.f., u.h.f. and microwave frequencies. Multiplex carrier, teletype and telemetering modes of operation would tremendously increase the potential capabilities of amateur radio facilities, and these modern installations, utilizing satellite relay, scatter, and line-of-sight communications techniques, with capable technical and administrative supervision, would become a tremendously large potential communications network of priceless value to the government for emergency and disaster communications.

The present loosely knit organization of the League does not provide the necessary controls for effective utilization of our facilities. The result is that individual effort is directed into many different directions, with duplication and over-saturation

both as to function and spectrum space. We end up with a very low rating of efficiency and effectiveness because so much of our activity is at the whim and for the pleasure of the individual amateur. — *William W. Adams, Sr., W5WW, Center, Texas.*

¶ The only frontier now for experimenters is in ultra-high frequencies. ARRL may be losing ground because it doesn't capture the imagination of the young experimenter but perpetuates dead and sentimental tradition and attempts to force its ideas rather than make them so appealing through leadership, that the mob follows. — *W. R. Moody, K3VQW, Riverdale, Md.*

[EDITOR'S NOTE: Policy matters such as formation of League technical study groups are decided by the Board of Directors. The next Board meeting will be May 5, 1967. If you are interested in expressing your views, be sure to write your Director; his name and address appear on page 8.]

THANKS!

¶ I would like to express my appreciation for the outstanding and unselfish services provided by Mr. James W. Knapp to Commander Carrier Division Six (Comcardiv Six) and USS *Independence* (CVA 62) personnel.

Comcardiv Six was embarked aboard *Independence* on a Mediterranean deployment from June 1966 to February 1967. During the deployment Mr. Knapp, ham radio station W2AFQ, Brockport, New York, provided outstanding ham radio message relay service for personnel of Comcardiv Six and *Independence*. The cooperation and assistance rendered by Mr. Knapp was outstanding in every respect. Nearly every day during the last two months of the deployment Mr. Knapp gave freely of his time to serve the men of *Independence*. Very often his services commenced at 5:30 a.m. and continued for eight to ten hours.

Mr. Knapp's diligence and service provided pleasure to men separated from families for long periods of time and his services are sincerely appreciated.

Please accept my deep gratitude for superior performance and service. — *V. G. Lambert, Rear Admiral, U.S. Navy*

¶ I would like to take the liberty of thanking the various individuals having ham radios who have assisted in my obtaining word with respect to my parents after the recent riots in Nicaragua. It seems that this could best be done by writing.

Although I don't know the name of the person involved, station YN1URI apparently exercised a major role in the assistance. The members of my family and I appreciate it. — *Edward D. O'Brian, Anaheim, Calif.*

RULE OF THUMB FOR VHF/UHF

¶ Ground everything in sight;
If you can't ground it, bypass it;
If you can't bypass it, shield it;
If you can't shield it, forget it.
If you can't forget it, go back to the low bands.
Dennis McCormack, K1PLX, Winchester, Mass.

CAN YOU VOTE?

¶ I have talked and written to amateurs who don't agree with many League policies. As a result of the League's backing of Docket 15928, some dropped their membership. What they don't seem to realize is if all (or most, anyway) of the U.S. amateurs

joined the League, they could easily put enough pressure on League leadership (after all, they vote for it) to change the policies with which they are not in accord. Not only this, but a respected and responsible organization of 270,000 people, whether it be of amateurs or hog callers, can exert a great deal of influence on the government commissions which regulate their practices. For these two reasons alone, the ARRL should be given the amateur's support. — *David F. Austin, River Edge, N. J.*

DUES

☛ I have been watching the debate over an increase in dues with interest. But, I don't think that anybody has touched on the real issue yet. It is simply this: In an age of inflation, you cannot survive on a fixed income. That is essentially what the ARRL is trying to do. Since I first got my license, the cost of living has risen some seven percent, if my estimate is correct. How much have dues risen in the same two years? To have kept pace, they should now be \$5.35. But they aren't. Insignificant? Perhaps on an individual basis, but multiplying that thirty-five cents by 100,000 members comes out to the symphony of \$35,000.

So, if the ARRL is to continue to operate in any capacity, its income must increase. That means a dues hike. — *Frank E. Fisher, Jr., W14UXQ, Arlington, Va.*

☛ I am against raising of dues. Five dollars is quite enough for most hams. It is worth it and I wish I could give more but would think twice on higher dues. Is there any other way you could raise revenue for overhead? — *E. F. Gray, K2SGQ, Beaver Falls, N. Y.*

☛ Please keep the dues down where they are! — *David Langmann, WB2VZC, Flushing, N. Y.*

☛ I don't know how you do it. I'm not rich, but believe in paying my own way. With the cost of ham gear what it is no one should complain about a raise in dues to \$15.00 per year. Think of the status an ARRL member would have then!!! — *Scotty Gray, Torrance, Calif.*

☛ I have read the recent issue of *QST* in regards to membership in the ARRL. It is regrettable that some people take great pride in their sarcastic attitude towards renewing their membership.

I travel throughout New England for pleasure, and have noticed many country clubs and boat clubs. I often wonder how long would they survive if their dues were only five dollars a year. In other words, would there be any incentive or prestige to be a member? Personally, I doubt it.

I have more than twenty years experience in radio repair and design. I have built many short wave receivers through the years and I never realized the enjoyment possible in ham radio. I received my General Class license in Nov. '66. I visited headquarters and became a member. Many thanks to W1AW for the code practice for without it I doubt if I ever could get to 13 w.p.m. I am now near 20 w.p.m.

I would suggest to new ham's who have doubts about joining the ARRL, and to ham's who are not renewing their membership, if at all possible, to visit W1AW and the museum. The collection is priceless. Had it not been for H. P. Maxim and the League this priceless heritage of the early days would not have existed. Speaking with R. B. Bourne, W1ANA, curator for the museum is an education in itself. — *Robert E. Flanagan, W1HAAU, Dorchester, Mass.*

WWV VISIT

☛ The two part series: "WWV Moves to Colorado" proved to be very interesting reading at our QTH; not only because it was so well written, but because it brought back to mind the pleasant experience we had during a brief visit at the Boulder complex this past Summer.

The articles failed to mention the one factor that impressed us the most about the operation and that is the attitude of the employees. I was a little hesitant about even stopping by the NBS center because I had visions of a typical governmental operation that would be geared to a formal frigid tour of the facilities. Some of these fears were dispersed when we pulled into the employee's parking lot and saw what looked like the gathering on field day — about every third car had either a whip or a halo.

An hour of our vacation time had been set aside to see what we could see about the NBS but as it turned out this little side trip became one of the highlights of our vacation. Never have I seen such a large group of mass dedication and enthusiasm; everyone acted like they should be paying someone for working there. Yes, the graphs in the article told of many accomplishments but I know that these gains were made not by an employee working on an assignment but complete devotion and mutual helpfulness by all.

Soon April 15 will be here and Uncle Sam will again be taking his big bite out of each of us. This year I found an inhibitor that will remove part of the sting . . . in Boulder. — *W. L. Lamb, W0PHD, Warren, Minn.*

2 IN 1

☛ When I proceeded to remove the wrapper from my February *QST*, the package felt heavier and thicker than usual and I thought maybe it contained a special edition. Lo and behold when I removed the wrapper I found not only *QST* but also the February issue of *CQ*!

Apparently the interloper publication had been tucked in the *QST* wrapper by a clerk at the P.O. It was really tucked in and from all outward appearances it looked as though the two magazines had been mailed in the *QST* wrapper. *CQ* was in its own wrapper however. Nothing like American free enterprise and competitor cooperation. — *Ferd Thiede, W2EC, Selauket, N. Y.* [QST]

Strays

The Albany High School Amateur Radio Society, W2YPN, has formed a New York State High School Net. The purposes are to further each individual club by discussing mutual high school club problems, passing traffic in and out of New York State, exchanging activity reports and eventually organizing a hamfest with all participating clubs invited. The net currently meets once a week on 3860 kc. at 2:30 p.m. local time. Any high school radio club station or individual representing such a group is invited to check in. Further information may be obtained by contacting Jerry Kahn, WB2PZL, Secy.-Treas. Albany High School Amateur Radio Society, 141 Western Avenue, Albany, New York.

How's DX?

CONDUCTED BY ROD NEWKIRK, * W9BRD

How:

The idea suggests itself, of course, but we thought it proper to show up in our mailbag before implementation: the Best of Jeeves. It did: several "How's" correspondents want to see some favorite W1CJD cartoon classics rerun. We intend to do this occasionally. Which Jeevesies of the past particularly tickled you?

While emptying out trash for the Tuesday pick-up (will that January snow ever go away?) we ran across a sprung Slinky. We've discarded sprung Slinkys before. In fact, with our kids, every spring seems to find at least one sprung around here.

Spring fever has us feeling more quirky than usual this year, so that old light bulb twinkled and we sprang for the Slinky, sprung or not. Being between deadlines, we indulged in a little pseudoscientific investigation.

A Slinky, as you well may know if you've ever stepped on one barefoot in the dark, is a 100-turn 2 3/4-inch-diameter coil of 1/8-inch spring-steel ribbon. Now any old plug-in coil man will tell you that this is a hair too hefty for 160-meter tanks. But any young apartment dweller should recognize inherent hide-away antenna possibilities. After all, Slinkys compress to 2 1/2 inches thick, closewound.

For those inclined to proceed further along such an inviting avenue of research, here's a start: A standard Slinky, extended to room-size length of 12 feet, self-resonates at about 12 Mc. Against ground, naturally, the dip is around 6 Mc.

By all means let us know how you do Slinky-wise on 20 and 40, fellows, as well as top-loaded on 80 and 160. For possible v.h.f. helix application you'll have to check with colleague W1DVE. You may not clear DXCC with it, but not every ham has an antenna that can walk downstairs. Gracefully.

What:

A packed program causes us to go lightly with your "How's" Bandwagon this month. Moreover, a few hours in the 1967 ARRL DX Contest just concluded should have armed you with a substantial stalk list. WA2BAH/1, a mill in his lap and pencils behind each ear, awaits your Test results at the League Contest Desk. Please file your outcome, be it extensive or casual, by early post to Newington. . . . We can't resist just a small peek at 28 Mc., especially since ten's first hot season in years is drawing to a close. Oh, there will be occasional late spring and summer 10-meter openings, of course, but that waist-deep DX QRM won't spill in again till fall. Or will it? . . .

10 phone DX excitement, described in dispatches from Ws 1CNU 8YGR, WAs 2LOR 5IIS 8GGN 9MQI, WB2s LBJ NDI and s.w.l. W. Kilroy, is the fault of CN8CS, CRs 4BC* (1700 GMT, 6DX (28,680 kc.), 7CD 19, 7DS 7IZ, CT1BB, GXs 4BT* 21, CB6* 9PP (650) 21, DM2AFO (700) 14, EA8s AM CR EX FG, FG7XL (587) 17, FH8CD

(600) 14-15, FS7RT (540) 22, GC1LI*, GI3OQR (585) 15-16, HC1EL (560) 15, HI9NTZ* (765) 21, HZ1AB, KG6AAV (620), KH6s AFG FQE GCE (659), GF (612), IJ (580), KP4s AXC BFI, KR6IS, KS6BV 23, KV4s CX ETI (560), KW6EJ (622), KZ5EE (600) 16, LU5DQG*, MP4TBO 11, OA8V 12, OD5s BZ 13, CN EL (600) 14, EY 13, FC 12, PJ 2CO*, SVs 1AE 10, IBL (500), 9WL (600) 14, 9WU (600) 15, TGs 8CJ (578) 14, 9EP, T2LSA (645) 20, UAs 9MBM* 9, 9XPQ (580) 9, UB5s ANQ* KAB* UG2AOL*, UDG6D, UFGAU* 12, UG6AB, UHBAE*, UW9XP* 13, VE2BUJ/SU, VK6s CF NG 11-12, QL* 12, VP2KR, VQ9AR 13, VS9s AJC 12, ATC* 14, VU2s JAI FN*, WA5NOA/VP 9 16, YAs 18V (600) 11, 5RG, YO6ANC*, YS1TM*, YV1QB 15, ZC4s BW 11, CI CN 12, GB JU MO* 11, RM (599), TX*, ZDs 3C 8ES 14, 8SKI, ZEs 1AS (540) 14, 1CB (492) 17, 1CK* 2JA* 8JV 15, ZLs 1GJ (602), 1KG (598), 2QS (600), 4LZ (600), ZSs 1XX 6BLR (645), 6BMD* 6ET* 6JK, 3C3FZ/SU (625) 9, 4U1SU, 4W1G, 4X4As, 5As ITG 12, 1TV 5TZ 10, 5N2s AAF (558) 12-14, AAW, 5R8As, 7Q7RM*, 8R1G 19-21, 9H1s AB* 10-11, X, 9J2s DT 19, MM VX (650) 14, WR, 9Q5s BD (680), EB 19 and QR, the asterisks indicating non-s.s.b. senders.

10 c.w. is tapped by Ws 1CNU 7VCB, K3FKU, WAs 2LOR 5IIS 8GGN and WB2UOO for the beeps of CR6EI, CT3AS (28,058 kc.), DM2BSM, EI9J (35) 1500 GMT, KH6PFR (23), KV4CI (52) 11, KZ5PF (38) 13, KX6ER (82), MP4s BAH 13, BEU (32) 12, OA4s KF (25) 15, PF, OD5LX 8-9, PE2EVO of Holland, PY5ASN, ST2SA, SV6WEE (50) 12, TA2AC (38) 12, UG6AD 12, U8CD, UL7s GI (108) 11, GO (40) 11, RP (45) 11, UAD, UM8AP (75) 11, VKs 2BRJ/9 7SM (70) 12, VPs 1DX (17) 20, 9FC, VU2s GG 11, TZ (45) 11, XE1AX (28), YOs 3GO (67), 7VS (39), YU2KY (40), YV4MC (30) 12, ZB2AM (50) 12, ZC4s DA GB (47) 12, SS (25) 13, ZE3JO (37) 16, ZL2RC (63), ZSs 1AC 6DT 6MM, 4X4s VF 9, VX, 5N2AAF 14, 6W8DD (55) 12, 7Q7RM, 9H1AE, 9J2s BC (47) 12, GJ (38) 16, HZ (50) 13, 9I1TL 13 and a handful of garden variety Europeans which will become rarish 28-Mc. catches as warmer weather — at last! — seeps northward.

Next month we expect to account for DX activity on other ranges thanks to (15 phone) Ws 1CNU 3HNK 7VRO 8YGR 9LWQ, K5VT, WAs 2LOR 8GGN 3PKG 9MQI 9QBM, WB2s LBJ NDI WLB; (15 c.w.) Ws 1BGD 1CNU 2ADP 3DPR 3HNK 7VRO, Ks 3FKU 3FOP 5MHG/6 5VTA, WAs 2LOR 3DSD 8GGN 9MQI 9QBM, WB2UOO, WNs 2YOJ 6TIF 6UHU 9SUU, T. Sulliman; (20 phone)



*7862-B West Lawrence Ave., Chicago, Ill., 60656.

— Reprinted from the March, 1959, QST

W5 2DY 4HOS 5KGJ 7VRO 8YGR 9LNO 0PAN/KH6, Ks 3FOP 9UCR, WAs 2LOR 5AER, VE1ASJ; (20 c.w.) W1 1BGD 1CNU 2ADP 2JBL 3DPR 3HNK 4YOK 4ZSH 7VCB 7VRO 8YGR 9LNQ 9CVZ, Ks 6MHG/6 5VTA 6SRM/4 0DEQ, WAs 2HLH 2LOR 3DSD 51HS 8GGN 9MQI 0ERM, Wbs 2LBJ 6TIF; (40 c.w.) Ws 1CNU 3DPR 3HNK 7VCB, K5VTA, WAs 2HLH 5TIS 8RQQ, WB2LBJ, WNs 2Y0J 8UIP; (40 phone) W7VCB, WA5IIS; (80 c.w.) Ws 1CNU ISWX 3DPR, K5VTA, WA2HLH, WN6TIF; (75 phone) WA5IIS; plus listeners C. Durnavich and W. Kilroy. How's DX out your way?

Where:

ASIA — "I still have K1YPE/XV5 QSLs for those lucky enough to work him," reminds W4UWC. "No confirmations will be issued for MP4TBO's operation as MP4BGA," regrets VE1ASJ. "Rog's Bahrain logs were lost." There are, fortunately, several active MP4B stations about. VE1ASJ points out that Canadian QSL attendants cannot mail self-addressed stamped envelopes bearing U.S. postage. International Reply Coupons instead, fellows. "I'm 7Z3AB's QSL manager for all W/K/VE/VO contacts made on and after February 15, 1967," declares W4HEG. Northern California DX Club's widely read *Dxer* understands that W9ARV can assist U.S. stations toward VS9HRV pasteboards. "VS9ABL sends me log info for U.S. contacts only," confides W4NJF. "However, when I work him I can usually check and clear non-W/K/VE/VO applications." The well-edited *Dxer* of DX Club of Puerto Rico is appraised by AP8B, erstwhile Pakistan QSL charge, that AP5HQ's gear and logs are still sealed and unavailable. This presumably goes for other AP QSO records. Very little bona-fide Pakistan hamming since May, 1965, border troubles shut things down.

AFRICA — CR6GO notifies, "I'm TU2BD's QSL manager for QSOs dating January 27, 1967, and thereafter. Direct replies require s.a.e. and necessary IRCs." "Unclaimed QSLs for WB6CIY's CT3AR and 3A6DX work last summer have been cleared via bureaus as of early February," announces K6CYG. "Those who do not receive their cards after a suitable waiting period can reapply to me direct, but they should first check their bureaus." QSL aide W4NJF reports, "I have no RT3AC logs for QSOs earlier than May 11, 1966. To confirm prior contacts I suggest applications direct to R. Shroff, K4CGC, 305 Grant Av., Morgantown, W. Va., 26506. Roy attends University of West Virginia. Fresh out of FL8AC cards at present but I expect we'll print more to take up the slack. I also manage EL2AG QSLs now, s.a.s.e. required." "ZD8J tells me he confirms all first-time QSOs 100 percent via bureaus," states WA2HLH. "John wants QSLs via his K4LJV address."

OCEANIA — "I can confirm all VK2BKK QSOs," advises WA9IBT, hinting at future DXpeditionary endeavors by that gentleman. S.a.s.e. and Greenwich Mean Time log reference, of course. ISWL's interesting *Monitor* gives P.O. Box 36, E. Melbourne, Vic., Australia, as a QSL route to antarctic outpost VK3s CS GP and TO. The QSL manager for Macquarie's VK0CR was listed here last month.

EUROPE — VERON's *Dxpress* says 5SM0s who are former SM5s gained a reprieve from that umbersome new prefix and are henceforth authorized to resume their Five status. New licensees in the concerned region will be SM0s, however. G2BRR, in the *Monitor*, observes that the International Short Wave League QSL Bureau relays from 800 to 1500 cards daily. Dick welcomes s.a.e.-



VP1VR, operated by WA4QVH, regaled some 1500 QSOers in December and January. Armando, a commercial c.w. man, held mainly to the key. (Photo via W4VPD)

with-IRCs inquiries about ISWL, a renowned outfit now in its sixteenth year. *Monitor* commends amateur radio's QSL managers generally but decries a certain few whose terms are curious. Why should stamps and IRCs ever be required to defray mailing costs? And why should the standard bureau route be denied those who prefer this economical and traditional means of QSL receipt? W6PQT is told by SV0WL that QSLs via his W3CJX address move much faster than those dispatched direct to Crete. Sevran Radio Club's F5KD, engaged in a first-anniversary six-operator QSO binge this month, promises QSLs for all contacts. NCDXC's *Dxer* has it that W6UNP can still expedite GC8HT verifications.

SOUTH AMERICA — "To date I've received no logs from VP8IU," protests G3MBQ, designated QSL agent for that station. "Please advise Robin's contacts I'll send out cards as soon as the required information arrives. Perhaps someone in QSO with him can jog his memory — I would like that log quickly." 9Y4VT suddenly began specifying QSLs via W3DJZ, so W8GIU not unwillingly relinquishes the job. "Never could get much in the way of logs from him, anyway. I still keep QSLs moving for CR6FW, FG7s XJ XY and FM7WI."

HEREBABOUTS — "QSLers of the Month" this month include CE3ZN, CP1FQ, CR7CO, CX2CO, DL6SL, D1UHF, E15BH, EP3AM, F2SQ, FG7XL, F08BQ, HA8WH, His 3AMF 8LAL, HR2PEB, HZ1AB, K8C4s USC USX, KG6IJ, KV4AM, KX2BEI, OH0NI, PJ2MI, PY2BAW, SV8WU, TA2AC, TG9AG, VEs 3FJZ/SU 6QG/SU, VP5RB, VQ9AR, VS8AJ, Ws 1BUV 4TPM 9RQF/YP9, WA5QVK, YK1AA, ZC4TX, ZDs 3G 8SK1, 4U1TTP, 5H3JL, 7Q7s BN EG and 9B3USA, plus QSL agents Ws 2CTN 7VRO, Ks 4AMC 6ENX and VE3EUU, all applauded by "How's" reporters Ws ISWX 3DPR 7VRO 8YGR 0PAN/KH6, Ks 5VTA 8CQG, WAs 1DJG 3CGN 8PKG 9IBT 9M1 9QBM and s.w.l. W. Kilroy for fast-draw QSL shootin'. Any quick card pushers you feel worthy of commendation here! 41p! K5VTA needs aid in running down QSLs from F48VN and VR3L snagged in '61; WA2HLH likewise re K1CHZ/KM6 '65, TG9KJ '64, UL7AA '63, VP4SD '65; WA4FJM the same for CR6AC '65, F48RJ '62, F47YJ '65, G2FMY '61, VP8GQ '64; WA9QBM will settle for HK5ACI; and WB2NDI seeks scoop on 5A1TT of '65. Ideas? W4VZD, K3FKU, WA9QBM and VE1ASJ make known their availability as QSL tenders for overseas DX stations, the rarer the better. "I'm QSL manager for VP6BW as of February 1, 1967," announces WA9IBT, "but on request I'll try to confirm QSOs made before that date." "On QSLing in general I have no complaint," says WA4FJM. "I stand at 139/123 worked/confirmed, only nine delinquents more than a year overdue, and some of those remotely located. Since I use no stamps/IRCs, and s.a.s.e. to managers only, QSLing direct by air to 'new ones', I'd say this is par for the course. Naturally I've had to work a few countries twice! As a whole I think the DX gang does pretty well." WA8RVU expects to have completed QSL work for K8EHU's Montserrat VP2MO endeavor by now. W2GHK, DXpedition of the Month proprietor, lists these main possible reasons for QSLing delays: (1) no stamp or IRC included with envelope, causing bureau reply; (2) sending more cards than envelopes, causing retarded shipment till all are accounted for; and (3) nonreceipt of logs from DX stations concerned. Stu reports I6RB and I6RB/4U mailings in January, but complete logs are still awaited from HZ2AMS/3, OY7S and 3A2BF. "I hold logs for VP1VR activity from December 28, 1966, to January 25, 1967," notifies W4VPD, stressing need for the customary s.a.s.e. and GMT court-



Cayman Islands DXpeditioners may come and go but ZF1GC stays on at Boddentown, 14-Mc. s.s.b. preferred, (Photo via K4CAH)

sies W7VRO, who has shipped some 4500 confirmations for clients CR6AI, HK7UL, HM1AB, KZ5GN, OD5EB, PY2BGL, YV5BMN, ZS1XR and 5N2AAF, urges non-s.a.s.e. applicants to expect replies only via local bureaus. Wonder if Dick winces every time a DX test comes along — PY2BGL alone could keep a QSL side hopper' Ex-CO2BO, now back home at OK3MM, tells K9KLR his thousands of Cuban QSOs will be thoroughly confirmed via bureaus Time to iterate that we normally haven't space to duplicate data already appearing in the *Callbook* but we may rerun items previously published in "How's" after six months or so, provided evidence to hand indicates that the information remains valid. You know, the "QSL via" material. Let's see how the land lies along the QTH front, remembering that each specification is necessarily neither "official", complete nor accurate . . .

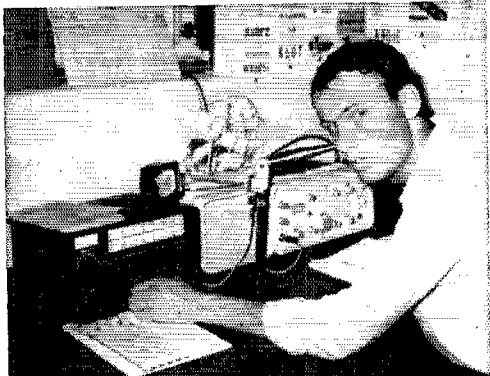
CM2BA (to OK1GX via CAV)
 CO1EG (to CM1EG)
 ex-CO2BO, J. Horsky, OK3MM, P.O. Box C-22, Piestany, Czechoslovakia (or via CAV)
 CO3CS (W/K/VE/VOs via W6CNA)
 CR6FW (via W8GIU)
 CR7JA, Box 2113, Laurencio Marques, Mozambique
 CX9PP, Box 1, Rivera, Rivera, Uruguay
 DJ1ZN/W2, K. Najmann, Glenham Green Apts. 9E, Route 52, Fishkill, N. Y.
 DL2WB/MI (to DL2WB)
 EA8FJ, Box 215, Tenerife, Canary Islands
 EI9BG (via IRTS)
 EL2AG (via W4NJF)
 EL2AH (via SM8BM)
 EL6B (via WA4ULE)
 FG7s XJ XY (via W8GIU)
 FM7WI (via W8GIU)
 FM7WB, Box 313, Ft. de France, Martinique
 GX9OB/3C7BHN, T. House, 737 Glencoe St., Denver, Colo., 80220
 GSAGA (to WA4IKU)
 HC5NW (via WA6MWG)
 HC7FD, P.O. Box 5, Quito, Ecuador
 HI3AMF, P.O. Box 951, Santo Domingo, D.R.
 HI7APO, Box 604, San Pedro, D.R.
 HI8LAL, Box 951, Santo Domingo, D.R.
 HI9NTZ, Arenoso, Provincia Duarte, D.R.
 HM2BD (via WA6MWG)
 HP1XHG, Box 4929, Panama City, R.P.
 HR2BS, Box 596, San Pedro Sula, Honduras
 HS4AR, P.O. Box 2008, Bangkok, Thailand
 K1YPE/XV5 (via W4UWC)
 K6OXV/CE6A (via K8EHU)
 KC6CL, R. Feigal, % Peace Corps, Truk, E.C.I., 96942
 KH6BIH (via WA6MWG)
 KH6FRO-W6PAN/KH6, L. Shima, P.O. Box 373, Pearl City, Hawaii, 96782
 KR6IS, Det. 1, 1982nd Comm. Gp., APO, San Francisco, Calif. 96239
 KV4AM, H. McBirney, Box 717, Christiansted, St. Croix, V. I.
 KW6EJ (via W2CTN)
 KZ5EX (via K1MWX)
 MP4s BGA TBO (see preceding text)
 OA1BO, Box 41, Sullana, Peru
 OK2BKH, J. Knotek, Krenova 3, Brno, Czechoslovakia
 OKs 3UL 4CM (W/K/VE/VOs via VE1ASJ)
 OX3AS (via EDR)
 PA6AA (via VERON)
 PJ3CL, R. Gibbs, Rondeklipweg 23, Curacao
 PX1EO (to F3EQ)
 PY0s MB NB (via PY1BYK)
 SM4PRK, P.O. Box 12, Falun, Sweden
 SM5BUT (via W3HNC)
 TG9FH, % U.S. Embassy, Guatemala City, Guatemala
 TI2JVL, Box 4325, San Jose, C.R.
 TI9s JIC LH (to TIs 2JIC 8LH)
 TTSAB, S. Besse, Box 401, Ft. Lamy, Tchad
 TU2AY, P.O. Box 20194, Abidjan, I.C.R.
 TU2BA, Box 172, Abidjan, I.C.R.
 TU2BD (via CR6GO)
 UP2OK, B. Arvydas, Box 310, Kaunas, Lithuanian S.S.R., U.S.S.R.
 VK2AVA/2 (via WA2RAU)
 VK2BKK (via WA9IBT)
 VK2BRJ/9 (via W4ECD)
 VP1MW, Box 554, Belize, Br. Honduras
 VP2AZ (via W0NGF)
 VP2AM, P.O. Box 152, St. Kitts, W. I.
 VP2MK (to W8EWS)
 VP6BW (via WA9IBT)
 VP6PJ (via WB2UKP)
 VP7CG, D. Morse, P.O. Box 4036, Carter Cay, Bahamas, % RCA MTP, Patrick AFB, Fla., 32925
 VP8IU (see preceding text)
 VP8JD (via CX2AM)
 VQ9AA/c (via W4ECD)
 VU2WNV (via W4ECD)
 W6FHM/DU1, B. Brunemeier, P.O. Box 2570, Manila, P.I.
 WA2DIJ/3V8 (to WA2DIJ)



KX6BU is control station for the Pacific Interisland Net which meets Sundays, Tuesdays and Thursdays at 0830 GMT on 14,330 kc. KH6 KM6 KW6 KG6 KJ6 KC6 KB6 KS6 and KR6 stations report in regularly, joined by U.S. traffic pushers when ship permits. Shown here, left to right, are KX6s EX (W5YI), EF (KH6DIC), FA (WB6FZX and EQ (WB6TGS). (Photo courtesy Kwajalein Hourglass)

WA9PAE/VP9, W. Reichert, 1604th CAMS, P.O. Box 2773, APO, New York, N. Y., 09856
 WB6IPI/KJ6 (to WB6IPI)
 XE3RE, Box 329, Merida, Yucatan, Mexico
 XE6YL, F. Lopez, P.O. Box 7565, Mexico City 1, D.F., Mexico
 YK1AM (via YK1DF)
 YVIRI, Aptdo. 7351, Coro, Falcon, Venezuela
 ZD8CX, Box 31, Ascension Island
 1A6SBO (to WA6SBO)
 1B9WNV (via W4FCFI)
 3A2NN (via 3A2CN)
 3W8D, R. Milroy, % RMK/BRJ-340, APO, San Francisco, Calif., 96312
 5U7AL, Box 201, Niamey, Niger Republic
 5VZ8RO, P.O. Box 11, Palime, Togo
 7Z3AB (see preceding text)
 8R1P (via WA4UOE)
 9L1JM, J. Mulder (PA8RR), P.O. Box 16, Freetown, Sierra Leone (or via 9L1SL)
 9M2DQ, J. Pershouse, Henrietta Estate, Padang Serai, Kedah, Malaysia
 9X5NH, Box 608, Kigali, Rwanda

Thanks for these suggested QTHs goes to Ws 1CN1 1SWX 1UED 1WPO 1YYM 2ADP 2CHT 2JBL 2VOZ 3DPR 4HOS 4NJF 4RM 5KGJ 6OHU 6PQT 7UVF 7VRO 8YGR 9KA 9LNG. Ks 4EWG 9KLR 9UGR. WAs 1DJG 2HLH 2LOR 5IIS 8GGN 8RQQ 9IBT 9MQI, WBS 9NDI 2QZE 6KVA. VEs AKZ ASJ, W. Kilroy, DARC's DX-MB (DLs 1EP 3RK), DX Club of Puerto Rico DXYer (KP4RK), Far East Auxiliary Radio League News (KA2LL),



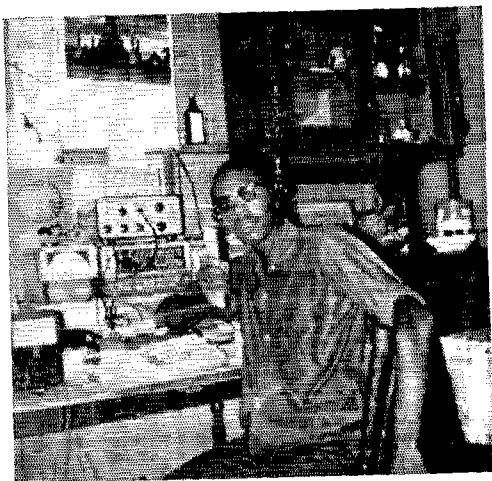
MP4TBO, a Trucial Oman regular on 15 and 20 single-sideband at 1200-1500 GMT, expects to return to England in July. Roger also briefly signed MP4BGA.

(Photo via VE1ASJ)

Florida DX Club *DX Report* (W4BRB), International Short Wave League *Monitor* (A. Miller, 62 Warward Ln., Selly Oak, Birmingham 20, England), Japan DX Radio Club *Bulletin* (JA1DM), Long Island DX Association *DX Bulletin* (WA2EFN), Newark News Radio Club *Bulletin* (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association *DX Bulletin* (K11MP), Northern California DX Club *DXer* (Box 608, Menlo Park, California, 94025), Ontario DX Association *Long Skip* (VE3EWY) and VERON's *DXpress* (PA9s FX LOU TO VDV WWP). The brethren could use anything along this line *you* have to offer, OM.

Whence:

EUROPE—Those who are still unfrazzled after the annual ARRL affair will find other DX contests on the docket this month and next. From 1500 on April 22nd to 1700 the 23rd, USKA (Switzerland) holds its annual *Helvetia-22 DX Contest* on 10 through 160 meters, c.w. and phone efforts combined. The usual RST- or R5001, R5002, etc., serials will be exchanged between Swiss amateurs and the rest of the world. Each HB station can be worked once per band at 3 points per contact, this point total to be multiplied by the number of Swiss hand-cantons worked, for final score (watch for these canton designators appended to HB calls: AG AR BE BS FR GE GL GR LU NE NW SG SH SO SZ TG TI UR VD VS ZG and ZH). Logs postmarked within 30 days of the contest for shipment to M. Roschy, HB9SR, USKA Traffic Manager, Chemin Grenadiers 8, 1700 Fribourg, Switzerland, will be eligible for possible certificates of merit to be awarded high scorers. Good chance to gun for the 22 QSLs necessary to qualify for USKA's coveted H-22 certification! From 1200 GMT April 29th to 1800 the 30th you can choose phone or c.w. weapons for battle in the 1967 *PACC Contest* sponsored by VERON (Holland) wherein non-Netherlanders will work as many PA/PE/PI persons as possible, once each per band, 1.8 through 30 Mc., using the customary RS- or RST001, RST002, etc., serial swap. You earn 3 points per two-way exchange, this point total to be multiplied by the number of Dutch hand-provinces worked, for final score (province abbreviations to be used: DR FR GD GR LB NB NH OV UT ZH and ZL). Each log, postmarked on or before June 15, 1967, should be sent to P. v.d. Berg, PA6VB, VERON Contest Manager, Keizerstraat 54, Gouda, The Netherlands, accompanied by a signed statement that the participant has observed the contest rules as well as regulations for amateur radio in his country, to be eligible for possible certifications of performance. At the same time you might request specifications on VERON's various reputable DX diplomas. A resumé of last year's PACC Test results appeared here last month. The *International Telegraphic Contest*, an annual affair sponsored by Russia's Central Radio Club, takes places from 2100 GMT on the 6th of May to 2100 the 7th, 3.5 through 23 Mc. Everybody works everybody in this one, except that "contacts between amateurs in the same city are not allowed." You may use the entire 24-hour contest period but each log entry must cover no more than your best solid 12-hour stretch. "CQM" is the contest call, and the usual RST001, RST002, etc., serials will be exchanged by non-U stations. U.S.S.R. entrants will transmit RSTs plus oblast (district) numerals, and a given station can be worked but once per band. Each completed contact with a station (a) on your continent counts one point, and (b) outside your continent counts three points, this total to be multiplied by the number of different countries accumulated during the fracas. Log entries go to the Central Radio Club, P.O. Box 88, Moscow, and must be mailed by June 1, 1967. Certificates of merit will be available to certain high-scoring participants, and your submitted logs may help you qualify for such U.S.S.R.-issued sheepskins as W-100-U and R-150-S. Good huntin'! 1966 WAE DX Contest results, released by Germany's DARC via contest manager DL7EN, list W1BPW, WB2CKS, W3YUW, K1BAI, W5WZG, W6AGSO, W7PQE 8GQU 9IOP, WA0KDI, VE52UN, 3IR and KH6LJ as c.w. call area winners on our



FY7YG is one of the many DXers who combine hobbies to advantage. Emmanuel spruces up a fine stamp collection when DX conditions go slack. (Photo via WA1DJG)

side. Mikewise it went W1HQV, WB2FON, W3CBF, WA5 4PKP 5ALB, K1KVN/7, WA5 8RSL 9LSM 0KDI, VE5 2AFC 3BHS and 6SF. Our ten highest phone scores were turned in by WA5 4PKP 2FON 9ISM, VE3BHS, W9KXK, WA5 8RSL 0KDI, WB2MDH and VE6SF in that order. The ten best code entries: WB2CKS, WA 2MEL 9IOP 3PCJ 3YUW, K1BAI, W3s HQU AJW, WA5 2UBC and 6SBO. Continentally, CP5EZ, CR6CK, SM2BJJ, W0GTA/8F4, WB2CKS and 4X4HF led the field by key; CX9CO, DJ6QT, H18XAL, OD5BZ, W0GTA/8F4 and 5A2TR paced the voice pack. C.w. entries outnumbered phone by three to one for the U.S.A. but the sideband set will be out to reduce that ratio in this year's WAEDC scheduled for August and September. WR6KVA's friend OK2BKH, active for a year with only 10 watts and a dipole, has 46 countries on 80 c.w. Honza's address appears in "Whence" and he would welcome unneeded QSTs and other radio literature from Stateside library surplus. Continental callings courtesy club newshounds: PA6AA, VERON's field day station, gets its annual DX workout on the 12th-14th of next month. . . . LA1C, OH2A, 8Ps 5PZK 7H2 and 9ADU transmit International Amateur Radio Union bulletins on 40 and 80 meters. . . . Prominent DXer OE1RZ joined Silent Keys in January. . . . HV3SJ often fills the Vatican void for QRL LIV1CN between 14,200 and 14,220 kc.

ASIA—VU2JA, who watches for W/K/YE friends on 14,076 kc. around 1400 GMT, says VU2LE's QRP gets out like a ton of bricks now with that new quad pictured in "How's" last month. . . . W7VRO's friend HM1AB-HM19AB hopes for early replacement in his present assignment as Korea Military Academy liaison officer. Cramps his DX style. John's first project will be a flock of HM19AB single-sideband QSOs. . . . Far east items via the clubs press: VK2AIF/XV5, though like 3W8D not cleared for QSOs with FCC-licensed stations at this writing, helps K1YPE/XV5 represent Vietnam on 14,265 kc. around noon GMT. . . . 9N1EG is a 14,198-14,205-ke. regular once more, 1200-1500 GMT. . . . YK1AAI shows up on 21,062-ke. c.w. at 1200 GMT, s.s.b.ing on 14,105 or 14,215 kc. at 1430 or so. . . . 4W1K, manned by Red Cross rep HB9AAT, puts the Yemen on sideband at 1900 GMT,



Midland DX men at this recent get-together included (seated, l. to r.) Gs 3LKG 3NAC 2LU 3DO 4M1, (standing) Gs 3FKM 2BOZ 2LB 3HDA 3HCT 3VJX 4CP 3AAM 4OI and 2ABB. (Photo via G3FKM, RSGB)

14,120-14,130 kc. . . . OD5s RZ and ETL want to radiate from Qatar as MP4QBU soon, VS9ARV likewise as MP4QBJ. . . . HS3NT, another taboo item for ITU signatures, ceases with 21,235-kc. sidebanding at 1000-1100 GMT. . . . Japan DX Radio Club, JA1s AA AG DM and PAQ officiating, celebrated its 15th anniversary with a gala 300th Bulletin issue.

AFRICA—TU2BD (ex-XT2HV) hangs around 14,140 A kc. at 0745-0815 and 1800 GMT week days but tries his luck with W/Ks near 14,250 kc. week ends. . . . CR6GO jumps between 14,197 and 14,232 kc. on Thursday schedules at 2200 GMT. Neighbor CR6CK, according to K5VTA, needs only Delaware to clinch ARRL's Worked All States wallpaper on 15 or 20 c.w. from 1800 till fadeout. . . . WA8GGN says FR77L/mans Tromelin's weather station and should be workable for a year or so, c.w. now and sideband later. Watch 14,109-14,120 kc. . . . W4NJF affirms EL2AT's closedown but his gear should continue to produce Liberia contacts. Paul sold out before heading homeward. . . . WA2HLH finds ZD8J having a d.c.-band ball on 1804-kc. c.w. . . . ZD9BE represents Tristan da Cunha reliable-like, s.s.b. on 20, c.w. on 15 meters. Alan hops between 14,140 and 14,255 kc. at 1730-2000 GMT, and usually hits 21,090 kc. at 1900-2300. . . . W2GHK hints that W4BPD, busy producing his own DX publication near Cordova, may break away for more Gus fuss at any time. . . . WA9IBT looks forward to TY5ATD tests courtesy 5N2AAY. . . . W2GHK feels that 9J2BK should be eager for more Zambia DXing after a U.K. holiday. . . . African addenda courtesy club data diggers: 9L1JM (PA0RR) boosts Sierra Leone prospects on c.w. and a.m., 7, 14 and 21 Mc., Sundays at 0900-1300 GMT, Tuesdays at 2000-2400. . . . WA2DIJ/3V8 was a late-February briefie on 20 phone and c.w. . . . Crozet's FB8WW sidewinds on 14,140 kc. at 1800 GMT or so, keying on 14,040 around 1430. . . . On the Cape Verdes front CR4BC likes 10-meter a.m., CR4s AJ and BA prefer 20 sideband, and CR4AB favors the key. . . . TT8AB is a pleasant straight-a.m. surprise on 21,335 kc. at 1900 GMT. . . . FH8CU's phone may show up between 28,600 and 28,700 kc. at 1330-1500 GMT. . . . 5U7AK skeds W8JEY Tuesdays and Thursdays on 14,235 kc. at 1930 GMT, and 5U7AL is catchable after 1700 around 14,215 kc. . . . ZSs 2FB and 8L are franchised as ZS9s B and D for Botswana brawls. . . . 5VZSRQ tanzantizes from Iogo on 14,154-kc. sideband, 2100-2200 GMT. . . . CR3KD's a.m. stirs storms on 14,180 kc. around 1430 GMT. . . . 5R8AS of NASA hits 14,120-14,160-kc. sideband at 1400-1900 when space duties permit. . . . W6KG and XYL WB6QEP of the Yasma group intend to follow 5T5 doings with stops in Senegal and other desirables over that way.

OCEANIA—W0PAN scored a Hawaiian DXCC as W0PAN/KH6 but is just as proud of his new ARRL A-1 Operator diploma, according to SCM KH6BZF. . . . Don't forget VK2AVA/2's multiband, multimode Lord Howe program coming up next month. . . . Pacific picture derived from literature of aforementioned clubs and groups: VK7SM or SM5B1A may steer you toward VK0CR of Macquarie, 14,180 kc. after 0700, Wednesdays, Fridays and Sundays. VK6s CS and GP hold forth from Mawson base, TO from lonely Wilkes. . . . Nauru notions are entertained by VK2BRJ/9 of Norfolk. . . . YJ8BW keeps New Hebrides hunters happy, 0800-1200 GMT near 14,025 kc. . . . VS5MH will add 21 Mc. to a DX repertoire which features 14,290 kc. after 1230 GMT. . . . VR1C of Ellice, due for early QRT, tries sideband on 14,100 or 14,200 kc. at 0600-0700 GMT. . . . 9M8RS pops up on 14,028-kc. c.w. around 1300 GMT. . . . KG6s IF and SB offer Marcus and Saipan respectively, 14,225-14,260 kc. at 0800-1200 GMT, while KG6s IC and LJ volunteer Volcano QSOs on 14,210-14,230 kc. at the same time.

SOUTH AMERICA—PY2BGL tells W7VRO his switch S from a multiband to monoband rotaries really chops the QRM crop. . . . Chris of KC4USM informs W4HOS he has almost another whole year of isolation ahead at Byrd station. "He's on s.s.b. almost nightly around 14,230 kc., 0100-0500 GMT, hunting Alaska, Arizona, Hawaii, New Hampshire, Rhode Island and European QSOs." W2JBL finds K1QDV at the key of near-by KC4USG. . . . "VP8JD is radioman for the biological party on Signy, South Orkneys," observes WA1DJG. "Steve's a long way from his home QTH, London." . . . K4CAH, WA4WIP and associates reportedly mull over Malpeo possibilities. . . . YV5s AHR ANF BNW BOA BPJ and CFA produced that February Aves probe as YV6AA.

HEREABOUTS—W7VCB plants a substantial Washington antenna farm after returning from EL4A-DE410 DXercise. "So far I have three rhombics, a four-legged Vee with 555-ft. legs, a couple of Sterba curtains and some vertical arrays. In the works are a full-size 7-Mc. Sterba, a five-eighths-wavelength vertical for 3.9 Mc. and a four-element quad. Now that I have all the room I want I find I'm short on time." Ken says the Citizens Band is a fine quick-scan barometer of 10-meter conditions, also that those cheapie UB ground-planes perform wonders on

28-Mc. DX. . . . WA2HLH commends the giant-killing 5-watter of YNICW. Gun works the States regularly with a 50-foot wire on the low edge of 80 c.w. . . . W2GHK plugs 1X far and wide with a snappy slideshow featuring 1Xpedition of the Month goings-on. . . . That recent Cocos caper of TIs 2JIC and 8LII as T19s JIC and LII was a no-c.w. transceiver sleeper. "Most operation appeared to be in Spanish on 14,108 kc.," chuckles WA2LOR. . . . "I can now understand why W/Ks are so well known as excellent operators," testifies DJ1ZN/W2 to ARRL Deputy Communications Manager W1YYM after recuperating from his first Sweepstakes. Active on our shores since October, Knut nears DXCC with low power and a ground-plane. DJ1ZN feels that ops at the rare end could split pile-ups more manageably by using as cues the final letter of call signs. This would divide comebackers into 26 choruses. . . . VP1PV shakes WA5IS and friends by checking into the Arkansas sideband net on 75. . . . W8YGR traced local a.c. hash to a meter box beside a rail spur. S9 throughout the neighborhood from BC to TV frequencies, declares Jack. Hmm—maybe we're overlooking railroad sidings as handy field day antennas? . . . W4NJF, due to retire from the Navy this fall, already has a DX farm lined up at Virginia Beach. Watch out, W7VCB! . . . WA8GGN votes for more mammoth snowfalls. "School was out for three days due to January's blizzard, and DX conditions were great!" Now that time has shuffled the DX deck Mike would like a re-do on last April's most-wanted-countries rundown. . . . WN9SUU likes to sample Handbook skywires and currently clobbers 21-Mc. Europeans with three half-waxes in phase 45 feet up. . . . WA1DJG managed DXCC shortly after turning 15—years, not meters. "Worked 110 countries



TN8AF closes these Brazzaville diggings in favor of Senegal. Stan helped open 21 Mc. as a DX band from here as FQ8AG back in the '50s, you may recall. We'll be watching for a new 6W8. (Photo via W9NLI)

before trying a beam," recounts Dick. "What a difference a little gain makes!" . . . W6CNA finds CO3CS adding a 200-watt final for his favorite band, 40 c.w., and K0KLR hears from OK3MM, ex-CO2BO: "I left Havana in early January for my home in Czechoslovakia. During my Cuba stay from July, 1965, I had more than ten thousand QSOs on 1.8 through 28 Mc." . . . Cheek with the Awards Committee, Society of Newfoundland Radio Amateurs, P.O. Box 1226, St. John's, Newfoundland, for up-to-date WAWO (Worked All VO) rules, a worthy diploma based on confirmed contacts with twenty VO and/or 3B stations. No fair working the same station twice as, for example, VO1AW-3B1AW. . . . Three confirmed contacts with certain XEs may qualify W/K/VE/VOs for the Founding of Guadalajara certification offered by CREO, Aptdo. Postal 197, Guadalajara, Jal., Mexico. Apply to that organization for details and target list. . . . WA6SBO hints at more sneakers following Pacific reef ruckus as 1A6SBO in February. . . . W1WQC rolled up some 460 South Caicos QSOs with all continents as VP5AB in January, 76 contacts on 75 phone. . . . K7GHZ, who has boat and will travel, considers Clipperton isle where, 'tis said, a French weather staff is stationed. . . . DX Club of Puerto Rico issued 8X8X8 certifications to DJ4OP, OK3DG and W9CRN recently. KP4s AST and GP are new DXCPR members. . . . W3KPI, W4s EPO JYQ, K4s GRD HEP, WA4s HIO NEV, WB4AD, W7GGD/J4 and K9KQV signed up with Florida DX Club, W4BRB, with WA4SVO assisting, succeeds W4MVB in the FDXX DX Report editorial slot. . . . Northern California DX Club's W6PLF questions the general status of 1Xpeditionary financing in a searching DX'er piece. Liddisms like zero-beating, swishing and shouting also come under heavy attack.

YL news and views

CONDUCTED BY LOUISE RAMSAY MOREAU,* WB6BBO

Convention Time

April, according to the poets from Chaucer to Millay, is a time for getting out and doing. We consult road maps, begin to think about weekend trips, and start to make definite vacation plans. On the air and at club meetings we discuss ham-fests and conventions from the type with a single theme, such as v.h.f., sideband, and YL, to the ones covering the full scope of amateur radio such as state, division, and, of course, "the big one," the National ARRL Convention.

Registration, reservations, advance planning for arrival is always the same no matter what organization sponsors a convention, but right there the similarity stops for an amateur radio convention is a very unique gathering. It is more like a kaleidoscope with dozens of completely different patterns making up the picture. We don't attend as delegates, but as individuals. We attend meetings to learn, and to contribute. And, we are there to meet the persons we have talked to for so long, and put faces on those very familiar voices.

Some of us are there to discuss policy and the new rules and regulations governing the service, while others are there only for the military affiliate activity. There are those who attend to learn more about technical advances, and will hear from some of the best qualified people in the communications field. And there are those who like to range the field and who will be hurrying from the technical meetings, to serious discussion groups on public service and on to a QCWA luncheon. For everyone, from beginner to old-timer there are mouth watering displays of the newest equipment.

For the gals it's a YLRL Forum; a special luncheon and fashion show, with a SWOOP initiation for the suffering unlicensed wives of the OMs. It's sight seeing tours of the convention town, and it is the same appeal of the technical meetings to the YL as to the OM, and woe betide the speaker who pauses to make a laymans explanation "for the benefit of the ladies who are present." Those very ladies may well stop him with an extremely specialized question during the Q and A period following the talk.

A convention is a code contest, luncheons, lectures, forums, social gatherings, Wouff Hong. It is banquets, and speakers and a dance. It is a wealth of information clearing away many problems. It is meeting people who have become legends in the field, and it is prizes, and a week-

*YL Editor, QST. Please send all news notes to WB6BBO's home address: 1038 East Boston St., Altadena, Calif. 91001.

end of talking on our favorite subject with no static, no fading, no disturbances, but oh, the QRM.

From April until late in the year the convention calendar will be filled with announcements of coming meetings across the country. This month is a good time to add a convention to the list of planned special events on our own "coming attractions" calendar.

YL — SCM

The only elected official in the ARRL, besides the Director, is the Section Communications Manager who is the administrator of League affairs at section level. To most amateurs the term connotes OM, in fact the duties describing the position are always written in the masculine gender. In the history of the ARRL field organization a number of women have been elected to fill the SCM office, and at present two of these very responsible jobs are held by YLs.

K9IVG, Roberta Kroulik, of Michigan City, Indiana, became SCM of Indiana Section in October 1961, according to her "after saying 'yes' in a weak moment." First licensed in 1957, Roberta went through all the usual phases of amateur operation, and then became interested in traffic nets. An OO briefly, then OPS, and PAM of the Indiana Phone Net since 1964. She holds A-1 Operator received the Hoosier Courtesy Award, and, in 1964 was voted the Outstanding Amateur Radio Operator of Indiana for that year. Operation during Hurricanes Carla, and Ethel, increased her interest in public service.

A member and past president of LARK, of Chicago, and a Director of HAWK, IRCC, and a member of the Michigan City Radio Club, Roberta's other interests are flying, and painting.

From Indiana to the Canal Zone is a "fur piece," unless it is on the air where we count in seconds rather than miles.



Myrtle Cunningham, WA6ISY, President LA/YLRC. W5VKH took her picture as she was presiding over the Annual Valentine Banquet of the Los Angeles YLRC. OM, Tom, W6PIF, is vice director, Southwestern Division ARRL.



Betty Gillies, W6QPI

Lillian Smith, KZ5TT, Administrative Assistant to the Director of Communications-Electronics, at Headquarters U.S. Southern Command is SCM in the Canal Zone. Her duties at work include administering examinations for both Canal Zone and FCC, renewing licenses, monitoring the bands for the office station, helping write changes in local regulations. Thus, her SCM position extends it a little farther by adding ARRL administration in the section. Lillian is well known on 10 and 15 meters helping service personnel keep in touch with home. She has had all sorts of experiences from relaying proposals of marriage to letting a grandmother hear her grandchild cry. She and the OM, KZ5LT have a son, now at school in Texas. Lillian is a member of YLRL and has won the Canal Zone Section Certificate for YLAP for the past four years. Holds WAS and is a member of the U.S. Air Forces Southern Command MARS.

W6QPI, "Angel of the Antarctic."

Betty Gillies, W6QPI, of Rancho Santa Fe, California, who is well known in many YL activities, was named "Angel of the Antarctic" by the service personnel stationed on the ice in recognition of her long time service of keeping them in touch with home. At a meeting of the Rancho Rotary Club last January Betty was presented with a bronze plaque in appreciation of her efforts.

In 1967, Betty answered a "CQ" from a station on Mc Murdo Sound during "Operation Deepfreeze" of the second national geophysical year, and that began a ten-year period



Lillian Smith, KZ5TT, SCM, Canal Zone.



Toni Chapman, K8PXX, 1967 YLRL Receiving Treasurer. Past President of the Ohio Belles. Toni is active in net operation with some 2000 QSLs in her files. Among her many interests she enjoys flying, and while not a licensed pilot, she holds a certificate that entitles her to land a plane when the pilot is disabled.

of handling messages for both service personnel and scientists located in the Antarctic.

In August, 1966, the men stationed at the polar bases decided that some recognition should be given her assistance that kept them in contact with their homes. The Navy requested that a presentation should be made in their behalf by the Rancho Rotary Club. At the meeting, Rear Admiral John E. Lee, USN, Retired, presented Betty with a bronze plaque bearing the insignia of the Antarctic Support Activities Command, with the inscription "... by the officers and men of the Antarctic Support Activities in grateful appreciation for her amateur radio services to the Antarctic, August, 1966." The letter read "So far as can be determined she (Betty) is one of the first to have worked the ice . . . Her dedicated service on their behalf has led our men to refer to her as "The Angel of the Antarctic."

Coming Events

The 10th Anniversary of the Loaded Clothesline Net will be marked by a special 24 hour QSO Party beginning 1700 GMT, April 3, 1967. Special certificates will be issued to anyone working three net members in good standing.

(Continued on page 142)



Roberta Kroulik, K9IVG, SCM, Indiana.

The World Above 50 Mc.

1215-1500

2300-2450

3300-4500

5650-5925

10,000-10,500

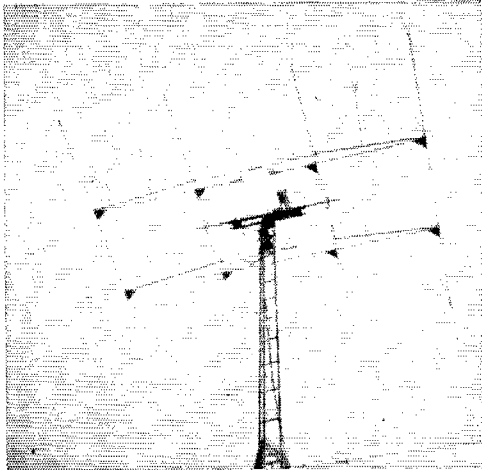
21000-22,000

30,000-7

CONDUCTED BY BILL SMITH,* WIDVE/KQJCR

F8DO-W6DNG QSO Via The Moon

News of the latest e.m.e. (earth-moon-earth) feat reached ARRL just before deadline for the March issue so we were not able then to give the contact the attention that it rightfully deserves.



This is the 32-element expanded-extended collinear array at W6DNG, Long Beach, California. (W6DNG photo)

Marius Cousin, F8DO, writes that the January 27 contact was the result of more than 2 years hard work for F1BF and himself. They were also assisted by F1HR, F9FT, F9LN and others. Marius built the 72-element Yagi array and the receiving system; the transmitter was built by F1BF. Marius says the array is fed with low-loss M7A coax and is tuned to 144.000 Mc. The receiving system is a TIXMO5 preamp ahead of a Nuvistor/E88CC/6AK5/6U8 converter into a Drake R4-A receiver. He also uses a post detection system with two cross-correlated audio channels keying an audio oscillator or pen recorder. F8DO is currently conducting other tests with OH1NL and K6MYC as well as continuing the tests with Bill Conkel, W6DNG.

OM Bill is no newcomer to the moonbounce game. He was the first American to work Europe on two meters when, on April 11, 1964, he made contact with OH1NL in Finland (see *QST* page 95, June 1964). At his Long Beach station, W6DNG uses a pair of 4X250 Bs running nearly 800 watts output. Bill's antenna is a 32-element expanded-extended collinear of the type designed

*Send reports and correspondence to Bill Smith, WIDVE, % ARRL, 225 Main St., Newington, Conn. 06111.

by the late Oliver Wright, W6GD, and exploited by Frank Jones, W6AJF. The gain measures 18.3 db. over a dipole. The array is rotatable both in azimuth and elevation.

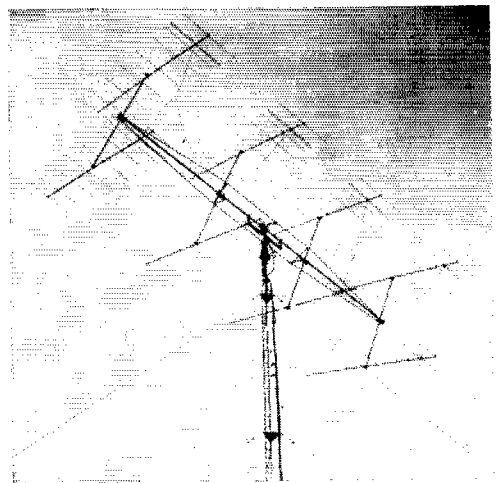
For receiving, Bill has a transistor preamp ahead of a Parks 144-1 converter. The converter output is fed through a noise clipping and blanking system and then into a much-modified Collins 75A-4. He also uses a tracking filter with provisions for audio and pen recording. Bill says the phase-lock receiver is very good on slow-speed c.w. f.s.k. He and OH1NL have tried the system several times with excellent results. Lena, OH1NL, is now experimenting with a seven-channel mechanical integrating recorder system for visual signal copying. Bill says, "visual copying is very popular among weak signal enthusiasts—it's much easier than squinting your ears!"

W6DNG is continuing his tests with both OH1NL and F8DO. Marius says he is open for schedules with anyone who can hear his own echoes.

More E.m.e. Notes

Dick Turrin, W2IMU, of the K2MWA group, has made available tape recordings of the contacts between the Crawford Hill club and VK3-ATN and K6MYC and the Australian. They are interesting listening and reveal some of Ray's future plans.

VK3ATN is going to build a LaPorte—Veldhuis rhombic (undoubtedly similar to the one



F8DO's 72-element 144-Mc. Yagi array used to work W6DNG via the moon. (F8DO photo)

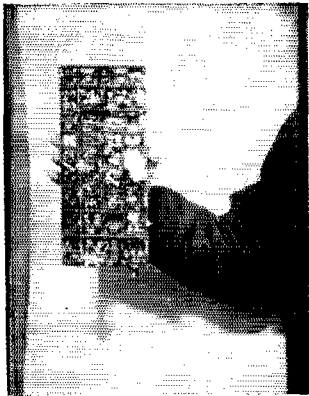
described later in this column by K6MYC) for comparison to his present 4-wire stacked rhombic. Plans are also being formulated for a stacked rhombic array on 52 Mc. (the VK 6-meter band) and a 32-foot dish for 432 and 1296 Mc., later to be replaced by a 60 footer!

Ray attributes his interest and success in moonbouncing to W1FZJ, W2IMU, W3SDZ, W6YK and others. Ray's work is particularly noteworthy in as much as he did almost all of the muscle work and building without any assistance, a 150-watt power limit and an understanding XYL.

German OSCAR Package Completed

The prospect of an Oscar flight later this year seems brighter as a result of the following letter from Karl Meinzer, DJ4ZC.

"The Oscar V electronic hardware is completed. We just want to have a testflight on a balloon before it is shipped to Project Oscar. Provided no serious problems turn-out during this flight, the set will be shipped to Project Oscar this month (February).



DJ4ZC's Oscar package that has been successfully balloon tested over Central Europe. (DJ4ZC photo)

The transponder is designed to put signals between 144.06 and 144.14 Mc. to the frequencies 145.86 and 145.94 Mc. Amplification of the set is 120 db. and p.e.p. output at the moment is 0.7 watt. I will work in the next days to bring this to 1 watt. The power for the transponder is regulated and no significant change of the data is expected during its life. Power consumption is between 1 and 2 watts depending on the loading from the ground; this will give a useful life of about six weeks.

Apart from the transponder the package contains a telemetry beacon on 145.95 Mc. with 25-milliwatts output. It is coded with two "HIs" followed by a long c.w. The length of the c.w. gives the battery voltage; the length of the "HI" interval gives the inside temperature of the transponder.

Just a few words about the antenna system. The antenna is designed to give a minimum of fading when linear polarization at the ground is

used. Because some doubt was expressed to me in some letters about this question I will tell you why. I use a crossed pair of dipoles that are fed to give right hand polarization on the receiver and left hand polarization from the transmitter, seen from the top. Seen from either side the antenna gives horizontal polarization for transmitter and receiver. Seen from below the antenna gives circular polarization again, but with the sense of rotation reversed to that of the top side. Out of the 16 possible attitudes in space only 4 nulls result from linear polarization at the ground, while circular polarization will result in 8 nulls."

This information from DJ4ZC does not mean the package will be immediately ready to fly once it reaches California. A series of tests will have to be conducted by officials at Project Oscar before flight plans are made.

Reportedly there have been some difficulties in the shipment of the Australian package (another prospect for Oscar V) and it has been delayed in Australia.

Late DJ4ZC Oscar Report

From DJ4ZC at deadline, "... we have balloon-flown the Oscar equipment to an altitude of nearly 13 miles during a two-hour flight. The package worked 100% satisfactory. Space distances were simulated with two 20 db. pads. People were very enthusiastic with the performance; one operator was able to log 63 stations, another had 34 s.s.b. QSOs. It is estimated that during the flight about 250 QSOs were made, all on s.s.b. and c.w.

I think you know that we have a transponder very similar to the Oscar that was flown here with the balloon so far 18 times. These flights gave our European operators a good chance to train themselves in the art of transponder communication. At the same time the set serves as a test of space operating objectives. The training proved to be very valuable. During the first two or three flights a lot of confusion was present, but in later flights skills improved and people in general are now quite capable of making the best of this way of communication.

There is still some time until the launch, so I think it would be nice to give the American hams an opportunity to train themselves, too. Perhaps you or some other ham might be interested in arranging a balloon transponder flight. I would be glad to supply you with the equipment as often as you wish and of course, free of charge. For these flights it takes a balloon that can lift six pounds and two or more mobile stations to hunt for the set. The hunt is great fun and our hunters like it very much. The maximum distance the set can be worked is about 400 miles so QSOs up to 800 miles are possible and were made in Europe."

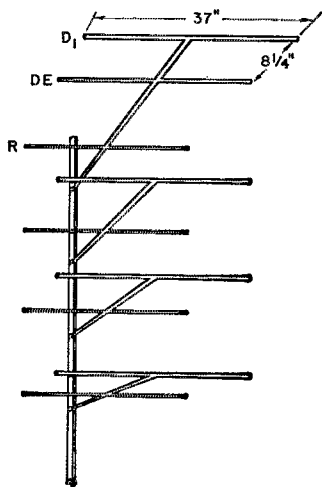
That is quite an offer, Karl! Because of the air currents, perhaps some group in the west or midwest would be the most logical to originate a test flight. Who is interested?

144 Mc. Antenna Ideas

K6MYC and W7FS have sent information on 144 Mc. antennas that should be of interest to the 2 meter DX man. First is a modification of the Cushcraft 16-element collinear from K6MYC to increase the gain of the antenna by placing a director in front of each pair of driven elements. This is the modification he used in the array that worked VK3ATN via 144 Mc. e.m.e.

Mike used an 8½-inch length of 7/8-inch o.d. aluminium tubing for each boom extension. The tubing is drilled ½-inch from one end to tightly accept a 37-inch length of No. 4 a.w.g. aluminium wire which serves as the director element. The wire is straightened and tempered by holding one end in a vice while pulling and twisting on the other end with an electric drill. The element is fixed in place with epoxy or a set screw.

The new assembly is attached to the original boom by loosening the driven element bracket and slipping the assembly over the end until it is under one side of the



K6MYC's improved collinear. Note the placement of the director assembly D_1 on the top set of elements. An identical assembly is added to each of the other sets of elements in the original configuration.

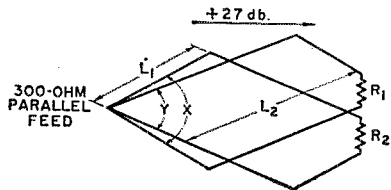
bracket. The spacing between the driven element and the director is $8\frac{1}{4}$ -inches. Now retighten the bracket and the job is finished.

K6MYC says the 4 directors add 1.7 db. to the previously measured 11.7 db. gain of the array before the modification. Mike's gain figures are over a reference dipole.

Mike also sent along details on a 144-Mc. rhombic that will fit into the average backyard. The gain is estimated at 27 db. over a dipole! He designed the rhombic for 144.100 Mc. following specifications from the *RCA Review*, March 1960, page 117 in an article by E.A. LaPort and A.C. Veldhuis entitled "Improved Antennas of the Rhombic Class."

The original authors say the configuration reduces undesirable sidelobes present in conventional rhombic antennas.

The narrow beamwidth obviously reduces the usefulness for general coverage, but for specific scatter or e.m.e. paths the antenna would seem to lend itself quite well. K6MYC says several European amateurs and W8PT either have built, or are building, the antenna.



A 144-Mc. rhombic with an estimated 27-db. gain over a dipole. The wires are all on the horizontal plane with the crossovers insulated.

- L_1 —29.5 feet
- L_2 —50.67 feet
- X — 52.2°
- Y — 37.7°

R_{1-2} —660 ohms, total wattage should equal half the power output of the transmitter.

Height above ground—12.29 feet

Elevation angle— 7.5°

Vertical beamwidth— 5.5°

Horizontal beamwidth— 8.5°

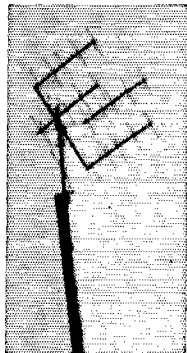
An interesting adaptation of the WICER/W8HHHS "Quad-Quad Array or 2 Meters" (May 1964, *75 Magazine*) is being used by Keith Olson, W7FS.

He increased the number of elements to five per bay; the original design featured four 3-element quads in a box configuration. W7FS noted an approximate increase in overall gain of one S-unit by adding two more directors to each bay. Each director is stub-tuned for maximum forward gain; the second director is spaced 19-inches ahead of the first director, and the third director is 21-inches ahead of the second director.

In the original design, coaxial transformers and coaxial harnessing was used to feed a 75-ohm transmission line. W7FS uses 450-ohm open-wire line, one-wavelength sections, to connect the bays. A balun transformer is used between the feedpoint and low-loss 75-ohm transmission line. The symmetrical feed system corrected the 10-degree skew in the lobe pattern of the original WICER design.

Keith reports excellent results in fade reduction over difficult paths since installing the quad array. He points the antenna at 6000 foot Mount Olympus, Washington 30 miles away for many of his contacts, including meteor scatter.

Those who are interested in an easily-built antenna that offers good gain and minimum fading effects through diversity response should not overlook a quad array for v.h.f. or u.h.f. work. Others have experienced results similar to those at W7FS.



The 20-element 144 Mc. quad-quad array at W7FS, Belfair, Washington.

220 Mc. and Up Directory

ARRL is preparing a directory of stations operating on 220 Mc. and higher. If you are actually on one of these bands we would like to know about it. Chances are that many of you have received a questionnaire already, but if you haven't by the end of April, please write for the form so you can be included in the directory. When completed, a copy of the directory will be mailed to each OVS appointee, or to anyone who sends a stamped self-addressed envelope.

Two Record Boxes

Several of you have asked for separate recognition of moonbounce and tropospheric-ionospheric records. So, beginning this month there will be two record boxes, one for moonbounce only and the other for the more conventional modes of propagation. Notice there is no record for either 50 or 220 Mc. moonbounce.

About the "Standings" boxes, postcards have been sent to each 144 Mc. operator who has reported no change in his standings for the past two years or more. Please help me keep the standings current so they may reflect not only previous work, but present activity as well.

OVS and Operating News

50 Mc. has been full of DX surprises. W6NLO, W6NZX, W6PUZ, W6YDF and K6GJD, report working CE3QG in Santiago, Chile at 0230Z February 12 on 50.125 s.s.b. Several Spanish speaking a.m. stations were copied around 50.008 Mc. and channel 2 from Mexico City was also putting a good signal into Southern California. The opening lasted almost two hours. In Brazil, PY5GK reports openings since

RECORDS

Two-Way Work

- 50 Mc.: LU3EX — JA6FR
- 12,000 Miles — March 24, 1956
- 144 Mc.: W6NLZ-KH6UK
- 2540 Miles — July 8, 1957
- 220 Mc.: W6NLZ — KH6UK
- 2540 Miles — June 22, 1959
- 420 Mc.: W5LUU — WA4KFW
- 1150 Miles — April 13, 1965
- 1215 Mc.: W6DQJ/6 — K6AXN/6
- 400 Miles — June 14, 1959
- 2300 Mc.: W1EHF/1 — W2BVU/1
- 170 Miles — July 1963
- 3300 Mc.: W6IFE/6 — W6VLX/6
- 190 Miles — June 9, 1956
- 5650 Mc.: WA6KKK/6 — WB6JZY/6
- 179 Miles — October 15, 1966
- 10,000 Mc.: W7JIP/7 — W7LHL/7
- 265 Miles — July 31, 1960
- 21,000 Mc.: W2UKL/2 — WA2VWI/2
- 27 Miles — Oct. 24, 1964
- Above 30,000 Mc.: W6NSV/6 — K6YYF/6
- 500 Feet — July 17, 1959

last October to Argentina, Puerto Rico, Netherland Antilles, Chile, Uruguay and Paraguay. According to W8NZ, K8WSK and W8DF copied an m. station signing ZS1JH in South Africa for about 30 minutes beginning at 1658Z on January 31. No contact was made. The frequency was 50.250 Mc. W6NZX reports back-scatter contacts with W5FW at Amarillo, Texas, WA7ASA in Phoenix and K7LZT near Phoenix between 1955 and 2048Z on January 14. W6NZX says he is interested in scatter schedules. Write to Bob at 3144 Tuna Avenue, San Diego, Cal. 92117.

WA6HXW, near Los Angeles, also reported F-layer DX during January from the military scatter systems on Midway Island and Hawaii. K7ICW at Las Vegas heard no F-layer activity. One other DX note, K7DVK in Portland, Oregon says Australian VK7ZKJ is active on six meters and will schedule. Numerous reports of E openings during the first two weeks of January were received from most areas of the U. S.

144 Mc. and aurora provided DX excitement during the January ARRL V.h.f. Sweepstakes. Reports of aurora contacts during the January 7 and 13 sessions have been received from Montana to Quebec and South to South Carolina and Texas. Both sessions produced strong signals and the intensity allowed even 5-watt W9JVB in Bridgeton, Missouri to work K2HLA on Long Island. Only one contact was reported on 220, but there were several on 432 Mc. which were reported last month. W1HDQ says the sessions are unusual for January and were about the best he has ever heard. The auroral openings directly correlated with marked increases in sun noise as recorded by W4HHK on 432 Mc. Dozens of reports were received from the high activity states, but some 'rare' ones put in an appearance also. Among them were K1BKK in Vermont; K1ABR, Rhode Island; W1GKJ, Maine; W8AEC, West Virginia; W9CUC, South Dakota; W9EKZ, Kansas; W7JRG, Montana; W7UFB, Wyoming; W3HC, Delaware;

MOONBOUNCE RECORDS

Two-Way Work

- 144 Mc.: VK3ATN — K2MWA/2
- 10417 Miles — Nov. 28, 1966
- 420 Mc.: WIBU — KH6UK
- 5092 Miles — July 31, 1964
- 1215 Mc.: WIBU — KH6UK
- 5092 Miles — August 9, 1962

W5WAX, Oklahoma; W4ZCM, Kentucky, and in Canada, VE3HW and 20 watt VE3ASO in Ontario and VE2BU in Quebec.

Meteor scatter buffs were in for a let-down during the December Geminids and January Quadrantids. At Las Vegas, K7ICW managed to work K7ZIR in Oregon but it took 1½ hours to complete the contact. Al missed with K7MKW in Idaho, W7RQT in Utah and North Dakota's W8EOZ. The proceeding was during the Geminids. During the Quads W3BDP at Wilmington, Delaware was unsuccessful with Nebraska and W5UGO in Oklahoma; W8PT worked W8EYE in Colorado but bursts were so poor they didn't make the usual switch to 220 Mc. (Apparently there still has not been a successful m.s. contact made on either 220 or 432 Mc.) Jack heard nothing from K7NII in Arizona. K3CFA at Lemont, Pennsylvania heard only occasional pings from W5HFV and K9MQS, Oklahoma and Iowa respectively. K3CFA mentions some adjustments appear in order for the W4LTU m.s. chart; they are in the works.

Alabama may soon become more workable. At Huntsville, W4CTG has completed a 64-element collinear array. W4OZK and W4WIA are also reported active in Alabama. After 3 years of being inactive. Norm Hawkins, VE6HO, is back on 144 Mc. from Calgary, Alberta. Norm is running a 4CX250B at 500 watts input, W2AZL converter and an 8-over-8 skeleton slot up 50 feet. He wants m.s. and tropo skeds.

220 Mc. news is sparse this month. K1YON at East Hartland, Connecticut reports little activity in Southern New England, but did work W3MFY at Treviso, Pennsylvania and W2IRA in Congers, New York during the January contest. K1JIX in Harvard, Mass. worked W8CSW in Powell, Ohio during the January 13th aurora. John says, "it's too bad more of the gang don't watch 220 during strong auroras." Donald Farwell, WA6GYD, is looking for 220 Mc. skeds from his Mount Hamilton, California location 4200 feet above sea level.

1896 Mc. and up news is even more sparse. At Pasadena, California, W6PUZ has a new 3CX100A5 432 to 1296 tripler finished, producing about 10-watts output. K1FFE

50 Mc. WAS

1 W0ZJB	22 W5SFW*	43 W6ABN*	64 W7ACD
2 W9BJV	32 W9OEB	44 W3AET	65 K9PYI*
3 W9CJS	24 W9ALU	45 W9JFP	66 W4HOB
4 W5AJG	25 W8CMS*	46 W9QIN	67 K0JJA
5 W9ZHL	26 W0MVG	47 W0WVN	68 K6RNN**
6 W9OCA	27 W9GNM	48 K9ETD	69 W9QVT*
7 W6OB	28 W1VNH	49 W0PKY	70 W6EDC**
8 W9NLY	29 W0SLD	50 W81PD	71 K9VLM**
9 W1HDQ	30 W7HEA	51 W0ZTW	72 K6GOS**
10 W5MJD	31 K9GGQ	52 W6GGC	73 W0EDM
11 W2LDZ	32 W7RFE	53 W2RCV	74 W9JCI*
12 W1LLL	33 W0PPP	54 W1DFI	75 W0LLU*
13 W0DZM	34 W6BJI**	55 W1HQY	76 W7RT**
14 W0HVV	35 W2MEU	56 W6ANN	77 W7RD**
15 W4KTB	36 W1CIS	57 W1SUZ	78 W6KIN**
16 W0SMJ	37 W6PUZ	58 W1AEP*	79 W6OKR**
17 W9CGW	38 W7ILL	59 W5LFH	80 K6GMX**
18 W7ERA	39 W0DDX	60 W6NLZ**	81 W7DYD**
19 W3OJU	40 W0DO	61 W7MAH	82 K6ZEE**
20 W6TMI**	41 K9DXT	62 W8BSZ	83 K6HCP**
21 K6BDX	42 W6BAZ	63 W2BYM	84 K6YIL**
			85 K6GMV**

* 49 states ** 50 states

VE7CN	45 EI2W	37 LU3DGA	27 SM6CHH	20
KL7AUV	44 CO2SZ	36 LU3EX	27 LA7Y	20
VE1EF	42 ZS3G	32 ZRE2J	26 VQ2PL	18
VE4HS	41 SM6ANR	30 LU9MA	26 JA8AO	18
XE1GE	39 CO2ZX	30 CO2DL	25 JA8BU	17
VE2ACM	38 SM7ZN	28 CT1CO	24 JA1AA	17
KH6UK	37 P21AE	28 CO6W6	21 JA1UH	15
	SM6BTT	28 LA9T	21 VP5FP	7

at Holliston, Mass. has 2 watts on 1296 Mc. with a 2C39 tripler and expects to use helices on 1296 and 2300 Mc. He also is looking for schedules or someone to work with. WB2-GQV, Hanover, New Jersey, is working on 21 Ge. gear and wants to know of anyone else so interested in Northern New Jersey.

432 Mc. activity is increasing in many areas, and not those necessarily in the high population centers. K9AAJ at Quincy, Illinois now has 10 states on the band. After making the first known 432 aurora QSO on September 9th with W9AAG, Lee has been monitoring 144 and 432 Mc. simultaneously during auroras. From Alexandria, Virginia, K4SUM reports hearing W1QWJ over a 350-mile path to Springfield, Mass. three days during late January. K4SUM says 13 stations are now active on 432 Mc. in and around Alexandria. W3UJG at Chester, Pa. schedules K2DZM at Rahway, New Jersey on 432.084 each night at 0300Z.

WA9HUV near Chicago worked K0DOK in St. Louis for the Illinois station's 11th state on 432 Mc. W4HHK at Collierville, Tennessee also worked K0DOK over a 250 mile path for Paul's 12th 432 Mc. state. Paul said after the QSO was over, he found he had forgotten to turn on the transitor r.f. stages ahead of his converter! The contact is apparently the first between Tennessee and Missouri on 432 Mc.

At Las Vegas, Al, K7ICW, is looking for information on temperature during 432 Mc. tropo tests. Al says temperatures below 60 degrees are apparently detrimental over the 225-mile path from Las Vegas to W6DQJ in Southern California. Al is experimenting with the back-to-back installation of Fairchild FD500 diodes in the front end of his 432-Mc. transitor converter to prevent r.f. burnout. W5AJG in Dallas worked W4HHK during January. WA0BOC in Parker, Kansas says he has a kw. and converter about ready for 432 Mc. W0EYE near Boulder, Colorado has 750 watts on 432.006 and a 64-element collinear. Don is one of the fellows to make some of the first aurora contacts on 432 Mc. They were with W9ENC in Southwestern South Dakota and W7JRG at Billings, Montana. He says the signals sound similar to 144 Mc. aurora.

One of the New England stalwarts on 432 Mc. is W1QWJ at Springfield, Mass. Dick schedules VE2LI at Montreal Wednesday and Sunday nights with constant exchanges. He also runs a keyer on 432.000 Wednesday nights beaming East from 2025 to 2035, Northwest from 2055 to 2105, Southwest from 2125 to 2135 and North between 2155 and 2205 EST. He listens in the respective directions for 5 min-

220- and 420-Mc. STANDINGS

220 Mc.				420 Mc.			
W1BU	14	5	600	K2UUR	9	3	280
W1HDQ	12	5	450	K2ACQ	8	5	525
W1AJR	12	4	480	WA2HQB	8	4	280
K1JIX	11	4	615	K2HQI	8	4	250
K1UQG	9	3	400	W7PUA/2	7	4	500
K2CBA	16	7	660	K2YCO	6	5	500
W2AOC	15	5	530	W2YPM	6	3	300
W2SEU	12	5	450	WA2DTZ	6	3	200
W2DZA	12	5	410	WA2TOV	5	3	140
W2NTY	12	5	360	K2GGA	4	4	383
K2DZM	12	5	400	W3MMV	11	5	410
W2LWI	12	4	400	W3RUE	11	5	470
K2KIB	12	4	300	K3CFLK	9	4	296
K2ITQ	11	5	265	W3FYE	8	4	310
K2JBA	11	4	340	W3SJD	5	4	300
K2ITP	10	3	265	W3UJG	4	2	350
K2AXQ	9	3	200	W4HHK	12	4	550
K2JWI	6	3	244	K4SUM	7	4	368
K2UUR	6	3	210	W4GJG	6	2	1000
WA2BAH	6	3	200	W4TLV	6	2	500
K2DIG	4	3	140	WA4BYR	6	2	420
W3FYE	11	5	350	W4G00	6	2	415
W3RUE	10	5	480	W4RFR	5	2	685
K3IUV	10	3	310	W4TLV	4	2	590
W3LCC	10	3	300	K4QIF	4	1	285
W3JTY	8	4	295	W5RCI	16	5	725
W3JZI	4	3	250	W5AJG	7	3	1010
W4TLC	5	1	315	W5SWV	7	3	525
K4QIF	4	2	500	W5HTZ	5	3	440
W5AJG	3	2	1050	W5ML	5	1	350
W6GDO	2	2	100	W5UKQ	4	2	500
K7ICW	4	2	250	W6GDO	2	2	493
W7AGO	2	1	160	K7ICW	3	2	165
K8AXU	11	5	1050	W7JRG	2	2	420
W8PT	11	5	660	W8PT	11	7	600
W9OVL	6	3	475	W8YIO	11	6	560
W9JCS	6	2	340	W8TYI	9	5	580
W0EYE	4	2	175	W8LEK	8	5	470
VE3BPR	3	3	300	W8WFF	6	4	450
				K8REG	6	4	275
				W8JLQ	6	3	275
				W8RQI	6	3	270
				K8AXU	5	3	660
				W9AAG	10	4	600
				W9DHUV	10	6	500
				K9AAJ	9	5	425
				K9ULP	9	5	390
				W9GAB	9	4	608
				WA9NKT	7	3	310
				W9OJI	6	3	330
				W0EYE	5	2	425
				W0ENC	2	1	400
				VE3AIB	5	4	450
				VE3BQN	5	4	447
				VE3BPR	4	4	600

The figures after each call refer to states, call area, and mileage of best DX.

2-METER STANDINGS

W1JSM	33	8	1390	K5WXZ	30	8	1225
W1ZBK	32	8	1384	W5JRT	29	9	1350
W1RZP	32	8	1300	W5UKC	29	8	1150
K1HTV	26	7	1226	W5PZ	28	8	1300
K1ABR	25	8	1330	K5TQP	27	7	1250
W1AJR	25	7	1130	W58WV	20	5	960
W1KCS	24	7	1150	W5WAX	18	7	1310
W1RDL	24	7	1040	W5MLZ	17	6	700
W1GEC	24	6	1000	W5BEI	17	5	1000
W1MMN	22	8	1200	W5KFU	16	5	1360
K1BKK	22	7	1275	W6GDO	17	4	1325
K1WET	22	7	1030	W6WSQ	16	6	1390
K1WH8	19	7	1030	W6NLZ	12	5	2540
W1ARQ	19	6	920	W6RKA	12	4	1120
K1UQG	18	6	1250	W6RMS	11	5	1240
K1JIX	18	6	800	W6DNG	9	5	5250
K1AFR	17	6	675	W6AJF	6	3	800
K1MTJ	16	5	1225	K6HCP	4	2	690
K1OYB	16	5	1225	W6MMU	3	2	950
W2NLY	37	8	1390	W7JRG	26	6	1320
W2CNY	37	8	1360	K7NII	23	5	1275
W2ORJ	37	8	1320	K7ICW	15	4	1245
W2BLV	36	8	1020	W7HL	12	4	1170
K2GQI	35	8	1365	K7ZIR	11	4	1130
K2LMG	32	9	1710				
W2AZL	29	8	1050	W8PT	41	9	1260
K2HLA	28	8	1300	W8KAX	39	9	1210
W7PUA/2	26	8	1150	W8IFX	39	8	1225
K2CEH	25	8	1200	W8QOH	38	9	1320
W2AMJ	25	5	960	W8SDJ	37	8	1320
W2ALR	24	8	1100	W8YIO	36	9	1250
W42PK	24	7	1340	K8AXU	34	9	1275
WA2PZE	23	7	1200	W8LOP	34	8	1060
W2LWI	24	7	1050	W8MVE	33	9	1155
W2ESX	21	6	750	K1CRQ/8	32	9	850
WB2RXB	20	7	1025	W8NOH	31	8	1090
WA2PMA	19	6	1010	W8YIO	31	8	1250
WA2PMW	18	6	1000	W8BKI	30	8	1240
WA2TMT	17	7	730	W8WNM	25	8	900
WA2YXS	17	6	720				
WA2JAM	17	6	670	W9WOK	42	9	1170
K2OBI	16	6	1010	K8SDG	41	9	1230
W2CCO	16	6	780	K9UTP	40	9	1240
K2JNB	16	6	600	W9WDD	40	9	1300
K2JVT	16	6	550	W9AAG	37	9	1200
WA2UDT	16	5	550	K9AAJ	36	9	1200
W3RUE	36	8	1100	WA9DOT	35	8	1140
W3BTF	32	8	1150	W9GAB	34	9	1075
W3GKE	32	8	1108	W9BBL	33	8	1140
W3SQA	32	8	1080	W9OIL	32	8	1090
W3TDF	30	8	1125	W9IFA	31	8	1050
W3KCA	28	8	1110	W9PBP	28	8	820
W3LST	22	6	800	W9OJT	27	9	910
W3LVA	21	7	720	W9UCU	24	7	1000
K3CFA	20	7	930				
K3CFA	19	6	870	W0BFB	44	10	1350
W3MFT	19	6	600	W0DQY	39	9	1100
W3HHC	16	6	550	W0EMS	33	9	1150
				W0LFE	33	9	1040
W4HJG	39	9	1150	W0EYE	32	8	1360
W4WNH	38	9	1350	W0ENC	32	7	1250
W4HHK	38	9	1280	WA9FDY	29	8	1050
W4LTV	37	8	1220	W0MOX	27	7	1300
K4LXC	36	8	1423	K0MQS	26	9	1170
W4MKT	34	8	1149	W0LER	22	8	1100
W4ZXL	34	8	964	W0IC	22	7	1340
W4FL	33	8	1050	K0ITF	21	6	940
W4MNT	32	8	1225	K0EMO	20	7	1125
K4QIF	32	8	1000	W0CUC	20	6	1403
W4VHH	30	8	1300	W0JAS	19	7	1130
W4CKB	28	8	1350	K0JXI	19	7	750
W4AWS	28	8	1350				
K4EJC	25	8	1100	KH6UK	2	2	2540
W4RFL	24	9	820	VE1CL	8	5	800
W4VLA	24	8	900	VE3DIR	39	9	1300
W4TLV	23	7	1000	VE3AIB	29	8	1340
K4MRS	22	7	1000	VE3BPR	24	7	950
W4RMT	21	7	1080	VE3BQN	23	7	1180
W4OLK	20	6	720	VE3AGQ	18	8	1300
K4YYJ	20	6	720	VE3HW	17	7	1350
K4VWH	18	6	590	VE8HO	1	1	915
W8RCI	41	9	1280	F8DO	1	1	5100
W8UGO	40	10	1401	OH1NL	1	1	5250
W8AJG	33	9	1360	VK3ATN	2	2	10417
W8FYZ	33	9	1275				
W8JWL	33	7	1150				

The figures after each call refer to states, call area and mileage of best DX.

utes following the automatic transmission. Dick will maintain the schedule through May, later if others ask him to. W7RQT at Providence, Utah has a varactor tripler and 4X250B cavity amplifier under construction. W8PT in Watervliet, Michigan is building a s.s.b. mixer for 432 and a rotatable LaPorte rhombic. W6NLZ, Palos Verdes Estates, is working on paramps, and in South Carolina, WA4HTV, WA4VZK and WA4LTS together with the Greenville V.h.f. Society are planning a 432 e.m.e. project. W2NLY suggests a listing of frequencies used by 432 stations. This seems reasonable and I'll find the space, but lets keep the listing to those who are actually on the air and know their frequency.

(Continued on page 158)

Good Old Neighbor

BY GEORGE W. STEVENS,* W0DZZ

LIVING near a small town on a high bluff overlooking lakes on two sides was a ham's paradise for me until a new neighbor moves in across the road. I take time out from hamming and go over and get acquainted — seem like a fine couple, they are from Chicago.

Couple days go by and then he is out putting up a antenna but it is smaller than ham beams that I have seen. I am hoping that he is another ham. Will have to ask him the next time we talk. That nite my good old SW-3 receiver has a funny whistle so I check it over and can find nothing wrong so I give up and hit the bed. Next morning 40 meters is good so I fire up the homebrew 53 osc. and push-pull TZ20s and pound the key a couple of hours. The next couple nites my old faithful SW-3 has a whistle but only at nites. I don't seem to find out why. Maybe it is a line noise, so I change my sleeping to after dinner and ham in the morning. I work 11 till 7 shift. Sunday is my afternoon for sked with old ham friend so at 2:30 I get rig warmed up and then this whistle appears, but soon I hear John calling me, his signal is stronger, so we ragchew for 10 minutes and there is a knock at my door, it is the new neighbor. He is mad because I am spoiling his television picture. I sign with friend and go over and take a look at this thing, called television, which looks like a snow storm on a big tube, every now and then I can see people on the round tube. Neighbor says my antenna is sucking all the picture away from his antenna and that is why there is so much snow on the tube, my antenna is bigger than his. I complain about the noise his big tube makes in my receiver and his wife agrees with me because it does the same on her little radio in the kitchen.

They both work in the day time so I agree to stay off the air at nite if they will leave television off on Sunday afternoon so I can keep sked with friend John. Everything goes fine for a couple weeks, I spend evenings sleeping while he watches television.

I study about TV and ham interference. Then comes the evening I am sleeping and good old neighbor comes over and knocks at front door and is storming mad. My XYL tells him that I am sleeping and that I go to work at 11, but he insists that I am using my radio to mess up his TV picture, and if I don't stop it he will cut my antenna down.

Next nite I take XYL to town for a show and stop at drive-in for a snack before going home, we are just about to leave when my old friend the town marshal drives up *along side*, I was on my way out to your place, the new neighbor called in awhile ago and wants to file a complaint against you for interfering with his television set all evening.

So we go out and see good old neighbor, I let the marshal do all the talking and after good old neighbor gets done complaining about how I spoiled his evening of watching TV and I was doing it in the dark, so he would think I was not at home when all the time he could see me on the TV. So goes the battle and I go off to work they are still at it.

The next morning when I come home from work I look up for my 40-meter flat top but it is on the



ground and wire is cut in small pieces. I am mad enough to eat shoe leather, but if good old neighbor wants to be that way so can I, so I drive back into town and find me one of those old-time light bulbs with carbon filaments and put it up in the attic and wire the light bulb into the hot line and cover the bulb with a big box so it cannot be seen, now let him watch his snow box. I put up a long wire on the other side of house using fine wire so it is almost impossible to see and work 40 meters c.w. in the daytime.

One month goes by and the good old neighbor don't speak when we meet on the street up town. I come home one morning and am sitting at the table eating breakfast, here comes a big moving van, which stops at good old neighbor's front door. When I get up at 5 o'clock they are gone. I understand they went back to Chicago where television is good, I hope so. I put my 40-meter flat top back up and the old SW-3 is playing sweet c.w. notes again. QST

Strays

Feedback

The long dimension for the side plate of the 50-Mc. transceiver (50-Mc. Transistor Transceiver, Mark II), February and March, 1967, QST, should be 9 inches, instead of 9 3/4 inches, as given in March QST, page 23. The 5 1/2 by 9-inch side plates are bent on the long sides only, resulting in a plate that is 4 3/4 by 9 inches, after bending. Thanks to WA4AWW, who brought this to our attention.

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

* Blue Earth, Minn. 56013.



Operating News



GEORGE HART, WINJM, Communications Manager
ELLEN WHITE, WIYYM, Deputy Comms. Mgr.

Administration: LILLIAN M. SALTER, WIZJE

DXCC: ROBERT L. WHITE, WIWPO

Contests: STANLEY H. ISRAEL, WAZBAH

Training Aids: GERALD PINARD

Public Service: WILLIAM A. OWEN, W4YAU

The Old and the New. You have all heard the old saw "Ring out the old, ring in the new." The old was rung out, with ruffles, flourishes, honors and even a few tears, during January and early February, a poignant combination of sorrow and cheer which inevitably goes with these affairs. The new has been duly rung in, to the accompaniment of cleaning out of old files, moving of effects, conferences on personnel shuffles and other departmental reorganizational matters. The result is a Communications Department made up of some old and some new faces, and some temporary key vacancies. To start a new regime short-staffed is an appalling prospect, but this is what we have been up against and we hope you will all bear with us until we get firmly established. We'll discuss some personnel details later, space permitting.

Right now, we have to take a look at the immediate future. Your Communications Department will continue to function in the best interest of the operating amateur in accordance with our interpretation of that interest as conveyed by the membership. We hope you will think of it as the same CD which has served you well and faithfully in the past and will continue to do so in the future — as a department staffed by mature amateurs with a combination of many years experience and completely open minds, a mixture of new and old ideas, methods and procedures, casting out the old as they become useless or obsolete, adopting the new when they represent progress

and achievement, but neither accepting or rejecting either because they are simply old or simply new. Logic doesn't change with the years, nor do the general trends in the course of amateur radio affairs. History has a way of repeating itself. The past is an inseparable part of the present and the future and is not to be ignored. On the other hand, old methods which were or are "good enough" cannot be allowed to continue if there are new ways which are *better*. Your CD always has been open to suggestion and change if merited. We want to make it clear that your new CD is not necessarily a continuation of the old, nor necessarily a complete break with the past. We do not intend to abandon tried and true methods, procedures and philosophies just because they are old; we do intend looking ever toward the progressive and will not hesitate to change methods, procedures and philosophies if progress will be achieved thereby.

Let's get specific. One of the most vital fields in which the development of operating organization is needed is that of the v.h.f.'s. During the past year your communications manager has stressed this, and it is due for continued stressing and emphasis. The Official Experimental Stations have become Official VHF Stations, and their energies being urged into the field of public service. We are not fully satisfied with progress made so far, and want ideas for more. Let's have 'em, fellows. How about development of new v.h.f. nets at local levels? How about using more

OPERATING EVENTS

ARRL-IARU Societies-SCM-Affiliated-Club-Operating Events

April	May	June
1-2 Florida QSO Party, p. 142 March <i>QST</i>	4 Qualifying Run, W6OWP	10-11 V.H.F. QSO Party
7 Qualifying Run, W6OWP	6-7 Russian Contest, p. 82, this issue.	13 Qualifying Run, WIAW
14 Qualifying Run, WIAW	12 Qualifying Run, WIAW	16 Qualifying Run, W6OWP
15-17 CD Party (c.w.)	13-14 Hawaii QSO Party, p. 132, March <i>QST</i> , Georgia QSO Party, next issue.	21-25 Field Day
22-23 Helvetia 22, p. 82 this issue.		
22-24 CD Party (phone)		
29-30 PACC Contest, p. 82, this issue. Missouri QSO Party, p. 108, this issue. Ohio QSO Party, p. 102, this issue.		

repeaters for *communication*, as well as experimenting? New developments make the field limitless — satellite, moon bounce, scatter, all these have communications possibilities and potential. But whatever possibilities exist are useless without planned organization, and that's what we are here for.

How about RTTY? This writer has never been able to mention this subject without getting into hot water with someone, because there is no enthusiast so rabid as the RTTY addict. (Oops, there we go again!) Think of the communications potential, as more equipments become available every day, and with lots of literature on the subject! A natural for organized communication if there ever was one. But again, it needs centralized organization, a plan of operation, a way of working into and being a part of the whole amateur package of public service communication.

Phone? Voice is a basic means of communication, so naturally there is more activity in this field than any other, but there are three different modes of radio voice communication and they need consolidating. Let's quit the scrapping about it. A.m. still has its uses, especially on ten meters and v.h.f. (quiet, you sidebanders!). Sideband is the coming thing — in fact, it has already come! On some of the v.h.f. bands, wide-band f.m. is receiving widespread use, what with surplus gear rapidly becoming available at no or small cost — and if you think f.m. has no advantages over a.m. and s.s.b., just ask someone who has used it.

C.w.? It's not dead, and shows no sign of dying. You can say what you please about its obsolescence as a communications mode, c.w. still occupies less spectrum space than any other and in the hands of skilled operators (ah, *there's* the rub!) can more than hold its own with any other method being used today. Anybody who can learn to talk can learn c.w. Learning to talk is a thousand times more difficult.

Contests? By all means they must be continued, slanted as possible toward training, but dedicated primarily to the "fun" aspect of amateur radio, a phase we can't do without. The "big three" are now the Big Four as the v.h.f. sweepstakes takes its place as a major activity along with the SS, FD and DX Competition.

And speaking of DX, this is by sheer popularity one of our most important operating activities and deserves the exclusive attention of a section

of the department. It shall continue to have it.

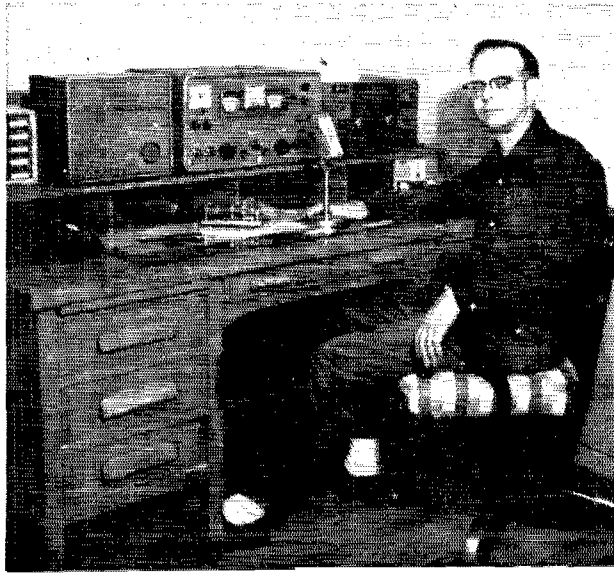
All the other awards, appointments, field organization activities and rules are continued in effect. There are no precipitant or drastic changes. All the forms previously used will be used up before they are revised or discontinued; but each form, as we run out, will be studied for improvement or possible elimination. The familiar F. E. Handy signature and initials will be around on ARRL forms and certificates for some time. You will see changes, from time to time. We can't consult you on every little detail. Let us know when we do something you don't like (as if you won't anyway!), but just to keep us from shooting ourselves, we would appreciate a pat on the back once in a while, too. We are firm believers in this rule of thumb for success: sheer perseverance, readiness to learn, sincere belief in principles, and a willingness to believe we could be wrong.

"Channel 60." The February *QST* article on converted Citizens-Band rigs for the ten meter band has started a lot of amateurs thinking along lines of low-power operation on ten during the coming high-sunspot-activity cycle. It is a well-known fact to those of us who have been around that when ten is open to skip, it is *open*, and the strength of the signal that can be put into a location far distant when the skip is right seems to have little relation to power. No doubt about it, within a few months "ten" will be wide open as it was in the late 50's — absolute bedlam on the low end, good occupancy at the high end.

And there will be a lot of converted-CB rigs in action, especially mobiles. The suggestion comes from some of the gang in Colorado that a certain frequency be picked on ten meters for an international calling frequency, primarily for low powered rigs and mobiles and especially for converted CB rigs, but open to anyone. The idea would be to listen on "channel 60" (i. e. 29.60 Mc.) for a QSO, either call a CQ or call someone CQing there, then, when contact is made, shift to channel 61, 62 or 63 (i. e., 29.61, 29.62 or 29.63 Mc.), whichever is free and commonly available on the particular rigs being used. The CB rigs are ideal for this, since they all contain three or more crystal positions. The procedure might be,

Meet Your SCMs

Wyoming SCM Wayne M. Moore **W7CQL** dates his amateur radio interest back to 1955. In addition to the post of SCM, he is currently an OBS, Assistant Director and an active member of the Casper Amateur Radio Club. Past leadership posts have included Section Emergency Coordinator and Vice Director. He holds an ARRL Public Service Award and is active on 80 meters, enjoys hunting, fishing and baseball and is a Past Master of his local Masonic Lodge. Wayne's station includes a Ranger driving an 813, HQ-170 and off-center-fed antenna.



typically, to get yourself a CB rig, convert it per the Feb. *QST* article, get yourself three crystals for 29.60, 29.61 and 29.62 (or 29.63 in place of one of the latter two — or all three if you have enough positions in your rig).

Note that we are getting close to but not sitting on the NCEF at 29.64 Mc. This suggestion has nothing specific to do with the NCEFs. However, the proximity of the NCEF to this calling channel (i. e., "channel 60") leads right into another possibility — put a 29.61 crystal into the rig so that when you are not looking for a QSO you can switch the rig to "channel 64," operate the squelch, and you will automatically not only be monitoring the NCEF, but ready

immediately to reply to any distress call you might hear there.

Let's try it, eh? If it works on ten, maybe we'll use the idea on other bands too. See you on "Channel 60."

CD Personnel Changes. The masthead above and in March *QST* give some idea of the set up. Ellen White, W1YYM becomes the "No. 2 man" in the department, with general supervisory functions. Ellen's former post of contest supervisor is taken over by Stan Israel, (WA2BAH/1), with the status of assistant communications manager. The only other change at present is the addition of a new staffer to take over public service functions, also with the status



DX CENTURY CLUB AWARDS



From January 1 through January 31, 1967 DXCC Certificate based on contacts with 100-or-more countries have been issued by the ARRL Communications Department to the amateurs listed below.

New Members

K9GVB.....233	WA4ZMH.....122	OK1BB.....108	K9UEV.....104	OK2KGV.....101	K3AOH.....100
ZL1HW.....207	WA6HKG.....120	DJ1VY.....107	UF8LA.....104	SM7ANE.....101	K4FRM.....100
W4TEFL.....203	0W3FD.....115	OK1GO.....107	7Z3AB.....104	UA1UD.....101	K8ABD.....100
VE1RB.....184	UJ8AB.....113	UA0JF.....107	K3CNZ.....103	W1ALT.....101	UA4NE.....100
UR2KAA.....180	LA5YJ.....112	UP2CT.....107	WB2MWU.....103	K1PML.....101	IT75CJ.....100
W86EFA.....176	WA3BXJ.....112	W2OHE.....107	K4CCK.....102	W2QWT.....101	WB2QGB.....100
OK2CF.....168	UB58P.....111	OK2KGD.....106	UD6CE.....102	WA2BRL.....101	W4OHF.....100
OK1ABZ.....143	WA2WJU.....110	W1OER.....106	WA2QHK.....102	W88PEY.....101	WA4PFD.....100
UA3DV.....141	JJL8KJ.....109	F9AP.....105	DM2ADC.....101	WA8HXL.....101	WA4QKQ.....100
Z86CW.....133	K1CTQ.....109	W4ZBW.....105	K1HRM.....101	DJ9NL.....100	WA5US.....100
J1LLQC.....131	DL9QY.....108	WB6NBV.....105	K1LEM.....101	K1KVI.....100	W8HNP.....100
YU3AT.....124	K4VFX.....108	DM3JML.....104	OE3SWG.....101	K1NIJ.....100	WA9BGK.....100

Radiotelephone

W4TEFL.....147	WB2WOU.....119	W6GRX.....108	VQ8AR.....106	W9HLA.....104	LA5YJ.....101
UR2KAA.....146	DJ18X.....115	J1LBWT.....107	I1TRV.....105	OE38AA.....103	WA6RTA.....101
W8KIT.....139	WA6QGW.....115	OK3DQ.....107	W0RW.....105	HC6GM.....102	DJ8OK.....100
UW9AF.....136	IA4HL.....113	KG9SB.....106	DJ1VY.....104	KH6PRO.....102	K5YBB.....000
UC2BF.....121	UA9BU.....112	WB6BE.....106	UB6BE.....104	W5NQR.....102	F2QM.....100
PA0XEQ.....120	K4YFQ.....112	WB6JRL.....106	W1MP.....104	W8ZYL/6.....102	W8CFG.....100
PY4AKT.....120	UA3CT.....108				

Endorsements

Endorsements issued for confirmations submitted from January 1 thru January 31, 1967 are listed below. Endorsement listings through the 300 level are given in increments of 20, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

340	KP4RK	280	K4YFQ	W6CUF	WA4LXX	W8EW	VE3HL	9M2UF
W4OM	W1TS	K1DIR	K4YYL	W6OUN	W6FB	XE1KKV	WB2JF	
	W3PN	K9PPX	UA3CT		W7OE	ZD5R	W3FII	120
330	WA6TGY	W5LEF	VE3ACD	200	W7RVM	4X4CJ	WA4KXC	K1LDK
G2BVN	W8EVZ	W7TDK	WA4CGS	DL1KS	W8NPF		W5KGJ	K1LMS
W3NKM	W8YCP		WA4HOM	DL3OH	W9BGX			K1OTA
		260	W9WQG	JA8ADQ		160		K3EUR
320		K5GOT		K4RSY		CR6AU		K5IN
K6VVA	300	W2AZX	220	K5XG	K3JCT	DJ5JH	K6RSY	K7PJF
W2TOR	G8KZI	W2CES	K1DFC	K9YOE	K4AUL	I1TM	VE3CDX	W1ETV
W3MWC	K8WOT	W2LJF	K1ZSI	OK3LR	KGAAV	K1YPN	V86AJ	W2NEP
W4BBR	W1YYM	W6FET	K8IQQ	SM6AMD	OK2BCI	K5TYW	W2CNQ	WB2UKP
W6DQH	W2PTM	WA6QGW	KR6JZ	W1RLV	W1YRC	SM4CLU	W4HFN	WA4JFM
	W5MBB		W1DEP	WB2FOV	WB2PGM	VE3AU	W6MPY	W5HTG
310	W5TIZ	240	W5RU	W4WHF	W7QY	VE3CDX	WA6AJB	WA9JDT
K4HNA	W0AUB	DJ7CX					W7YBX	W8KAW

Radiotelephone

320	WA2RAU	260	PY2QT	VP2AFC	K9BPO	VE3BLD	120
W3NKM		K5GOT	W5LEF	W1FJJ	L8UBD	D19CQ	
W6RKP		K6ENX	220	W2PDB	PY4AIR	W1SEB	K3RPY
	280		OK1MP	W5OPL	W1MLM	W2CNQ	K4PSR
310	EA1GH		WA4CGS	WB6GOV	W1YCH	W2SSC	LA4DJ
W4EEE	K6HZP	240	WA4HOM		WA5IEV	W3BYS	W1PLJ
	W2TQR	K3HHY		180	W7OEV	W4WHF	W4MUB
300	W3VSU	W6ACD	200	IA4HE	ZL3MN		W6LTV
W1MMV	W4CWV	W4BBL	K2POA	K1ZSI		140	W7YBX
W2PTM			K4YYL	K4FA	160	SM6AMD	WA8GKW
			K0BUR	K4GXO	CR6AU		

ELECTION NOTICE

of assistant communications manager. This is Bill Owen, W4YAU, former EC for Bristol, Tenn., member of several traffic nets and a high scorer in many past contests. Bill has not yet joined the staff at the time of this writing, but should be on the job when you read this. Continuing their former functions as assistant communications managers are Lil Salter, W1ZJE, for administrative supervision; Bob White, W1WPO, for DXCC awards; Murray Powell, W1QIS, and Chuck Bender, W1WPR, for WIAW attendance and maintenance. Still missing: an ARPSC assistant, to replace W1BGD, lost to higher education.

But the biggest blow of all is the loss of our beloved department head, Ed Handy. It will be some time before we can learn fully to struggle along without him. — WINJM.

JANUARY CD PARTIES

Both K2EIU/5 (in the c.w. and phone portions) and the W6RW crew (c.w. portion) broke their own records. The new phone record now stands at 114,345 (which happens to be more than 14-K over Ken's October performance). The ops. at W6RW have run the multiop. record up to 364,700 to beat their previous 319,470 total (last Fall). W8UM operators for the c.w. portion: K2SIL, WB2FIT, K8QKY, W8CQN and W8FAW, have become the second group to break 300-K. The single-op c.w. record is now 293,250 thanks to K2EIU/5, while K2AJA made 100 QSOs on phone in less than an hour and a half!

With statistics like these, little doubt should exist concerning the conditions and activity this past January — the question is — who will be the first ones to break 400-K on c.w. and 200-K on phone?

Based on logs received by Feb. 15, the following are high claimed scores, numbers of QSOs, sections and operating times with final corrected results to appear in the April CD Bulletin. — W4ZBAH/1

C.W.	W8UM (5 oprs.)
K2EIU/5 293,250-843-69-20	311,850-891-70-20
W1BGD 276,120-760-72-20	WA8CFJ (K8BPX, WA8s
K1WJD 258,620-785-67-19	CFJ PMN) 169,600-524-64-19
K4VYF 225,425-620-70-18	PHONE
WA9NFS 216,920-634-68-15	K2EIU/5 114,345-356-63-20
K2AJA 211,485-606-69-15	W9YT (K9LJB opr.)
W4DVT 207,200-585-70-19	89,030-300-58-14
KZ5FX 204,500-586-69-19	K2QDT 80,620-274-58-17
W9LNU 191,080-555-68-17	W1FJJ 72,240-252-58-12
K1ZND 183,625-558-65-17	WA9NFS 66,040-250-52-10
K0AAZJ 175,175-535-65-18	W0WVJ 62,800-230-53-17
W3EIS 174,535-515-67-19	WLPYM 52,420-209-49-15
WA2UWA 166,400-512-65-18	WASIS 52,205-191-53-15
K3HNP 166,975-477-65-19	K1YSD 51,255-196-51-18
W8ABB 156,650-477-65-20	W9YH (K8EGT opr.)
W9CXN 150,280-442-68-18	48,250-188-50-15
WB2OHK 143,000-410-65-18	W6DGH 40,500-155-50-12
W6NKR 138,020-405-67-15	K0YIP 40,185-164-47-12
W3MSR 137,475-416-65-10	K5ARH 38,025-166-45-14
W6WX 130,240-400-64-14	K1CAU/0 37,975-151-49-12
W8BKUW 128,800-453-56-19	K2AJA 32,685-132-47-3
WA2SRQ 127,100-405-62-13	KZ5FX 32,120-139-44-13
W4YAU (WA4VYP, opr.)	W3HO 31,600-127-48-12
125,050-404-61-19	WA2UWA 30,745-133-43-8
WA8GYT 123,380-391-62-13	W9GIL 26,775-113-45-6
W1AW (W1WPR, opr.)	K2ARY 25,010-122-41-9
123,200-378-64-15	W2ZVW 24,975-128-37-6
K0YIP 120,250-363-65-17	WA9LHJ 24,395-119-41-12
W1EOB 117,250-343-67-9	W4000 23,400-99-45-6
W2YV 115,800-345-66-12	WA9ELM 22,905-118-45-6
W5BUK 114,500-351-64-14	W9ACU 22,425-108-39-10
W2GZL 114,050-343-65-12	W9ABAUM 22,345-103-41-8
K0G5Y 109,545-322-67-13	W43CU 22,050-105-42-12
WA5KUD 104,025-360-57-16	K1MNK 21,935-103-41-12
WA6MLE 102,785-333-61-10	W1BCD 21,400-100-40-3
W4KFC 102,690-319-63-4	W6PYM 20,710-104-38-13
W44WWT 101,100-330-60-13	W3EIS 20,670-100-39-4
WA9ITB 100,170-313-63-10	WA9IFB 20,670-101-39-4
W6RW (K2PHF, W8TMC,	K9VJG 20,165-107-37-9
K9FLT) 364,700-1042-70-20	WA9KGD 20,140-103-38-6

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 have been a licensed amateur for at least two years and similarly a full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 p.m. 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 no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signers uncertain or ignorant of their 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 the names of all eligible candidates.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

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. This is your opportunity to put the man of your choice in office.

— George Hart, WINJM, Communications Manager

Section	Closing Date	SCM	Present Term Ends
Santa Barbara	Apr. 10, 1967	Cecil D. Hinson	Aug. 10, 1966
Maine	Apr. 10, 1967	Herbert A. Davis	Mar. 12, 1967
Alberta	Apr. 10, 1967	Harry Harrold	Apr. 10, 1967
Eastern Penn.	Apr. 10, 1967	Allen Breiner	June 15, 1967
Nebraska	Apr. 10, 1967	Frank Allen	June 10, 1967
Oregon	Apr. 10, 1967	Everett H. France	June 10, 1967
Manitoba	Apr. 10, 1967	John T. Stacey	July 1, 1967
South Dakota	Apr. 10, 1967	Edward P. Holt	July 3, 1967
Tennessee	Apr. 10, 1967	William A. Scott	Resigned
Western Mass.	June 9, 1967	Percy C. Noble	Aug. 11, 1967
New Mexico	June 9, 1967	Bill Farley	Aug. 16, 1967
Kansas	June 9, 1967	Robert M. Summers	Aug. 18, 1967
Kentucky	June 9, 1967	Lawrence F. Jeffrey	Aug. 20, 1967
West Virginia	July 10, 1967	Donald B. Morris	Sept. 18, 1967

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.

Sacramento Valley	John F. Minke, III, WA6JDT	Feb. 25, 1967
North Dakota	Harold L. Sheets, W0DM	Mar. 8, 1967
Missouri	Alfred E. Schwaneke, W0TPK	Mar. 11, 1967
Minnesota	Herman R. Kopsichke, Jr., W0TCK	Mar. 15, 1967
North Carolina	Barnett S. Dodd, W4BNU	Apr. 10, 1967

In the Alaska Section of the Northwestern Division, Mr. John P. Trent, KL7DG, and Mr. Albert F. Weber, KL7AEQ, were nominated. Mr. Trent received 60 votes and Mr. Weber received 57 votes. Mr. Trent's term of office began Jan. 12, 1967.

CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Apr. 14 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OWP only will be transmitted Apr. 7 at 0500 Greenwich Mean Time on 3590 and 7129 kc. **CAUTION!** Note that since the dates are given per Greenwich Mean Time, Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. *Example:* In converting, 0230 GMT Apr. 14 becomes 2130 EST Apr. 13.

Any person can apply. Neither ARRL membership for 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 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m. you may try later for endorsement stickers.

Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0230 GMT Tuesday, Thursday and Saturday, speeds are 15 20 25 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5 7½ 10 13 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each 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 on the air!) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and texts to be sent in the 0230-0320 GMT practice on those dates:

- Date Subject of Practice Text from Feb. QST
Apr. 3: *It Seems to Us*, p. 9
- Apr. 6: *10-Meter Conversion of CB Transceivers*, p. 20
- Apr. 11: *How to Originate Messages*, p. 68
- Date Subject of Practice Text from *Understanding Amateur Radio*, First Edition
Apr. 19: *Some Hints on Operating Your Receiver*, p. 64
- Apr. 28: *Setting the B.F.O.*, p. 65

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Jan. Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPI	4602	1902	1719	183	8406
K6ONK	82	2047	2026	36	4191
K6EPT	9	940	857	83	1889
WB3UL/4	245	640	609	9	1503
W6LGG	15	742	669	13	1439
W7BA	8	657	601	54	1320
W7HMA	108	451	439	5	1003
W7ZIW	23	489	483	6	1001
W6RSY	100	455	356	60	971
K5TEY	17	706	225	6	954
K7TCY	10	460	428	42	940
W6YEH	41	449	435	10	935
W6EML	29	454	357	0	840
W5OBD	26	406	405	1	838
K6IOV	8	491	329	0	826
W0ZWL	0	507	0	301	808
W6EHS	32	376	354	29	791
W4ASCK	37	365	362	2	766
W6BBO	41	368	275	36	718
W6QNX	20	336	334	2	692
K9IVG	23	383	248	13	667
W4ADNJ	50	250	276	18	594
W3CUL	105	239	217	16	577
W4AWWT	26	264	257	1	548
K6FDH	21	257	255	2	535
K3MYS	19	267	223	15	524
Late Report:					
K5TEY (Dec.)	22	959	366	4	1351
W4AQR (Dec.)	39	241	192	36	508

More-Than-One-Operator Station

W90DD	549	7	8	3	567
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BPL for 100 or more *originations-plus deliveries*

W4ABMC 306	K7CTP 129	WB2QL 105
W6VFP 247	W2OE 127	W1LE 104
K0ZLJ 204	W3ATQ 119	WB2WH 103
W4GCP 198	W4LOY 117	W5FBN 103
W1PEX 151	W4ANEV 116	W4QNP 103
W4OGG 147	K1RQO 114	W6DSC 102
W4SSHP 143	K9IU 113	W4RHA 101
W4AHA 142	K0RPH 108	Late Report:
W3NAL 139	W1FNF 106	W6MPP (Dec.) 248
W3CYX 135	W4GOQM 106	

More-Than-One-Operator Station

K4CG 243	W6EE 125	Late Report:
W1AW 151	W0ZLN 111	W5YM (Dec.) 109

BPL medallions (see Aug. 1954, p. 54) have been awarded to the following amateurs since last month's listing: WB20HK, W6FCO, W7ZIW, W4SSHP.

W1AW SCHEDULE, APRIL 1967

The ARRL Maxim Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 3 p.m.-3 a.m. EST, Saturday 7 p.m.-2:30 a.m. EST and Sunday 3 p.m.-10:30 p.m. EST. 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.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	RTTY OBS ^{3,7}	.....	.....
0030
0100
0120-0200 ⁴
0200
0205-0230 ⁴
0230
0330-0400 ⁴
0400	RTTY OBS ³	.....	.....	.....	.....	.....	.....
0410-0430 ⁴
0430	Phone OBS ²	.....	.....	.....	.....	.....	.....
0435-0500 ⁴
0500	C.W. OBS ¹	.....	.....	.....	.....	.....	.....
0530-0600 ⁴
0600-0700
0700-0800
2000-2100
2100-2200
2300-2345

¹ C.W.OBS (bulletins, 18 w.p.m.) and code practice on 1.805, 3.555, 7.08, 14.1, 21.075, 50.7 and 145.6 Mc.

² Phone OBS (bulletins) on 1.82, 3.945, 7.255, 14.28, 21.41, 50.7 and 145.6 Mc.

³ RTTY OBS (bulletins) on 3.825, 7.045 and 14.095 Mc. 170/850 cycle shift optional in RTTY general operation.

⁴ Starting time approximate. Operation period follows conclusion of bulletin or code practice.

⁵ Operation will be on one of the following frequencies: 21.075, 21.1, 21.41, 28.08 or 28.7 Mc.

⁶ W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.

⁷ Bulletin sent with 170-cycle shift, repeated with 850-cycle shift.

Maintenance Staff: W1a QIS WPR NPG. *Times/days in GMT. General operating frequencies approximate.

Electronics Crossword

BY S. M. DUNNAM, JR., * KSKEI

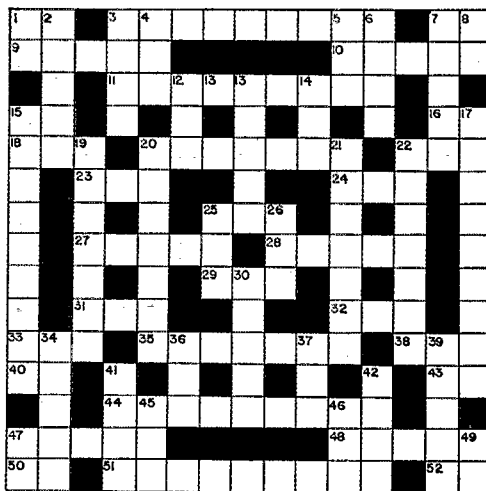
ACROSS

1. Freq. Absorption.
3. Reduces TVI.
7. Freq. measurement.
9. Modulation checker.
10. Chassis front.
11. Demodulation.
15. Here.
16. ARRL appointment.
18. Noise filtering circuit. (ab).
20. Type of amplifier.
22. "King Spark ——" (Pre-WW-I).
23. Intermediate Freq. Oscillator.
24. Phono part.
25. "Your sig. fades."
27. Intermediate.
28. Unusable.
29. Station leading a net.
31. Electron Coupled Oscillator.
32. Beam direction: Little Rock to Dover.
33. WX description.
35. S.S.B. amplifiers
38. Iterate (ab.)
40. Beam direction: N.D. to Ga.
43. Electrical degree.

44. Reduce.
47. Grid signal.
48. Electrocutted (slang).
50. Been
51. Ham service opportunity.
52. AØ activity. (ab).

DOWN

1. Field Strength (ab).
2. Small tube type.
3. Type of switch.
4. Henry, easy, easy.
5. Negative coefficient designation.
6. Multiple capacitor.
7. Measuring instrument.
8. "I am closing my station."
12. Chart of values (ab).
13. Instrument covers.
14. "I".
15. Children.
17. To mark a dial.
19. Reducer.
20. Gain potentiometer.
21. Speaker mounts.
22. Radiator.
25. Static troubles.


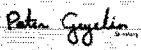
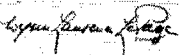


26. ——— bar.
30. Crisp, smooth, clickless, and chirpless.
34. Code license requirement.
36. Brilliancy (ab.)
37. Power source for rural hams.
39. "P".
41. Radiation element.
42. vy.
45. Test equipment meter (ab).
46. Messages (ab).
47. Power ratio unit. (ab).
49. Type of current. (ab).

* P.O. Box 62, Longview, Texas 75601

Answer on page 142

Strays


 THE FRANKLIN INSTITUTE
 OF THE STATE OF PENNSYLVANIA
 AWARDS THE PRESIDENT'S CITATION
 TO
 PHIL-MONT MOBILE RADIO CLUB
 IN RECOGNITION OF
 FOURTEEN YEARS OF LOYAL AND DEDICATED SERVICE OF ITS
 MEMBERS IN HELPING TO ESTABLISH AND MAINTAIN AMATEUR
 RADIO STATION W3TKQ IN THE SCIENCE TEACHING MUSEUM,
 THUS ENABLING THE FRANKLIN INSTITUTE TO ADVANCE THE
 CAUSE OF AMATEUR RADIO AND OF RADIO EDUCATION.
 Four November 12, 1968





On January 18, the Phil-Mont Mobile Radio Club received this award from the Franklin Institute. Pictured is W3ADY receiving a similar award from Institute President W3QCV. The President's Citation had been made only seven times prior to this occasion.



• 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 M. Thompson, W3HC—SEC: K3NYG, RM: W3EEB. New appointments: WA3-DYG as EC NC. County: W3DEO as OPS. Renewals: W3HKS as ORS; K3MPZ as OBS. DEPN: QNI 50, traffic 8. D8MN: QNI 56, traffic 2. The DEPN was activated by WA3DUM and W3PAM during the tornado which struck Felton, Del., Jan. 27. W3HC, K3NYG, WA3CDV, K3NVU/mobile and W3D0G soon checked in and with W3GUS, W3DNN and K3RRT on MARS RTTY had the state well covered in case our help was needed. We regret to report the passing of Old Timer W3HO. W3EEB is temporary NCS on 1st session 3RN. K3URP had a ball on the 6-meter opening of Jan. 10. WA3CRU expects to have a new linear amplifier working. K3UXQ has been transferred to W. Va. Good luck, Hal, and thanks for a good job as EC. WA3DUM checks into MDDS. W3BDP is making changes to improve reception on 2 meters. Traffic: W3EEB 331, W3HC 44, K3URP 9, W3DKX 7, WA3CRU 6, WA3DYG 5, W3HKS 5, K3NYG 2, WA3-DUM 1.

EASTERN PENNSYLVANIA—SCM, Allen R. Brainer, W3ZRQ—SEC: W3ELI, RMs: K3YVG, W3CBH, W3EML, K3MYO. PAM: W3FGQ, K3PSW and K3SUN are new OOs. The EPA C.W. Net had QNI 453 and QTC of 287. The PTN Training Net had QTC of 259. The EPA Emergency Phone & Traffic Net had QNI 720 with QTC 151. WA3FUE is looking for Hawaii and Alaska for his WAS. WA3EMO joined our training net and uses an NC-303 and a DX-100. After 45 years in ham radio, W3CAU made DXCC. W3FGQ worked WB2EGZ on 432 Mc. for DX. K3VMY and WA3HGO are now active on 6 meters. K3HTZ made the Dean's List for the third time in a row at Temple U. W3NNL located his v.f.o. problems, a bad resistor. WA3CTP made CP-30. K3SWZ joined the National Guard and will be stationed in Texas. W3CUL closed shop and headed for Florida for the winter. New Gear Dept.: an HQ-180 receiver to WA3DE; an 80-meter c.w. 5-watt portable built by WA3CFU; a DX-100 for K3VBA; an 80-meter inverted Vee to WA3EXW; an SB-610 Monitor-scope for W3EML. K3AOH is a new member in 2nd Army MARS. New club officers: Pottstown ARA—K3NUM, pres.; K3INU, vice-pres.; WA3-FQJ, secy.; W3VWD, treas. Anthracite Chapter QCWA W3PVY, pres.; W3OML, vice-pres.; W3KJJ, secy.-treas. Abington ARC had WA3EEC as guest speaker on "Pictures from Satellites." W3ZRR is waiting for warmer weather to get his rotor unstuck; he also retired Feb. 1. WA3CLD got his General ticket in Sept. and works 80, 40 and 20 with his T-60. Your editor has acquired employment again so activities will be mainly evenings and week ends. The next EPA Section Dinner-Meeting will be held Apr. 22 at Coplay, Pa. Details will be forwarded in the quarterly EPA bulletin. If you are not on the mailing list you may be put on by dropping a card or radiogram with your name, call and address to your editor or any of the EPA net managers. Traffic: W3EML 840, W3CLD 577, K3MYS 524, K3MVO 299, WA3ATQ 260, K3YVG 151, K3PFE 139, K3RTY 121, W3MPX 100, WA3EXW 97, W3FGQ 91, W3AEQ 86, W3ZRQ 86, W3CBH 85, WA3CTP 83, WA3AIB 78, W3VAP 77, W3AIZ 71, W3RV 71, WA3BXV 66, W3OY 66, W3NNL 54, K3VAJ 52, WA3BYH 42, WA3FVK 42, W3JXX 41, WA3AFI 34, W3RV 71, WA3BSV 66, W3OY 66, W3NNL 54, K3VAJ KJJ 23, K3HBF 22, K3KTH 20, WA3FWT 18, K3MIDG 16, K3HKW 14, WA3CFU 13, K3KKO 13, K3WEU 11, K3F0B 10, W3BUR 9, WA3EXB 9, W3ADE 8, W3OML 8, W3PVY 8, W3BFF 7, WA3DGR 7, K3NZD 5, WA3EEC 3, K3HTZ 1, K3VAX 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM,

Carl E. Andersen, K3JYZ—SEC: W3CVE, RMs: K3OAE, W3ZNV. PAMs: W3JZY, K3LFD.

Net	Freq.	Time	Days	Sexs.	QTC	Inv. QNI
MDD	3643	0000Z	Daily	31	366	14.2
MDDS	3643	0130Z	Daily	31	70	6.2
MEPN	3820	2200Z	M-W-F	22	88	21.8
MEPN	3820	1700Z	S-S			
NITE OWL	50,250	0400Z	Daily	31		10

New appointees: WA3CFK as OPS, W3DPR as ORS, WA3FHB as ORS, W3GKP as OVS, W3BQV as OO, New AREC stations: K3VHS, W3JHR, WN3GKH. Renewals: W3CDQ as OBS, W3RNY as ORS, K3VHS as ORS/OPS, W3MCG as RM/ORS, W3UE as RM, K3CYA, W3MSR, W3ECP and W3EIS took part in the Dec. FMT. WA3AE was active in the V.H.F. S.S. Contest. He is active on 2 meters as well as 3693 kc. K3ORP reports that the Eastern ARS meets the 3rd Wed. of each month. Md. Two Meter Termites, P.O. Box 153, Linthicum Heights, Md., 21090, reports an active 2-meter net on 145.200 at 0130 GMT and a club for those interested in 2 meters. WA3CFK reports CVTN meets on 145.620 at 0300 GMT Sun. W3CDQ has a new National 200. W3PRC finally finished his homebrew linear for 80 through 10 meters. K3URZ had a new two-element quad for 15/10 ready for the DX Contest. W3DPR took first place in the Conn. QSO Party from Md. K3QDD was home for Christmas and a semester break but is now back at MIT as W1DVH. The PVRC, led by W3GRF, made plans on how to place first in the ARRL DX Contest this year. W3UE reports W3DQH, in Belair, as an MDD newcomer. K3NCM is back on 160 better than ever and improving his 2-meter setup. K3URE transmits ARRL Bulletins on 6 meters and also reports on the Nite Owl's Net activity. W3MCG reports Murphy's law in operation at his QTH in full force the first week end of the DX Contest. WA3CFK has added a new s.w.r. bridge and a homebrew VLF receiver. He made 53K on the CD Party. Traffic: WA3EEQ 133, K3LFD 125, W3TN 123, WA3CFK 120, K8MYZ/3 93, K3JYZ 70, W3PQT 53, K3QDC 50, W3-FOV 41, WA3ERL 40, W3ZNV 39, W3MCG 36, W3DPR 30, K3GZK 30, W3PRC 23, W3ECP 19, WA3EOP 17, WA3CCN 15, K3VHS 14, WA3CEK 12, WA3BNL 11, K3URE 11, W3UE 9, K3QDD 1.

SOUTHERN NEW JERSEY—SCM, Edward G. Raser, W2ZI—Ass't. SCM: Charles B. Travers, W2YPZ. SEC: W2BZJ, RMs: WA2KIP, WA2BLV. PAM: W2ZI and NJPN Net Mgr. NJN reports a QNT of 601 and traffic 373. NJPN reports QNI of 726 and traffic 180. W2BVE is the new asst. mgr. for NJN. WA2UPC resigned because of college work. WB2MOQ and W2CKF are now ORSs. WB2-TEN was high man with 500 QSOs during the SS Contest for SJRA's effort, while W2ORA made 307 contacts on phone. I wish to acknowledge receipt of SJRA's excellent bulletin, *Harmonics*. W2BLM is a new station in Windsor reporting into NJPN, as well as W2USA the MARS station at Ft. Dix. W2VJ, ex-W3ARV, is on the air at Browns Mills with a TR-4. WB2UO reports a new radio club in the Williamstown area. Assemblyman: A. S. Smith again is sponsoring Amateur License Plate Bill No. A-323 and will need all your support. New officers of the SCARA are K2BKG, pres.; WA2QAA, vice-pres.; WB2FTD, treas.; W2BYW, secy. The SJRA's newly-elected officers are K2IEO, pres.; K2BG, vice-pres.; W2ORA, treas.; K2BFX and WA2ABF, secy. A brand-new radio club known as the West Jersey Radio Amateurs recently was formed by the merger of the Burlington Amateur Radio Society and the 6-Up Amateur Radio Club of Burlington. K2SQS is pres.; WA2HJP, vice-pres.; K2QIJ, secy.-treas.; K2BNS, trustee for the club station, W2KUU. The club operates a local v.h.f. net Sun. on 50.60 Mc. at 1900 local time. W2RLY keeps daily skeds with W2ASQ/4 at Melbourne, Fla., at 12 noon. W2W1/4 is operating at Leisure City, Fla., again this year. W2ZEW is a new OPS and WA3BB1/2 the new EC for Burlington Co. Traffic: (Jan.) WA2KIP 170, WB2MOQ 157, WA2BLV 155, W2YPZ 74, W2ZI 74, W2CKF 66, K2SHE 40, WA2UPC 34, WA3-BB1/2 33, W2RG 18, W2DVU 15, W2RZJ 9, WB2TEN 7, WB2VFN 6, WB2GTE 4, WB2RVE 4, K2BG 2, W2ZEW 1, (Dec.) WA2UPC 231, WA2KIP 219, WB2TEN 139, K2SHE 93, W2CKF 40, WA2BLV 16, WB2SBD 6, WA2DU 5.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2RUF. PAM: W2PVI. RMs: W2EZB and W2FEB. NYS C.W. Net meets on 3670 kc. at 1900; ESS on 3590 kc. at 1800; NYSPTEN on 3925 kc. at 2200

GMT; NYS C.D. on 3510.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 3510 kc. at 1930 Wed.; TCPN 2nd Call Area on 3970 kc. at 0045 and 2345 GMT; NYS County Net on 3510 kc. Sun. at 1400 and 2345 GMT on Mon. Congratulations to W2OE on making the BPL. W2RUF advises that the AREC Training Net will be on Sat. at 1730 on 3670 kc. at 8 p.m. Check in and get an application and other information. W2PVI renewed as PAM and OPS. K2SSX was renewed as ORS and K2AYQ as EC for the Glens Falls area. Minimum participation requirements for active listing in the NYSPTEN is 7 check-ins per month. WB2SIA received an NYSPTEN certificate of merit. The Walton Radio Assn. elected K2EZK, pres.; WB2FWG, vice-pres. and act. mgr.; W2OSL, secy.; WB2AGX, treas.; and W2FAMU, trustee. WB2VPA and WB2VPK have received General Class tickets. W2ALL and W2CNS presented a 432-Mc. program to the Squaw Island ARC. May 13 is the date of the Western N.Y. Hamfest and East Coast Spring V.H.F. Conference at Vince's 50 Acres, near Rochester, N.Y. This is the big one sponsored by the RARA. Notice the addition of a complete v.h.f. program. WA2HSB reports that the RACES control was recently moved to an underground shelter and equipped to operate for two weeks continuously with emergency power and ration. W2RUF spoke at a recent RARA meeting. The Fulton ARC held an installation banquet. W2WOS, WB2VXX and WB2VTR all passed the General Class exam. The Chautauque ARC visited the Niagara Mohawk steam station at Dunkirk. K2AYQ reports that Glens Falls AREC is planning to produce a movie depicting its activities. Money was raised for the project via an auction. WA2AWK reports that Onondaga County AREC now has 22 members. Start planning for Field Day right now! Traffic: K2KQC 466. W2OE 428. W2SDI 381. W2RUF 185. WA2NDG 168. W2GVH 194. K2QDT 100. WB2GAL 75. WB2SMD 60. W2HYM 56. WB2OYE 53. W2FEB 49. WA2IHP 46. K2OFV 37. WA2MWF 31. W2RQF 31. WA2ANE 23. WA2HSB 23. K2JBX 23. W2FCG 21. WB2BJN 18. K2HOH 18. K2SSX 17. W2MTA 13. K2IAH 11. WB2-10Q 7. K2DNN 10. WA2GLA 10. K2AYQ 8. WB2SIA 8. WA2ANE 7. WA2AWK 7. W2PVI 3.

WESTERN PENNSYLVANIA—SCM, Robert E. Gawryla, W3NEM—SEC: K3KMO. PAM: K3VPI (v.h.f.). RMs: W3KUN, W3MFB, W3UHN, K3SOH. Traffic nets: WPA, 3585 kc. daily at 0000 GMT and KSSN 3585 kc. Mon. through Fri. at 2330 GMT. The Penn State University Amateur Radio Club has been reactivated and has received its station license and new call, WA3HCG. W3YA is the club's advisor and W3LWN is the station trustee. The Spark Gap reports that K3EGW is now WB6CTK in Downey, Calif. K3FOY is now operating portable OX on 14,230 kc. from Greenland, Ex-K3ZMH is very active in the Huntsville, Ala., area as W4GRG. K3NLL, stationed in Korea, has received his new call, W3ICN. He will be residing in both Michigan and Pennsylvania so will use both calls and he should be home from Korea shortly after this article is in print. W3GJY is now QSL Mgr. for FM7WD. K3QZX is serving with the Army in Viet Nam. W3RFO moved across town into a new home (better antenna location on that hill?). K3EJF worked ZS4JB, G3DO and E18H on 14-Mc. s.s.b. while he was mobile. W3KQD is working on his linear again. W2KAT/3 now has a home station on 80 with 75 watts and a Cave Dwellers short dipole. W3IYI has a new NC-300. W3NGNG is a new Novice in our area. "The S.S.B. Nameless Net" meets on Mon. and Thurs. at 2100 EST on 2 meters. W3LHN is now 134/144 for DXCC. W3LOD has a new HD-10 keyer which sounds FB at the SCM's QTH. W3NCE has a new Swan. W3BZR is now WB6-AAQ. W3ITV says W3PON/6 has a new beam up. Traffic: K3HKK 195. W3KUN 160. W3NEM 137. WA3AKH 103. K3SOH 74. W3LOS 72. W3MFB 70. K3PYS 63. WA3BLE 50. K3RZE 39. K3HCT 37. WA3EPQ 36. W3OEO 24. W3-LOD 16. K3SJA 14. WA3AKB 13. W3IYI 12. W3SMV 7. W3YA 7. W3KQD 6. W3RUL 5. W3GJY 3. W4ZHZN/3 3. W2KAT/3 1.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W9PRN—SEC: W9RYU. RM: WA9GUM, PAMs: W9VWJ, WA9CCP, W9KLB and WA9RLA (v.h.f.). Cook County EC: W9HPG. Net reports:

Net	Freq.	Times	Days	Tfc
LEN	3940 kc.	1400Z	Sun.	18
ILN	3760 kc.	0000Z	Daily	209
NCPN	3915 kc.	1300Z	Mon.-Sat.	115
NCPN	3915 kc.	1800Z	Mon.-Sat.	408
H11 PON	3925 kc.	2300Z	Mon.-Fri.	312
H11 PON	50.28 Mc.	0200Z	Mon. & Thurs.	2
H11 PON	145.5 Mc.	0200Z	M-W-F	117
TNT	145.36 Mc.	2100Z	Sun.-Fri.	106

This section's sympathy is extended to the family and friends of W9MIVZ, former Vice-Director of the Central Division, who recently was killed in an automobile acci-

dent; also to the family and friends of WA9HQS, who died suddenly during the heavy snow storm which recently plagued Chicago. W9REC, K9UFK, W9WYB, K9WMP, W9VBV and W9JUV/K9OSO participated in the recent ARRL Frequency Measuring Test. The Milwaukee Amateur Radio Club reminds the gang to reserve July 7 and 8 for the Central Division Convention, which will be held in Milwaukee. The committee promises that everyone will have a fine time at this gala affair. K9LUF will hold a QSL Day on Apr. 1 and 2 and will send a certificate to everyone who works him on this anniversary of his first year in amateur radio. New appointees include W9RQR as EC of St. Clair County. W9JXV as EC of Maron County. WA9QXT as ORS. K9DQU as OO and K9HDZ and W9-ZTK as OBSS. WA9GZD received his Extra Class license. New calls heard in DeWitt County are WN9TMW and WN9TOO. W1WPO, of ARRL Headquarters, attended the DXCC Dinner in Chicago Jan. 25. The Ninth Regional Net handled a traffic count of 554 messages during Jan., and W9NWK reports that the 75-Meter Interstate Single Sideband Net handled 400 messages. Many reports were received from throughout the state from amateurs experiencing damaged antennas from the recent snow and ice storm. New officers of the Central Illinois Amateur Radio Club are W9IJE, W9GXR, WA9NVV and WA9-BKC. W9YH has a new 130-ft. tower to bring in DX. W9LNQ, snowed in for days, brought in some good DX. He also received his WAZ certificate. W9DOQ was voted manager of the North Central Phone Net. New father-and-son calls in the Ivanhoe, Ill., area are WN9TTD and WN9TTE. WA9NFS finally went s.s.b. with a Heath SB-400. K9IFE made Extra Class. WA9KKA is back on 2 meters with a homebrew rig. WA9CCP is the only recipient of the BPL award this month. Traffic: (Jan.): WA9SEO 366. WA9CCP 309. K9KZB 236. W9CGC 186. W9AXR 179. W9NXC 157. WA9GUM 125. W9DOQ 111. WA9OTD 111. WA9MHU 108. W9EET 58. W9JXV 85. WA9PPA 75. WA9NFS 68. W9ELL 60. K9BTE 59. W9HOT 38. WA9POZ 37. WN9SPA 37. W9YCH 26. W9SKR 20. W9HSK 18. WA9LDC 18. WA9EBT 16. WA9RLA 10. WA9HVQ 9. W9LNQ 8. W9HJM 7. WA9BRZ 6. W9HSD 4. W9DQU 2. WA9HSZ 2. W9YH 2. (Dec.) W9LNQ 11. W9YH 10.

INDIANA—SCM, Mrs. M. Roberto Kroulik, K9IVG—Asst. SCM: Ernest Nichols, W9YX. SEC: WA9GKF.

Net	Freq.	Time	Jan. Traffic	Mgr.
IFN	3910	1330Z Daily	2300 M-F	316 K9IVG
ISN	3910	0000Z Daily	2130Z M-S	461 K9CRS
QIN	3656	0000Z Daily		236 W9HRY

W9PMT, mgr. of Hoosier V.H.F. nets, reports Jan. traffic 116. K9EYF, mgr. of PON, reports Jan. traffic 60. K9-DHC, mgr. of RPN, reports Jan. traffic 46. K9VFT, mgr. White River AREC, reports Jan. traffic 19. WA9KVP, mgr. So. Bend ARC Net, reports Jan. traffic 42. QIN Honor Roll: K9VHY 31. W9ZYK 24. WA9KOH 21. WA9-OYI 20. WA9FDQ 19. W9SNQ 17. K9HYV and W9OLW 18. W9HRY 17. K9VWJ 16. K9DHC and W9BDP 15. WA9GKF/WA9QWN is our new SEC. Welcome to WA9-SBR and WA9PAP, new Generals, and WN9SSI, a Novice. WA9RJ has a new EC-200 receiver and a triband vertical. The new MARS Director is W9FSA. Congrats to W9JYO on a job well done. W9HW is building an exciter and an amplifier. WA9QOF has built an SH-200. W9INI has put up a 10-meter antenna and WA9MFF has built a 40-meter beam. The NEIC Banquet will be held Apr. 1 at Waterloo, Ind. W9FJH has the new antenna up. New officers of the Kokomo ARC are WA9GLS, pres.; WA9-QWQ, vice-pres.; WA9GKT, secy.; W9BFD, treas.; W9-MZN, dir. New officers of the Gibson Co. ARC are K9IIV, pres.; W9ZZR, vice-pres.; W9FJI, secy.; W9ZZR, resident agent. WA9IT is modifying a 75A-2 for s.s.b. K9ZSS has built a 6-meter v.f.o. Don't forget the IRCC meeting at Butler U. Apr. 2. (that's in Indianapolis.) K9-UXX is enjoying a new NCX-3 transceiver. *Amateur radio exists because of the service it renders.* BPLers: K9IVG and K9IU. Traffic: (Jan.) K9IVG 667. WA9OYI 300. W9MM 248. W9ZYK 206. W9JUK 203. W9HRY 163. K9FZX 135. WA9FDQ 118. K9IU 117. K9HYV 90. K9-VHY 62. W9JVV 57. W9SNQ 53. WA9KOH 52. W9CC 51. W9PMT 48. W9IUB 44. WA9GNA 40. W9RWQ 30. WA9BGJ 27. W9PU 27. W9FWH 26. K9EYF 25. WA9BHG 23. K9-BST 23. K9CRS 23. K9YFT 23. W9YX 23. W9RTH 22. WA9TKZ 22. WA9BNX 20. K9JQV 16. W9DZC 15. WA9-KAG 14. W9LG 14. WA9CSS 13. WA9LTI 12. W9IDK 11. K9GBR 11. WA9RNT 11. WA9CFW 10. W9EJW 10. K9-ILK 10. W9RZI 9. W9RDP 8. K9FTJ 8. WA9GJZ 8. WA9GKF 8. K9UEO 8. WA9LJW 7. W9CMT 6. WA9CHY 5. WA9ITB 5. WA9MFY 3. WA9CYG 2. WA9QX 2. WA9-ABI 1. K9FZU 1. (Dec.) WA9MXG 32. W9RFN 30. W9-CLY 23. K9WET 18. WA9LGQ 12. WA9JGN 10. WA9KOH 5.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: K9ZPP. RM: WA9MIO. PAMs: K9IMR, W9NRP, WA9QKP.

Net	Freq.	Time	Days	Sess.	ONI	QTC	Mgr.
BNB	3985 kc.	1300Z	Mon.-Sat.	26	299	239	W9NRP
BNB	3985 kc.	1800Z	Daily	31	579	188	WA9QKP
WSBN	3985 kc.	2315Z	Daily	31	1059	245	K9IMR
WIN	3662 kc.	0115Z	Daily				WA9MIO
SWRN	50.4 Mc.	0300Z	Mon.-Sat.	25	359	8	W9JZD

New appointees: K9ZYS and WA0OFF as OVSS. Renewed appointments: W9NUW. Coming events: Central Division Convention July 7 and 8 in Milwaukee and the WNA Picnic July 23, at Wisconsin Rapids. FLARC officers for '67 are W9EEQ, pres.; WA0QAM, vice-pres.; K9EEQ, secy.; WA9JAY, treas.; W9NFT, W9LJR and K9YXW, directors. W9EWC, W9ZGJ, W9GYQ, W9AFY and WA9-EUA are transmitting amateur TV, and are looking for c.w. phone or TV contacts on 420 Mc. FMT results: W9KCR 15.3 and K9OSC 213.7 p.p.m. error, K9GSC and W9AYK lost their towers in storms. WA9OMO is looking for members for his teenage net. W9JKM reports that his NYL passed the Novice test. K9GDF led the OOs with 43 notices in Jan. K9OSC has a new trap dipole antenna for 80 and 40. BPL certificates for Jan. traffic went to WA9QKP and W9OJD. A CAN certificate was earned by W9DND. Traffic: (Jan.) W9ODD 567, W9CXY 297, W9-DYG 185, WA9QKP 183, WA9NPH 142, WA9OMO 128, W9IFS 115, K9FHI 108, W9JKM 106, W9YT 93, WA9ONI 92, W9DXV 66, WA9NFG 65, K9JMP 64, K9GDF 55, W9-NRP 53, W9DND 51, K9IMR 49, WA9NRY 49, W9AYK 47, W9KRU 44, W9KQB 37, WA9KPW 33, K9GSC 29, WA9IZK 27, K9OSC 27, W9OTL 22, WA9AKE 21, WA-PKM 20, W9CBE 18, WA0HRM/9 17, W9HQF 6, W9HWQ 5, WA9NBU 3, W9LRZ 2, K9LGU 2. (Dec.) K9IMR 127, WA9PKM 10.

DAKOTA DIVISION

MINNESOTA—SCM, Herman R. Kopischke, Jr., W0-TCK—SEC: WA0IEF, RMs: W0ISJ, WA0EPX, PAMs: WA0MMV, WA0JKT, WA0DWM, W0HEN, MSN meets daily on 3595 kc. at 0030Z. MJN meets Tue.-Sun. on 3595 kc. at 0100Z. Noon-MSPN meets M-Sat. on 3820 kc. at 1805Z and Sun. at 1500Z. Evening MSPN meets daily on 3820 kc. at 2300Z. A1STN meets Tue.-Sat. on 50.4 Mc. at 0430Z and Sun. at 0200Z. Appointments renewed: WA0-JKT as Evening MSPN PAM. KOZZR as OO, K0ICG as Blue Earth Co. EC. KOZZR as Hennepin Co. EC. WA0EPX as ORS. K0ICG, WA0JKT, WA0MMV and W0TCK as OPS. W0TCK was the only one nominated as SCM so he was declared elected. New officers of the Rochester ARC are W0ZUN, pres.; K0VTV, vice-pres.; W9OPFV, secy.; WA0EJW, treas. K0ULJ received his WAS award in Dec. after waiting seven months for Maine. WA0JKT has worked about 1400 counties in the U.S. and has received over 100 awards so far. Dave needs only Traverse Co. to complete Minn. During a recent snow-storm nearly 40 cars were ditched on Hwy 61 near Duluth, including WOEMM/M. WA0EJW, unable to locate a wrecker, went to aid EMM. K0EFT, K0FCH and W0LTP maintained radio contact with them during this time. ARRL President, W0NWX being in St. Paul, dropped in on the Jan. meeting of the St. Paul ARC. Bad weather prevented the planned speaker from attending, so Bob gave an impromptu talk on League matters. K0SAZ has moved from Rochester to Windom. W0PFP, Ames, Iowa, gave a report of emergency v.h.f. operation in the Belmont, Iowa, area last Oct. at the Viking ARS meeting in Waseca. Traffic: (Jan.) W0EPX 298, W0ISJ 75, WA0JKT 70, WA0LAW 67, K0ORR 58, W0TCK 47, W0PET 45, K0OBI 42, WA0MMV 38, WA0EJN 29, K0ZRD 23, K0SRK 22, K0AQT/0 21, W0RHO 18, K0AKM 17, W0UMX 17, K0IGZ 16, W0KJL 12, WA0-HRM/9 11, WA0JPR 11, W0HEN 10, K0HP 10, WA0-DFT 9, WA0QAK 8, K0EFT 7, K0ICG 7, WA0LYK 6, W0ATO 5, W0SZJ 1. (Dec.) W0YX 146, WA0BY 80.

NORTH DAKOTA—SCM, Harold L. Sheets, W0DM-SEC: WA0AYL, OBS: K0SPH. The Forx Radio Club members held a Valentine dinner for their wives and sweethearts at the Westward-Ho Antler Room. The YL Weather Net had a workout during the January blizzards. W9OPPK has taken her code exam and sent for that Conditional exam. The Industrial Arts Dept. at the UND is setting up an amateur station consisting of a Drake 2B receiver, a Knight transmitter and a 14AVQ vertical. WA0PUD/7, who is doing graduate work at Arizona U. will be the trustee. W0CAQ is now a draftsman for a Fargo architect firm. WA0GRX is feeling fine again. K0SPH reports that the N.D. RACES now totals 146 members. W9QGN is a new Novice call in Bismarck. K0QYD has a new SR-34 and is mobile now. BARK, the Bismarck club, has a new SR-150. Code and theory classes have started with 25 prospective Novices. WA0-MSJ is act. mgr. WA0AT has a new doublet up so the HT-32 is getting out better on 75 meters. K0OVE changed to open wire feeders and an antenna tuner. WA0KSB has the new EICO keyer going. WA0HUD is going great guns on the traffic nets. K0ITP is in there

pitching too. W0DM reports the Valley Jr. High Radio club has started a theory class now that all prospective Novices have passed the code for the Novice test. ND-RACES reports 21 sessions, 943 check-ins, 194 messages handled; NDPON, 10 sessions, 126 check-ins, 33 messages, 126 stations reporting; ND Weather Net, 16 sessions, 447 check-ins, 15 messages. Traffic: WA0HJ 175, WA0-KSB 61, K0ITP 57, WA0EWW 46, K0SPH 36, K0MHB 16, WA0AYL 14, W0CCM 10, W0DM 10, K0PZK 7, WA0ELO 5, WA0AAU 2.

SOUTH DAKOTA—SCM, Seward P. Holt, K0TXW—SEC: W0SCT, RM: WA0AOY, K0BSW, at Madison is now net manager for the S. Dakota Single Sideband Net. Reports of good activity on v.h.f. are received from W0CUC and K0FKJ. New ECs appointed effective Jan. 1: WA0JUM, Campbell and Walworth Counties; WA0-CPX, Gregory and Tripp Counties; WA0PDE, Bennett and Washabaug Counties. K0TNM renewed for Faulk County. WA0AOY reports for the C.W. Net for Jan., 187 QNI and 11 QTC. Traffic: WOZWL 808, WA0AOY 70, K0ATE 51, K0VY 43, WA0LLG 42, WA0PDE 35, K0YGT 23, W0DJO 20, K0TNM 16, WA0MWN 11, W0SCT 8, WA0BMG 4, K0CAU 2.

DELTA DIVISION

ARKANSAS—SCM, Don W. Whitney, K5GKN—SEC: WA5KTX, PAM: WA5GPO, RM: W5NND, NMs: WA5-PPD, W5DTR, W5MJO and K5ABE, WA5KTX, who served the Arkansas section so ably for the past year as SEC, sends his letter of resignation which we acknowledge with regret. Don's resignation became effective Feb. 1, 1967. I am happy to announce the appointment of former SCM W5DTR, who will serve as SEC for the remainder of the term. The Eureka Springs Hamfest will be held again this year on May 6 and 7. I am looking forward to making this one for the first time. Net reports for Jan.:

Net	Freq.	Time	Day	Sess.	QTC	ONI	Net Time
RN	3815 kc.	0001Z	Daily	31	60	857	695 min.
AFN	3885 kc.	1200Z	Mon.-Sat.	26	12	774	1674 min.
OZK	3790 kc.	0100Z	Daily	31	87	328	641 min.
APON	3825 kc.	2130Z	Mon.-Fri.	22	122	404	660 min.

Traffic: (Jan.) W5OBD 838, W5MJO 130, W5NND 87, W5YM 68, W5CAF 61, WA5KEF 39, WA5CSJ 27, K5TYC 11, WA5KQJ 4, WA5NCJ 4, K5TYW 3. (Dec.) W5DTR 290, W5YM 198, W5OXU 83, WA5CSJ/5 18, K5ABE 17.

LOUISIANA—SCM, J. Allen Swanson Jr., W5PM—RM: W5CEA, V.H.F. PAMs: W5UQR, WA5DXA.

Net	Freq.	Days	Time	Net Mgr.
LAN	3615	Daily	0030Z	W5GHP
LaPON	3870	Sun.	1300Z	W5KIC
Delta 75	3900	Sun.	1330Z	WA5EVU

The BRARC's Annual Banquet and Hamfest will be held May 6 and 7. W5GZR is the proud papa of a 2nd jr. operator! W5EA just goes merrily along! W5AJY won 1st place for the 5th District in the CQ WW SSB Contest! WA5DES continues to send Official Bulletins. W5NQQ reports the showing in the La. QSO Party was excellent this year. Yours truly made 252 contacts. New officers of the LARC are W5NQR, pres.; K5ARH, vice-pres.; W5NQQ, secy.; WA5DNU, treas. WA5QVN reports K5HLO and others have started a club in Monroe. WA5LQZ ably represented La. on 15 during the party. W5BUB worked over 340 contacts. WA5HGX and W5BJG also were active in the Party. WA5BLG is the new pres. of the Jefferson RC. W5MXQ reports attendance is very good at each of the club's meetings. WA5DXA reports 2-meter f.m. was open to Florida during Jan. New officers of the GNOARC are WA5CST, pres.; WA5KIC, vice-pres.; WA5DZA, club EC. WA5KLF says school has curtailed his activities. W5CEZ is giving 2 meters a whirl with his antenna up 60 feet. W5PM and W5BUB spoke before the CARC in Houma on Chasing DX. Illness in W5AJY's family has curtailed his DX-chasing. The LARC has a large bunch on an informal net 3880 Sun. at 2000Z. We wish WA5KOI and WA5EDK all the best on their move to Texas. New officers of the OARC of Shidell are WA5FTD, pres.; WA5CKJ, vice-pres.; WA5LVW, secy.-treas. W5OYO and WA5QCX have been snagging some DX on 20. Incidentally, the OARC V.H.F. Net meets Wed. at 0130Z on 50.55 Mc. with good traffic-handling between St. Tammany and Orleans Parish. K5VJZ, W5BJG, W5GZR, WA5-LCO and W5MBC are new ORSS. WA5KLF is a new OPS. W5CEW has transmitter trouble. WA5CAU is back chasing DX. W5HKJ keeps the waves bouncing each morning on 3900. W5NO is secy. of the OOTC in N.O. K5KQJ has a new antenna. W5LDH reports that the Delta Division again leads the country in increased membership in the League. Traffic: (Jan.) W5CEZ 148, W5KRX 145, W5-MXQ 114, WA5DES 78, WA5LQZ 54, W5BJG 53, K5OKR

52, W5PGT 39, W5AJY 30, W5AFNB 28, W5EA 18, W5-GZR 17, W5AQVN 14, W5AKLF 12, W5ADXA 5, W5-IGR 5. (Dec.) W5GHP 325.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—SEC: W5JDF. The Mississippi Sideband Net had an exceptionally fine Semi-Annual Picnic at Lake Raymond. W5WMIQ was elected net mgr. and W5OKI asst. Hinds Jr. College presents courses in electronics to the Jackson Ham Club and other amateurs. W5OKI has a new 10-meter beam working fine. Many Mississippi hams worked WWV on their first day of operation. K2DEAI/5 has a new T4X to add to his Swan 350 mobile and is doing a fine job as OO, as are K5TJG and W5CKY. W42WBA/5 is an asst to our phone and c.w. nets. K5TYP has a new four-element 10-meter beam and new 14AVQ vertical. The Meridian Net, on 3818 kc. Sun, at 1330 CST, is growing under the leadership of W5ANLO. K5YGT and W5YCS are on again. W5ODV gives us a new outlet for traffic since moving to Olive Branch. W45JWD is having fun converting CB rigs to 10 meters, courtesy of Q8T. W5BW built an electronic keyer and is having fun changing from his old Vibroplex. Traffic: W5OKI 82, W5BW 21, W5-EMM 12, W45JWD 11, W5ACAM 2.

TENNESSEE—SCM, William A. Scott, W4UVP—SEC: K4RCT, RM: K4UWH. PAMs: W4PFP, W44-EWW, W4ACGK.

Net	Freq.	Days	Time	Sess.	QNI	QTC	Mgr.
TSSB	3980 kc.	Tu-Su.	0030Z	26	1627	261	
TPN	3980 kc.	M-Sa.	1245Z	31	1147	224	
		Sun.	1400Z				
ETPN	3980 kc.	M-F	1140Z	22	394	29	
TN	3635 kc.	Daily	0100Z	56	325	32	
			0230Z				

Congrats to W4OGG on making the BPL again. The Memphis Hamfest May 20-21 promises to be the best yet with all three clubs working to make it so. Johnson City RA officers are K4UWH, pres.; W4UVP, vice-pres.; W4CXM, treas.; W4UVY, secy.; W4BEHK, act. mgr. The best wishes of the section goes to W4YAU as he joins the Hq. Staff in Newington. W4HHK reports sun noise of 5.6 db for Jan. high preceding the aurora of the 7th. Dec. high was 4.75. The Knox County and Oak Ridge 6-Meter Emergency Nets are considering consolidation. All appointees are reminded that activity reports are due the 7th. AREC in Tennessee now numbers nearly 550. Send your applications to your EC, K4RCT or W4UVP. Traffic: W4OGG 431, W4URU 383, W4FX 140, W4POP 115, W4AYDT 112, K4UWH 100, W4SQE 88, W44YEM 73, W4UVP 68, W4DIY 63, W4CXY 39, K4UMW 39, W4MXF 32, W4PFP 29, W4MCC 16, W44EWW 11, W4VJ 9, W44NEC 8, W4TYV 8, W4TZB 5, W4AZBC 5, K4MQI 2, W4SGI 1.

GREAT LAKES DIVISION

KENTUCKY—SCM, Lawrence F. Jeffrey, W4KFO—SEC: W4OYL. Appointment: W44FM/5 as EC, District 4. Endorsements: W4ADH as OPS and OBS; W44GHQ as OVS and PAM, W4ATTE as ORS.

Net	Freq.	Days	EST	Sess.	QNI	QTC	Mgr.
FMKPN	3900	M-F	0630	21	396	55	K4KIS
MKPN	3960	Daily	0830	25	200	39	W44KFO
KTN	3960	Daily	1900	31	831	247	W44AGH
KYN/KSN	3600	Daily	1900/1700	49	356	392	W4BAZ
KPON(Dec)	3945	Sat.	1300	5	101	75	W44AVV

We are sorry to report the death on Feb. 6 of W4TFK, of Frankfort, Ky. Johnny was one of the best-known amateurs in Kentucky and probably the friendliest. He probably was best known on 3932 kc. with the Corn Cracker Net and was a former SEC. He was a former mayor of Frankfort and was active in civic and state affairs. And now it's de W4TFK SK. A traffic net meeting was held in Louisville Jan. 22. All nets were represented with over 50 present. Thanks to W4BAZ for handling all the arrangements. W44WWT now has his 35-w.p.m. certificate. K4GOU is handling the Falls City Area Net. W4ADH reports MARS activity. K4KZH reports that the FCATN had 9 sessions, QNI 46 and QTC 43. K4PFW is active in six v.h.f. nets. W4JSH has an active AREC group now in Lexington. Traffic: (Jan.) W44WWT 548, W44DYL 253, W44AGH 177, W4BCY 157, W4BAZ 106, W44KFO 93, W44VUE 83, W4CDA 50, W4B4TM 49, K4MAN 49, W44ZIR 40, W44GHQ 38, K4-TRT 35, K4GOU/4 34, W44GMA 33, W4RCE 31, W44UAZ 27, W4NEZ 26, K4HOE 21, W4YOQ 14, K4VDO 12, W4-KJP 8, W4BTA 5, W4JUI 5, K4UMN 5, W4BAFH 2. (Dec.) K4KZH 56, K4GOU/4 48, W44UAZ 18.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—Asst. SCM: K. E. Stecker, W8SS. SEC: K8GOU, RMs: W8ELW, K8QLL, W8EWR, K8KMQ. PAMs: W8CQU, K8-

LQA, K8JED, V.H.F. PAMs: W8CVQ, W8YAN. Appoint-ments: W8EFZ, W8GAI, K8IGQ, K8KJL, W8QCQ as ECs; W8HQL, W8MBH, K8VEX as OVSs; W8AUD, W8ADN, W8UW, K8QKY, W8UM, W8WUO as ORSs; W8FSZ, K8JJC, W8APH, W8SS, W8SWF as OFSs; W8SS, W8SWF as OBSs; W8VPC as OO. Net reports:

Net	Freq.	Time	Day	QNI	QTC	Sess.	Mgr.
QMN	3663	2300	Dy	1051	504	62	W8ELW
WSSB	3935	0000	Dy	1025	114	31	K8VDA
B.R.	3930	2230	M-Fri.	1214	136	22	K8JED
PON(e.w.)	3545	0000	M-Sat.	151	37	26	VE3DPO
PON(Day)	3860	1600	M-Sat.	651	389	26	W8OGR
MICH.6	50.7	0000	M-Sat.	299	87	26	W8LRC
U.P.N.	3920	2230	Dy	793	64	31	W8QQH
M.E.N.	3930	1400	Sun.	320	18	5	K8JED
SW MICH2	145.26	0100	Mon.	91	2	5	W8CVQ
QCWA	3900	1300	Sun.	—	—	5	W8CAM

New officers: Metro Raghewers Club—W8CXs, pres.; K8PUS, vice-pres.; W8AQPN, secy.; W8CXs, act. treas.; W8XU, K8JKU, K8UOF, board. Grand Rapids ARA—W8DNX, pres.; W8AGY, vice-pres.; W8AAT, treas. Sag. Valley ARA—W8GRI, pres.; W8KNB, vice-pres.; W8ORO, secy.; K8LNR, treas.; K8LH, W8LNE, K8SWQ, board. Van Buren County ARC—W8RWK, pres.; W8QHI, vice-pres.; W8AQPO, secy.; W8QGV, treas. Genesee County RC—W8ANPV, pres.; W8LNL, W8IFK, K8GOW, vice-pres.; W8BQO, secy.; K8KML, treas. Detroit ARA—K8DYI, pres.; W8MGQ, vice-pres.; W8AVGA, secy.; W8FBH, treas.; W8LEU, K8XJ board. Plymouth RC—W8MJT, pres.; W8GLH, vice-pres.; W8QCV, secy.; W8TEA, treas. Cent. Mich. ARC—K8-BZV, pres.; K8NOP, K8ETU, K8HKM, board. Silent Keys: K8IWI, K8LKA, K8DYI and K8HRE are hospitalized because of heart attacks. W8GKK is out of the hospital. K8PBA is going back to college. K8UZ/G's XYL, W8SCHH/O, gave him a new son. W8HDF/8 also has a new jr. operator. W8SSKU, who is paralyzed except for 2 fingers, got his Conditional. W8TUE made General. K8NJW is working in Hawaii. W8RHD was in the hospital. W8CZJ activated the 6-meter emergency net during a heavy snow fall. W8DSW has a new SR-42A transceiver. W8ASX is in California with the Navy. W8HID has a top-loaded vertical on 160. W8EX is "gramps" for the fifth time. K8BMC is in the Veterans Hospital. W8HGC is in the Navy; W8NBD is in the Marine Corps. W8ATC is chief engineer at WERX. K8-IQY finished at Mich. Tech. K8ZSM has the new SB-100 working. W8UBAB is now Conditional. K8RRD is working 2-meter s.s.b. W8IXD now works for a corp of engineers. On Jan. 27 and 28 the B.R. Net went into emergency operation during a snow storm for 21 hours with 387 check-ins, 58 messages, and over 100 phone calls. K8YEK is looking for R.I. and Vt. for WAS-RTTY. Traffic: (Jan.) K8KMQ 290, W8OGR 207, W8IWF 195, W8UC 160, W8HQL 147, W8AIA 121, W8VAN 108, K8-PBA 92, W8AMCQ 90, W8LXY 89, K8ZJU 79, W8TU 78, W8FX 78, W8AAQ 75, W8LRC 66, K8GOU 60, W8-MAM 54, W8RTN 54, W8ELW 50, W8BZE 45, W8CZJ 44, K8HSJ 43, K8JED 37, K8VDA 36, W8CQR 32, W8PRO 29, W8AENW 28, W8AXF 27, K8KRX/8 25, W8QOK 25, W8CQB 24, W8ORC 24, W8OQH 20, W8UFS 15, W8SCW 14, W8WV 14, W8MRM 12, W8NOH 12, K8TYK 12, W8AMGM 11, K8MJK 11, W8PTM 11, W8-TBP 11, W8DSE 10, W8AGTM 10, W8APWF 8, W8-OLD 6, K8YEK 4, W8AAM 2. (Dec.) K8GOU 114, K8YGH/8 51, K8HSJ 33, W8AXF 24, W8DSE 15, W8N-VHG 15, W8HRT 2.

OHIO—SCM, Wilson E. Weckel, W8AL—Asst. SCM: J. C. Erickson, W8DAE. SEC: W8OUU. RMs: W8BZX, W8DAE and K8LGB. PAMs: W8VUZ and K8UBK. The Fifteenth Annual Ohio Party will be held Apr. 29 and 30. This Ohio intrastate contest is sponsored by the Ohio Council of ARCs and the logs must be submitted to K8-HDO by May 30. Mt. Vernon ARC's *K8EEN Newsletter* tells us 1967 officers are W8UMH, pres.; W8DMM, vice-pres.; W8OTF, secy.; W8QJH, treas.; W8CPU, W8-PEN, K8LFA, W8KNP, directors. Officers of The Treaty City ARC are W8AQO, pres.; W8KZR, vice-pres.; W8AQD, secy.-treas. Meetings are held the 1st and 3rd Thurs. Parma RC's *P.R.C. Bulletin* informs us 1967 officers are W8CZM, pres.; W8OYP, vice-pres.; W8NPLC, secy.; K8ZTO, asst. secy.; K8BYQ, asst. secy.; K8JZI, treas.; W8SCGH, asst. treas. U.S. Army Signal School communications electronics extension courses are available free of charge to Ohio MARS (Army) members. Contact W8QCU for information. The Inter-City RC has started its Novice classes. Buckeye Rag Chewers Club officers are W8BU, pres.; W8ANTW, treas.; W8-DAH, vice-pres.; W8OKI, secy. The Six Meter Nomads' *The Amateur Extra* tells us club officers are K8VIL, pres.; K8PXR, vice-pres.; W8GRE, secy.; K8AJG, treas.; W8CWL, W8GFV, K8VGF, trustees. Sunday Noon Naggers Net's officers are W8ARIV, pres.; W8-

CGY, vice-pres.; WA8SMZ, secy.; WA8SOG, treas. From Canton ARC's *Feeding* we learn that W8SWB moved to California. WA8NCK is at Great Lakes Naval training station. WB2PYV moved to Hartsville. W8FON has a new SB-100 transceiver. W8FMW, W8UNE and K8PRR were in the hospital. W8WEG says W8LEV is conducting classes each Wed. night at the Naval Reserve Armory to the Lima Area ARC. Toledo's *Ham Shack* *Cross* says WA8VH received his General Class license; WA8RZQ, WA8SCK and WA8VBH received their Tech. Class licenses; WN8TIV and WN8VKN are new Novices; W8KIX has a new baby girl, K8BAT and K8WDZ took a short trip to Florida. Geona RC's officers are W8SUD, pres.; K8VH, vice-pres.; WA8UEF, secy.; W8KDK, treas. and K8LRJ, WA8CTS trustees. Toledo Mobile RAs 1967 officers are K8TZ pres.; WA8LJU, vice-pres.; WA8ANF and W8LNV, treas.; WA8RPL was in the hospital; St. Lawrence Seaway Two Meter Net's officers are K8QFT, mgr.; WA8FSL, asst. mgr.; WA8NPG, secy.; and WA8CEL, asst. secy. Westpark Radiops is celebrating its 20th anniversary. Columbus ARA's *Caroscope* tells us the club heard a speaker from Ohio State U. talk on communications in Viet Nam. Massillon ARC's *MARC News-sheet* informs us W8OYL returned from the Philippines. K8QEL moved back from N.Y. K8EJV moved to Cuyahoga Falls and K8EKG is in the insurance business. Cincinnati ARA's *The Mike & Key* has a cover picture of WA8DAK and a large picture of Cincinnati Police Chief W8PFX, along with K4CL (ex-W8BTI), W8JIN, W8JJW, W8CEG and W8ZCT. W8LZE was hospitalized. Piqua RC's officers are WN8UW, pres.; K8OGN, vice-pres.; W8WKN, secy.-treas. W8RZX spoke on traffic to the Miami County ARC. Appointments: WA8PMN and WA8PZA as ORSs, K8ONA and WA8RYC as OBSs, WA8KUY as OPS, WA8PJK as OVS, K8DDG has a 75A-4. W8OUU is our new SEC. K8BXT says Warren ARA's officers are WN8SRB, pres.; W8HCL, vice-pres.; K8BXT, secy.; WA8ABF, treas.; W8KDG, trustee. WA8VHV has a new Swan 350. WA8UKJ is in North Jackson, ex-K8AUU, now WA8VHF, has a new Swan 350 and WN8VBS is a new Novice in Warren.

Net	QNT	QTC	Sess.	Ave.
OLN		31	4	
BN		170	24	7%
OSSB	1840	324	57	14.4%

Traffic: (Jan.) W8UPH 412, WA8CFJ 266, W8NAL 261, W8CHT 245, WA8SHP 231, K8LGA 222, W8DAE 143, WA8PZA 136, W8OCU 132, WA8FSX 127, WA8OCG 123, W8RZX 94, WA8SED 69, W8OUTU 66, W8GOE 65, W8TV 62, W8OE 61, WA8RWK 61, W8PMJ 57, WA8LAM 51, WA8NTA 51, W8FGD 50, K8BYR 48, K8EJZ 36, W8CXM 32, W8LZE 32, WA8PQL 22, W8CEZ 28, K8DEJ 27, K8LGB 27, W8GIU 22, K8LFI 22, WA8MHO 21, K8BXT 20, WA8FJN 19, W8WEG 18, W8LAG 17, W8QXQ 15, W8LT 13, W8GVX 11, K8DDG 10, WA8AJZ 7, K8QYR 7, W8ONQ 2. (Nov.) W8OE 85.

kc. nightly at 2300 GMT. Appointment: WB2FXB as EC. Endorsements: W2HO and W2HZZ as EC; W2HZZ as OBS. WB2HZZ won the most valuable station award on NYS for 392 sessions; also, W2VANV was runner-up for high reporting station. W2RUF, mgr. of NYS, reports a slow-speed net training session each Sat. on 3670 kc. at 1730 local time for phone operators and others wishing to learn how to handle traffic. All are welcome. Nice to report the Overlook Radio Society of Kingston and Hastings H.S. Club as new affiliates. Welcome to our family of clubs. The Cadet Club of West Point, W2KGY, is handling traffic on the NYSPTEN for the entire cadet body. A mid-year season dinner was the feature at the Albany Club; while W1HDQ was the speaker. Not to be outdone, W1HDQ also was the attraction at the Schenectady Club. In New Rochelle, the club featured a power tube film from RCA. Its new club officers include WB2GMN, pres.; WB2NVJ, vice-pres.; K2SJN, secy.; W2YLE, treas. The RPI Club, W2SZ, reports a new rotator on their 55-ft. tower and plenty of help during the V.H.F. Contest. WB2SFD is a new Conditional. Just notice all those WB2 calls in the traffic listings; our newcomers really are public-service-minded. Traffic WB2UHZ 348, WB2HYZ 136, WA2VYS 80, W2ODC 70, K2LKI 55, K2SJN 54, K2SSX/2 51, W2EAF 39, WB2JYV 23, WB2FOA 19, WB2SHU 17, WA2WGS 17, WB2ANV 11, WA2ZPD 7, K2JINW 5, WA2HGB 4, WB2QYZ 4, WB2UEQ 4, WB2FXB 3, WB2RBG 3.

NEW YORK CITY AND LONG ISLAND—SCM.
Blaine S. Johnson, K2IDB—Asst. SCM; Fred J. Brunjes, K2DGI. SEC: K2OVN, PAM; W2EW. Section nets:

NLI	3630 kc.	1915 Nightly	K2DXV — RM
NLIVHF	145.8 Mc.	2000 TWTH	WB2RQF — PAM
NLIVHF	146.25 Mc.	1900 F85M	WB2RQF — PAM
NLIPN	3932 kc.	1600 Daily	WB2SLH — PAM
NLS(Slo)	3630 kc.	1845 Nightly	WB2UQP — RM

Listen, the Rockaway ARC's Annual Auction will be held Apr. 14. (April 7th was erroneously given earlier). It's at American Irish Hall, Beach Channel Drive at 81st St., Rockaway Beach, starting at 8 p.m. WB2QIL made the RPL. WB2RBA reports with a tear in his eye that he needs a new keyer, a new transmitter, a new antenna and a new typewriter that can spell! K2UBG says Jan. was very dull traffic-wise and to keep from getting bored he kicked the dickens out of the ARC-1 and it started to play for the first time in some moons. WB2UQP, brand-new RM for NLS, figured he better tack a piece or two of wire onto his Lazy Don antenna to increase the efficiency down there in NLS-land. WB2PTS skips on the Farmingdale Track Team. W2GKZ started the inhabitants of 6 and 160 meters recently by showing up there and exclaiming, "It's a lot of fun!" WB2SLH says, "Official Phone Station appointment is a fine achievement." Hey, didja see the write-up in Feb. '67 QST "YL News and Views" on our own WA2GPT? WB2PYI did an FB job on the basic information for the article. W2EW reports you guys didn't try too hard in Jan. on the liaison v.h.f. to h.f. bit on the traffic nets. He had to refile as much as 44 pieces of traffic onto the MARS nets because liaison wasn't there. Are we traffic guys gonna let them continue? WB2NGZ is now on 2-meter RTTY. WA2UWJ made a trip to Montreal and says the hams are going all out for EXPO '67. WB2JJW is doing a good deal more phone work nowadays. W2PF reports that W2RSC and W2CCD are working hard on the reorganization of the Radio Club of Brooklyn. A rogue Antenna-Fink absconded with the WB2BKS apartment roof-type AR-22 driven 5-stick 2-meter beamer. WB2ASR has a new Heathkit color TV going like the dickens. The rig coughed a couple of times and quit for most of the month over at WB2TZX. K2DGI heard from K2DDK, who has a new SB-301 and is hearing stuff he never heard before. On the other hand, the W2CB RME-70 was getting hard-of-hearing and is in for a tune-up. W2LDQ sends code practice for the Wantagh RC every Mon., 2000-2100, on 147 Mc. WA2JKX is sending it every Thurs., 2100-2130, on 145.64 Mc. WB2AWX is looking for more stations on the Kings 23.62-Mc. AREC/RACFS Net Mon. at 2030. WB2EXI put a Clegg Venus on 6 and a 14 AVQ on the lower bands. The Massapequa ARC is newly organized with WB2MPP, pres.; WA2PAL, vice-pres.; WB2IUR, secy.; W2OBF, treas.; WB2RND, act. mgr. The first project for MARS is a TVI Committee under K2PQY. The Jericho ARC also is newly organized with WN2YUM, pres.; WB2RYZ, vice-pres. The first project for the JARC is the licensing of all members. New officers of the Staten Island ARC are W2VKE, pres.; W2EUY, treas.; K2USX, secy. Traffic: (Jan.) WA2UWA 492, WB2RBA 231, K2UBG 191, WB2QIL 137, WB2UQP 137, WB2PTS 100, W2GKZ 94, WB2SLH 65, WB2DVK 59, W2EW 59, WA2LJS 54, WB2RQF 54, WB2HLX 50, WB2AEK 35, WB2NZL/UJX 35, WB2NGZ 33, WB2JIN 32, WB2TZX 31, WB2DXM 25, WB2MBU 24, WA2UWJ 23, WB2TCS 22, WB2YUV 18, K2UFT 16, W2EC 15, WB2DBQ 14, WB2UEZ 14, WB2FAJ 12, WB2JJW 12, WB2UGP 11,

FIFTEENTH OHIO QSO PARTY

April 29-30, 1967

All Ohio amateurs are invited to take part in a QSO party, sponsored by the Ohio Council of Amateur Radio Clubs.

Rules: 1) The party will begin at 2300 GMT Saturday April 29 and end at 2300 GMT April 30. 2) All types of emission and all bands may be used, but a station may be worked only once regardless of mode. A maximum of ten stations may be worked in a single county. 3) The general call will be "CQ Ohio." 4) Scoring: Multiply the number of Ohio stations worked by the number of Ohio counties contacted. Logs should include calls of stations worked, time, date and the county in which the station is located. 5) Suggested frequencies are: 3545, 3740, 3860, 7095 and 7250 kc. On the other bands, take your choice. 6) A cup and four appropriate certificates will be awarded to the highest scoring stations. 7) All contest logs must be postmarked not later than May 30, 1967, and should be sent to the contest manager, Miss Karla Habel, K8HDO, 81 West Main Street, Westerville, Ohio 43081.

HUDSON DIVISION

EASTERN NEW YORK—SCM. George W. Tracy, W2EFU—SEC; W2KGC, RM; WA2VYS, PAM; W2JIG. Section nets: NYS on 3670 kc. nightly at 2400 GMT; NYSPTEN on 3925 kc. nightly at 2300 GMT; ESS on 3590

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The development of the BH rectifier, which helped make radio a reality, was a Raytheon achievement. Raytheon's many engineering and production breakthroughs—with magnetrons, miniature and subminiature tubes—are well known throughout industry. So, too, is Raytheon's extensive experience with complex electronic systems for the U.S. government—such as the Hawk and Sparrow missiles, and the guidance system for Apollo space vehicles.

Part of the answer lies in continuing adherence to the highest engineering and production standards—which guarantees electronic components having the utmost reliability.

In many cases, Raytheon specifications are even more stringent than military requirements. For example: Raytheon frequently requires 1,000-hour live tests whereas military requirements may call only for 500 hours of testing.

Another example: Raytheon is especially concerned with high-and low-line operation. All horizontal amplifiers must provide full scan

at 100 volts and extremely long life at 130 volts. Tests of 11 volt tubes (and similar tests for heater ratings) are conducted by Raytheon even though they are not required by the military.

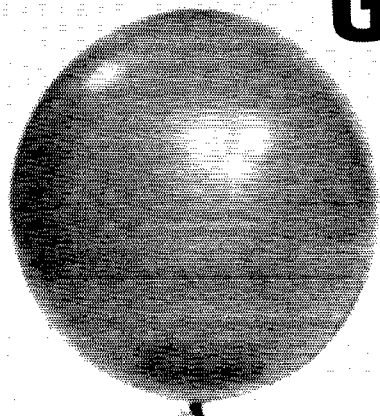
For more information about Raytheon receiving tubes, write to Raytheon Company, Receiving Tube Operation, Fourth Avenue, Burlington, Massachusetts 01803.



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 Kit HP-13, Mobile Power Supply, 7 lbs. \$64.95
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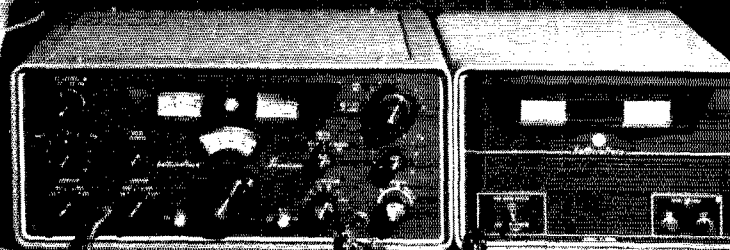
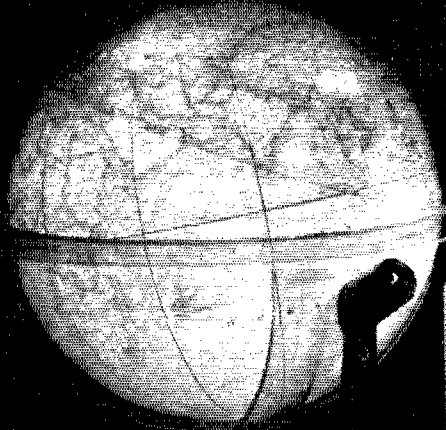
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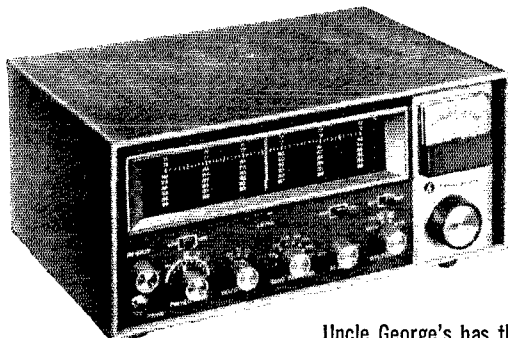
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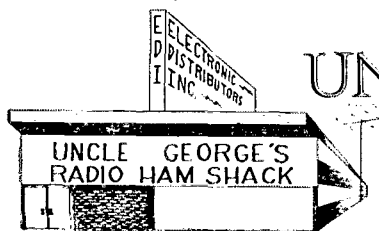
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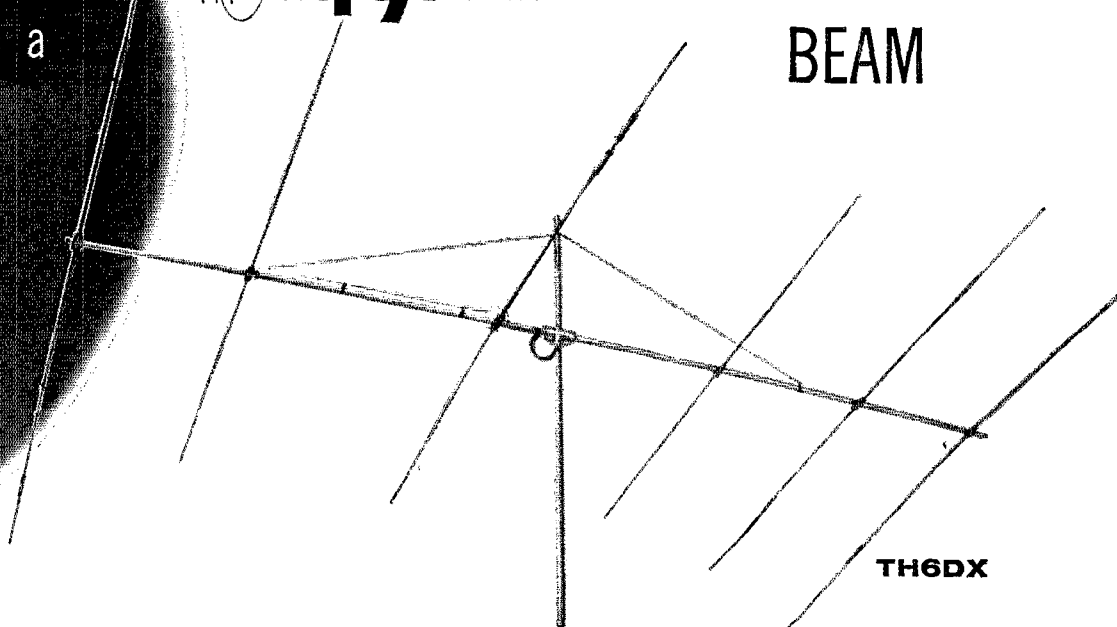
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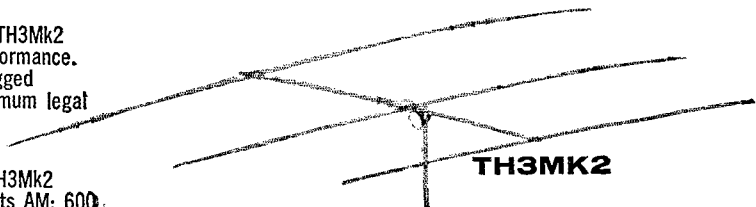


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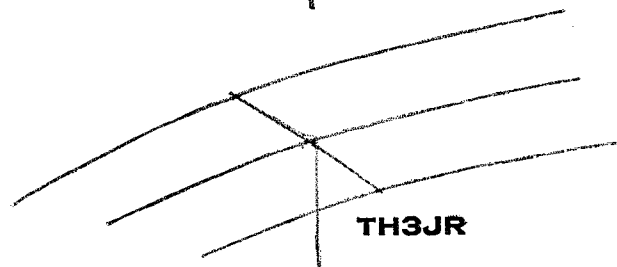
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NORTHERN NEW JERSEY—SCM, Louis J. Amoruso, W2LQP—Asst. SCM, Edward F. Erickson, W2CVW. SEC: K2ZFL. ARPSC Section Net Schedules:

NJN	3695 kc.	Daily	7:00 P.M.	WA2KIP RM
NJ Phone	3900 kc.	Ex Sun.	6:00 P.M.	W2PEV PAM
NJ Phone	3900 kc.	Sun.	9:00 A.M.	W2ZI PAM
NJ 6	51,150 kc.	M-W-Sat.	11:00 P.M.	K2VNL PAM
NJ 2	146,700 kc.	Tue-Sat.	10:00 P.M.	K2PTZ Mgr.
NJ P.O.	3900 kc.	Sun.	6:00 P.M.	WA2TEK Mgr

All times shown local. AREC Net skeds are available from SEC K2ZFL. New appointments: WB2UFV and WB2RKK as ORSs. Endorsements: W2DMJ as EC Wood-Ridge and Vicinity; K2AGZ as QC. Newly-elected officers of the Land-Rovers ARC (W2FCL) are WB2RUM, pres.; K2ZOQ, vice-pres.; WA2UJ, secy.; WB2ZGX, treas.; WB2VE, trustee. W2VMX and K2LEO arranged a 6-meter bedside station for WB2HWF, who is currently recovering from an auto accident. WA2ASM got his last missing county in the recent N.H. QSO Party. WB2TQK bought an HQ-170. WA2RDY built a new linear from a recent issue of QST. WA2BNF made the A-1 Operator Club. WB2QJ built a new EICO keyer and reports it works FB. WB2YON is now on 2 meters with a Gonset 11. WB2LQ is on with a new Swan 350. WA2UUU is at the Loring AF Base in Maine. WN2YMH, a new ham in Teaneck, has 11 states and a KP4 with his 20 watts. WB2OEH and WB2AEJ have been slowed down by school work. WB2FUW is at Bucknell and gets on occasionally from the club station, W3RFB. WB2KTO finished his 813 20-meter linear. His 176 DXCC total includes 96 on s.s.b. WN2YPQ reports into three different traffic nets. WB2PXO is using 8 over 8 with his Gonset IV. WB2UFV is adding new equipment to facilitate his traffic-handling. K2IEF, who completed the HBR-13 receiver, is now adding a homebrew all-band s.s.b. exciter to his shack. W2LQP and Director W2TUK had an FB time at one of the North Jersey DX Club meetings. This group is to be congratulated on the job they do in mailing out the 20,000 DX QSL cards received each month. W2QNL reports his RTTY converter is working OK. K2ZFL and I would like to hear from some of you who would be interested in an EC job. We need more help in this area. How about it? It doesn't take too much time. Traffic: (Jan.) WB2OEH 221, WB2VWH 181, K2-VNL 88, WB2UFV 75, WB2RKK 71, WA2TEK 62, WB2YO 57, W2LQP 54, WB2SEZ 46, WA2TAF 37, W2PEV 32, WB2JWB 31, WB2VE 27, WA2TBS 26, WB2UIR 19, WA2SRK 17, K2MFX 16, K2ZFL 16, WA-2IGQ 15, WB2TKP 15, WB2SSZ 14, WA2KZF 12, WB2PXO 12, K2EQP 11, WN2YPQ 10, WR2NZU 9, W2DRV 8, WB2BCS 7, WB2QGB 6, WA2CCF 5, WB2-UOQ 5, W2EWZ 1 (Dec.) WB2QJ 20, K2EQP 15, W2TFM 15, WB2AEJ 6, WB2KTO 3, WB2FUW 2. (Nov.) WA2CCF 22, WB2FUW 13, WB2AEJ 8. (Oct.) WB2AEJ 25.

MIDWEST DIVISION

IOWA—SCM, Owen G. Hill, W0BDZ—Asst. SCM: Bertha V. Willits, W0LGG. SEC: K0BRE. PAM: W0NGS. RMs: W0TIU, W0SCA. QO reports were received from K0AZJ and W0DRE. W0ONG participated in the Frequency Measuring Test in Dec. W0EIT is changing his final to a 3-400Z. WA0OTA now has a new 1X-62 and quad on 6 meters. W0PFP reported wide-spread aurora effect on 50 Mc. Jan. 7, and again on Jan. 14. It reminds him of 1957-58. W0JAQ sends Official Bulletins as follows: M-W-F, 3975 kc. at 1825Z. K0AHP is the new president of the Sioux City Amateur Radio Assn. W0BDZ now has the additional call of W0LGY. Lee Co. was on duty after the tornado in the Ft. Madison area Jan. 24. Clubs are reminded to send election reports as well as other news items. Don't forget to send in your certificates for endorsement. The Iowa 160-Meter Emergency Net reports QNI 873, QTC 9 in 31 sessions. Iowa 75-Meter Phone Net reports QNI 1399, QTC 195 in 26 sessions. Traffic: (Jan.) W0LGG 1439, W0LXC 481, WA0DYV 48, W0CZ 44, WA0JUT 30, K0TDO 27, K0ZCQ 24, W0DDW 22, WA0JEG 18, K0BRE 17, K0TFT 16, W0YLS 15, W0JPI 13, WA0IYH 12, WA0AFY 10, WA0AMT 8, WA9RCS 4, W0GQ 4, W0NGS 4, W0JAQ 2. (Dec.) WA0JEG 172.

KANSAS—SCM, Robert M. Summers, K0BXF—SEC: K0EMB. PAM: K0JMF. RM: WA0MIE. V.H.F. PAMs: WA0CCW, W0HAI, WA0KSK, WA0LSH. Wx Net Mgr.: WA0LJC. KWN reports for Jan., QNI 605, QTC 6. K EC Net, QNI 77, QTC 13. Zone 7 AREC Net, QNI 34. Zone 10 AREC Net, QNI 64, QTC 1. Zone 11 AREC Net, 75 meters, QNI 183, QTC 8. 2-Meter Net, QNI 20, QTC 4. Zone 13 AREC Net, QNI 70. Zone 15 AREC 75-Meter Net,

QNI 70, QTC 1. The repeater station in Salina was reported on the air from 4:30 A.M. to 10:30 P.M., 146.90 Mc. The correct date of the CKRC Hamfest is June 11. The repeater in Topeka should have resumed operation with a few changes, two output frequencies 146.94 and 146.82. Normal input frequency is 146.84, plus an additional command channel. The Kaw Valley Radio Club elected W0JLY, pres.; K0BJF, vice-pres.-treas.; K0BAU, secy. The Fourteenth Hamfest of the III Plains Amateur Radio Club will be held Sun., May 21 at the grade school in Plains. The Jayhawk Amateur Radio Society, Kansas City, Kans., has officially announced Apr. 23 as its hamfest date, with activity centered around the Ag. Hall of Fame Site, Bonner Springs. WA0CCW, reported that the North Central V.H.F. Society had a net in operation during Jan. with QNI 97, QTC 10. Also Zone 15 EC K0UVH has a 6-meter net on 53,360 Mc. Sun. at 0900 CST and passed 79 pieces of traffic in Jan. Zone 7 AREC 2-Meter Net reports QNI 39, QTC 2 and the Coffeyville AREC Net QNI 55. EC W0FII Zone 7 also announces Zone AREC nets meet Sat. at 2 P.M. on 3925 kc. and 145.1 Mc. Sun. at 7:30 P.M. QKS Kansas C.W. Traffic Net on 3610 kc. daily at 1900 CST, reports QNI 250, QTC 160. Kansas PI Net reports Dec. QNI 56, QTC 6; Jan. QNI 89, QTC 8. Note the frequency correction and time, 145,340 at 2105 CST Sat. Kansas Phone nets report QNI 321, QTC 50; and the Kansas Sideband Net QNI 737, QTC 190, both on 3920 kc. Traffic: K0MRI 271, WA0MLE 214, K0YRQ 125, K0GZP 110, WA0LJC 95, K0JMF 90, W0AVX 80, K0BXF 79, K0UVH 57, K0EMB 50, WA0HZD 47, WA0CCW 44, WA0JOG 34, K0JDD 28, K0KED 22, K0LPE 20, W0INH 19, W0FII 13, K0-MZZ 11, WA0EMQ 9, W0KSY 9, WA0HMZ 8, K0GII 7, W0FDJ 4.

MISSOURI—SCM, Alfred E. Schwaneke, W0TPK—SEC: W0BUL. WA0LOG is a new OPS. New officers of the St. Louis ARC (K0LIR) are W0UCK, pres.; WA0EFB, vice-pres.; WA0KMF, secy.; K0HUO, treas. New officers for the PHD ARA are W0AMO, pres.; K0IQS, vice-pres.; WA0QLN, secy.; K0SPE, treas.; WA0KUH, act. mgt. Officers of the Mid Mo. ARC (Jeff. City) are K0ETY, pres.; K0JJS, vice-pres.; WA0NGC, secy.-treas. WA9KXXV is now WA0QLN. WA0HGL is now a Silent Key. K0DYM received his Extra C1 license. With the January issue of the HARC (K.C.) newsletter W0TFQ completed over 15 years as editor. WA0IQB is 4644 for WAS. WA0CHH is going to Costa Rica. K0SPE and K0IQS operated a c.d. van in Orrick after the tornado, and WA0KUH operated the c.d. station at Liberty. Other PHD Net members aiding in tornado traffic were W0AMIO, WA0QLN, W0DIX, W0GYX, and W0KHT NCSs for MEN are W0BUL, WA0BWW and W0KWC. NCSs for MON are WA0FMD, W0TDR, W0OOD, WA0PYI, K0ONK and K0YGR. K0UCG, the father

MISSOURI QSO PARTY

April 29-May 1, 1967

The Northwest St. Louis Amateur Radio Club, KOAXU, invites all amateurs to participate in its 4th Missouri QSO Party.

Rules: (1) The contest period starts at 2300 GMT Saturday April 29 and ends at 0300 GMT Monday, May 1. (2) No time limit or power restrictions. (3) Missouri stations count 1 point per contact and multiply total by the number of states, provinces and countries worked. All others count 2 points per Missouri contact and multiply by the number of different Missouri counties (possible 115). (4) The same station may be worked on more than one band (phone or c.w.) for additional credit. (5) Suggest frequencies 3520 3950 7025 7225 14050 14330 21050 21350. For Missouri contacts April 30; check 3950 at 0300, 7225 at 1600 and 14330 at 2000. (5) The general call will be CQ Mo. c.w. and calling Missouri on phone. (6) Information required to exchange: QSO number, signal report, Missouri county (or state province or country outside Missouri). (7) Certificates will be awarded to the 5 high Missouri stations and, additionally, to the highest scoring individual in each state province and country (5 QSO minimum). Awards will also go to the 3 highest clubs in the world and a trophy to the single operator high scorer inside and outside Missouri. (8) Logs and scores must be in by May 31, 1967 and sent with SAE or SASE to Bud Riegert, KOYIP, 1927 S. Compton, St. Louis, Mo. 63104.

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SPECIFICATIONS:

- Measures 2 3/4" x 4" x 7" (excluding lens and connectors).
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- Operates on 100-130 volts 50 or 60 cycles, 7 watts.
- Tested at 10° to 125° F.
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of KOGSV, has a TR-3 on 80-40-20. WAQJH has a new Galaxy V. OO reports were received from KOGSV, WQQWS and KOYIP: OVS reports from WAQITU and WAQJRP. Net reports for Jan.:

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mar.
MEN	3885	2330Z	M-W-F	13	269	25	W0BUL
MON	3585	0100Z	Daily	31	213	294	W0TDR
MNN	7063	1900Z	M-Sat.	26	92	20	W0UOD
MoSSB	3963	2400Z	M-Sat.	26	611	133	K0TCB
MoPON	3810	2100Z	M-F	21	278	211	W0HVI
MTTN	3040	2300Z	M-F	21	245	65	W06ELM
GMO	3580	2200Z	Sun.	5	30	9	W0AFDR
MSN	3715	0300Z	Daily	31	47	12	K0ONK
PHD	5043	0130	Tues.(GMT)	5	91	8	W06FLN
HBN	3880						
	7280	1805Z	M-F	22	536	212	W06BHG

Traffic: (Jan.) KOONK 4191, KOAEM 229, W0TDR 215, W0EEE 195, W0APYJ 194, K0RPH 192, W0ZLN 173, W0HVJ 131, W0UOD 120, W0AJH 83, W06FLN 49, W0AFMD 41, W0BAZ 31, W0ALYE 24, W0BUL 23, K0TCB 23, W06HQR 21, K0ORB 19, W06ELM 16, W0AFKD 15, K0VH 14, W0QGR 12, W0QGT 11, K0ENH 7, W06HIV 5, K0GOB 4, W06CH 3, W0BVL 2, (Dec.) W0QDGG 10, (Nov.) W0BUL 9.

NEBRASKA—SCM, Frank Allen, W0GGP—SEC: K0OAL. Appointments: W0QLWI as EC. Net reports: Nebr. Phone Net, W0AJUF, QNI 928, QTC 49, Nebr. AREC Net, (phone) W0IRZ, QNI 149, QTC 2, Dead End Net, W0QMCX, QNI 394, QTC 59, 180-Meter Wx Net, W0ACBJ, QNI 873, QTC 2, West, Nebr. Phone Net, W0NIK, QNI 592, QTC 32, Wx QTC 146, Nebr. Storm Net, W0QKGD, 1st session, QNI 1132, QTC 85; 2nd Session, QNI 1244, QTC 62, Nebr. C.W. AREC Net, W06EL, QNI 12, QTC 6, Nebr. Emergency Phone Net, W06GHZ, QNI 1524, QTC 96, Nebr. C.W. Net (NEB) W06GHZ, 1st session, QNI 93, QTC 114; 2nd session QNI 107. Thirty-seven Nebraska amateurs participated in the Nebraska Centennial Airmail Flight Net on Feb. 22. W0SAI was in charge of arrangements. Traffic: W06GHZ 404, W0QDU 312, W06LOY 160, W0LOD 144, W0NIK 97, W06HWK 83, K0RRL 74, K0UWK 65, W06IBL 41, W06GK 36, W0GGP 34, W06OHO 28, K0VTD 20, W06WZ 19, K0QKW 19, K0JFN 17, K0JTW 17, W06AG 15, W06EEI 15, W0BVF 13, K0FRU 12, W06IBB 11, K0PTE 11, K0IXY 10, W0AGAT 8, K0HNF 7, W0HOP 7, K0OAL 7, W0YFR 7, K0BRG 6, K0DGW 6, W06IXD 6, W0ACBJ 5, W06XF 5, K0KJP 5, W0LJO 5, K0DFJ 5, W06TKG 4, W06JUF 4, W06KHE 4, W0PQP 4, W0WHY 4, W0WZR 4, W0CXH 3, W06KFP 3, W0PHA 3, W0EQQ 2, K0FJT 2, W06IRP 2, W06JAV 1, W0SWG 1.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, John J. McNassor, W1GVT—SEC: W1PRT. RM: W1ZFM. PAM: W1YBH. Net reports for Jan.:

Net	Freq.	Days	Time	Sess.	QNI	QTC
CN	3640	Daily	18:45	31	372	362
CPN	3880	M-S	18:00	31	490	174

High QNI: CN—W1ZFM, W1KUO, W02PFT/1 and W1FNFJ, CPN—W1GVT 30, W1EEL 29, W1YU 28, W1YB 25, W1MPW 24, K1SRF 23, K1EIC and W1LH 22, K1DGG 21, W1AGBA 20, K1QGG 19, K1PKQ 18, W1CTB and K1LGB 17, K1PPF 16, SEC W1PRT sends the *Pi-Conn Bulletin* to all ECs. Please respond with activity reports and keep your EC appointment endorsement up to date. The successful search for two lost children was greatly aided by K1SRF, K1MRL, W1GEA, W1NDX, W1LHJ and K1WJL in an actual emergency operation handled by the Southeastern Conn AREC. The Headquarters staff made Jan. 31 a red-letter day for W1BDI to note his retirement from ARRL. W1KE is visiting clubs to explain ARRL's tremendous program for the Preservation of Amateur Radio Frequencies. W1BHV is handling traffic on 20-meter s.s.b. W02PFT/1 is a new Connecticut resident and is active on CN. K1TKS suggests the new ARRL *Operators Manual* as a "must" for all stations. K1YON is active with extended range propagation on 220 Mc. K0KII keeps W1YU active on CPN. W1AGBA has been active the past two years as 10-A.M. Sun. Net Control for the Echo Net (K1MIU) on 50.838 Mc. and offers a certificate for 3 check-ins. Congratulations to W1FNFJ for BPL, K1RQO for 3rd BPL in a row, W1KE for 50-w.p.m. c.w. check! Also to W1BGD, W1EBO, W1ECH and W1QV for Dec. FMAT participation. 1RN certificates were issued to K1EYU, W1FNFJ, K1LMS, K1QGG, K1TKS and K1UUD. Be sure to attend the 1967 New England Division ARRL Convention in Swampscott, Mass. Apr. 22 and 23. Hope to meet you there! Traffic: (Jan.) W1EFW 420, W1AW 208, K1RQO



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EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., WA1LP—W1AOG, our SEC, received reports from W1s RPF, BZJ, LVK, K1s ERO, PNB, DZG. New appointments: K1QNZ as EC for Winchester, WA1EUN as ORS, WA1ETC as OVS, W1FJI as OPS. New officers of the Norwood RC, K1JMR are, WA1EOT, pres.; WA1EQU, vice-pres.; K1HRV, secy.; WA1DLU, treas. WA1ETC has a Ranger 2, HQ-110, four-element beam. WA1DGH enjoyed his first CD Party. W1AKN has a T4X, SB-200 and R4A receiver on c.w. and s.s.b. WA1EOT was in the V.H.F. SS for the 1200 Radio Club. K1DZG, Somerville EC, needs help from the lums in town. Call him at 666-0875. Ex-W1JK (formerly of Melrose, is a Silent Key. EM3MN had 22 sessions, 252 QNIs, 112 traffic. W1RPE and his Avon AREC Net are on 51.0 Mc, Wed. at 9 p.m. WA1HEN, ex-W1BAL, is on after a 35-year layoff. WA1GBT is building a v.f.o. and modulator for his rig. Heard on 75: WA1GHU and W1PE. W1ZLX has AI Operator club membership. The South Shore Club held a very good auction with W1AKY as auctioneer. WA1GRP, in the Navy, is on 10/15/20, W9MIJ/1, in Brockton, has a sked with KC4USE. K1KIX has a rig for 2. K1VGM is going to N.U. W1ZMO, secy. of the Danvers ARA, says the RACES Net was activated for a bad fire in town. W1RH-DL5PI is on 10/15/20 in Germany with a KWM-1. K1WJD, W1VAH, W1AYG and W1BGW took part in the Dec. FMT. WA1DIM is busy at school, says W1TW. The Natick HS RC will be on again with a Viking 2. The Framingham RC had a talk on the HRO-500 by W1FSJ. The Capeway RC meets at KIIPB's. K1DFJ is moving to W. Hollywood, Pla. W1KRD gave a talk on "Impedance Matching" at the Wellesley ARS. W1CWM has moved to Danvers. W1DTV-K2TOP, Andover, is on many bands. K1OJQ is going into the Army for 8 months. Don't forget the convention at Swampscott Apr. 22-23. K9AQP/1 is working on s.s.b. for 2 and 6. WA1DPX has a Telerex six-element 24-ft. boom with a 6-meter yagi to go up. W1FJI has a Swan 350. W1BHD, Everett EC, reports a successful c.d. meeting. K1BUF joined Navy MARS. W1ZSS is in the hospital. New 1RN certificates went to W1DAL, WA1EUN, WA1EVY and W1JVP from W1EFW, 1RN mgr. K1OWM, W1PYT, W1WNK and W1JBA have their 420-Mc. transceivers working. WA1EPN gets in on nets on 6. K1FFE got out well during the aurora on 2. The Yankee RC held a "surprise meeting." Appointments endorsed: K1PNB, W1QFN as ECs; W1s VMD, TZ, KBN, K1WHM as OBSs; K1BUF, K1OJQ, W1s AQE, EMG, K1WJD as ORSs; W1GHT as OVS; W1s ZLX, TZ as OOs; W1AQE as RM; W1ZSS as OPS. W1NF has been a ham for 65 years. WA1AKR has applied for OVS appointment. New stations in our Novice Net on 3733: W1NIs GPU, GQE, GWU, K1YUZ, W1UJF. W1AQE is on 160-meter c.w. W1NJL and K1WHM are busy at college in Maine. W1ZQQ is working on code speed for the Extra Class license. WA1BFD has WAC and WAS, W1NIGZ and WA1HEX are new in Needham. WA1ECY is NCS Mon. for EMNN. WA1FSH has a new HW32 for 20-meter s.s.b. His XYL is FSI. K1GPH is active in A.F. MARS. W1DVH is on the air from school. K1CLM is feeling better. K1YUB is mobile on 6. Our sympathy to K1BGK on the death of his wife. Traffic: (Jan.) W1PEX 371, W1FMG 197, K1ESG 149, K1GKA 137, W1OJM 120, W1UIR 70, WA1EYV 69, K1WJD 65, K1VPJ 59, W1DOM 54, WA1EVY 51, W1OFG 48, W1AOG 40, W1DAL 38, WA1EY 35, W1CTR 34, WA1DPX 24, WA1FS1 21, K1GPH 21, K1ZGH 20, WA1EFN 18, WA1DEC 9, K1VOK 9, K1LCO 8, WA1DJC 7, WA1DED 6, W1FJI 6, WA1DLT 5, W1DVH 5, K1OWM 3, W1AKN 2, K1CLM 2, K1YUB 1. (Dec.) K1GPH 39, WA1DLT 3, W1NJL 3.

MAINE—SCM, Herbert A. Davis, K1DYG—SEC: K1QIG. PAMs: K1WQI, K1ZVN. RM: K1TZH. Traffic nets: Sea Gull Net meets Mon. through Sat. on 3940 kc. from 1700 to 1800 and 2000 to 2100. Pine Tree Net meets daily on 3596 kc. at 1900 on c.w. A tribute to two Silent Keys: W1BCL, of Bowdoinham, who passed away recently, was active on most of the bands and Army MARS. W1SDW, of Millineeket, also passed away recently, was active on most of the bands, nets and in local affairs. They both will be sadly missed by all who knew them along the way. W1EFW, mgr. of the 1RN, sent the following news: WA1BEB, W1GU, K1TZH and W1QI have received new 1RN certificates. There is an amateur station active at Hebron Academy with new operators on the way. W1GRG is getting his antennas up at his new home. Traffic: K1WQI 40, W1GU 21.

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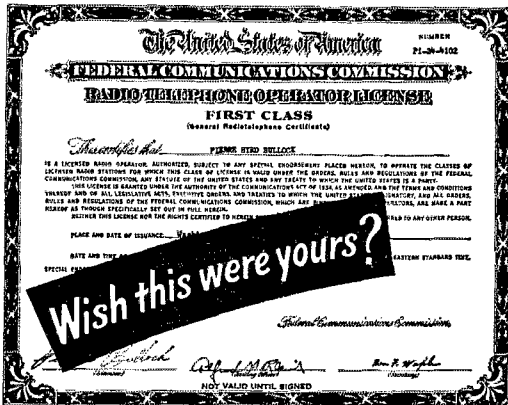
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NEW HAMPSHIRE—SCM, Robert C. Mitchell, W1-SWX/KIDSA—SEC: K1YSD, PAM: K1APQ, RM: Open.

Net	Freq.	Time	Days	Sess.	QNI	QTC	Mgr.
GSPN	3842	2300Z	M to F	27	765	68	K1APQ
GSPN	3842	1330Z	Sun.	—	—	—	K1APQ
VTNHN	3685	2230Z	M to F	21	87	38	K1UZZ
NHPON	50.82	2400Z	M to F	No net report			K1BGI
MVAREC	50.82	0100Z	Mon.	No net report			K1DWK
NHEPN	3842	2230Z	Sat.	No net report			K1YSD

Endorsements: W1BYS as OPS, New Nashua Mike and Key Club officers are WIARE, pres.; WHITE, vice-pres.; W1QKA, secy.; K1PPE, treas.; W1DUB, act. mgr. Welcome to new hams W1NHGT, W1NHGM, W1NHGL, W1AGHE and W1AHRF. K1HRE was a new Drake 2C. K1CTI has moved to Campton, W1UX/1 is going on RTTY with a new Model 19. K1PQV is working 40-meter DX. W1BHA has a new TR-3. K1PCZ and K1PCY had a visit from son K1RJU. Yours truly met SCM W15FLG while in New Mexico recently. K1IHK is home on leave from the Army. W1DYE still is studious with the help of a new NCX-5. K1IHK has new Drake "twins," K1MINK was in the CD Party. The Nashua Mike and Key Club will hold an auction Mar. 28. K1HFV is active on the v.h.f. bands. K1APQ and W1KOC attended WISEL's funeral in Burlington, Vt. K1RNN has been watching bikinis in KH6- and KG6-Land. Traffic: W1ALE 35, W1MHX 25, K1PQV 22, K1BGI 16, K1MINK 14, W1AIDAO 7, K1IHK 2, W1SWX 2.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: K1IIL, PAM: W1TXL, RM: W1BTV, V.H.F. PAM: K1TPK, R1SPN report: 31 sessions, 428 QNI, 85 traffic. At the Annual Meeting of the Providence RA, W1OP, the following were elected: W1EYH, pres.; W1WKO, vice-pres.; K1HZN, secy.; W1KKE, treas.; W1IUP, W1OTE and W1IUX, members at large. W1BIL has been appointed Asst. ARRL N.E. Director and W1EYH has been appointed delegate to R.I. Amateur Radio Week Committee. The Fidelity BC, K1NQG, was active in the V.L.F. Sweepstakes and CD Party. W1AEEJ was the operator. Club members, W1AGGD, who is active on 40- and 20-meter C.W., and W1AFOS, who is active on 75-meter phone, recently received their General Class licenses. The NCRC Club of Newport will hold an auction at the Club Headquarters at the Seamen's Church Institute, 18 Market Square Newport, R.I., Apr. 17, at 7:30 p.m. All are invited. The W1AQ Club of Rumford elected W1NHL, pres.; K1AGA, vice-pres.; K1CZD, treas.; W1BFH, secy.; W1EJ, trustee. Appointed to committees were Membership, K1IIL, Technical K1CBO, K1QLM, K1AGA and K1AMG. Traffic: W1TXL 276, W1YKQ 148, W1AEEJ 73, K1YVC 44, W1BTV 28, K1TPK 27, K1CPL 10, K1NQG 2.

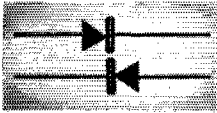
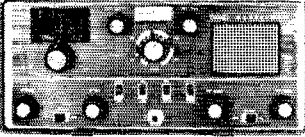
VERMONT—SCM, E. Reginald Murray, K1MPN—SEC: W1VSA, RM: K1UZZ, Jan. net reports:

Net	Freq.	Time	Days	QNI	QTC	NCS
Gr. Mt.	3855	2230Z	D x S	513	22	W1VMC
Vt. Phone	3855	1400Z	Sun.	272	1	W1UCL
VTNHN	3685	2230Z	M-F	87	38	K1UZZ
VTCD	3960 1/2	1500Z	Sun.	31	0	W1AD
VTSB	3909	2230Z	M-Sat.	672	26	W1CBW
		1330Z	Sun.			

The Trading Post Net had 85 check-ins during January. W1FRT has been awarded a 1RN certificate. Hope you had a good time in the Vt. QSO Party. K1WSP recently was heard on s.s.b. We welcome WA1GUV (Burlington). K1RMG is home from the hospital and so is W1LYD. An FB bulletin is being put out by the Catamount Club. Keep it up, fellows. Traffic: K1BQB 233, K1UZZ 25, W1FRT 13, K1MPN 10, W1IDM 9.

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BVR—C.W. R.M: W1DWA. A very excellent *W1M Net Bulletin* was sent out by RM W1DWA, and it should show results in increased activity. Those reporting into WMN at least 10 times during the month were W1DWV (with 100% attendance), W1DWA, W1B2SCD/1, K1LJV, W1BVR. Total traffic for the net was 62. K1WZY has received a certificate for regular participation in the First Region Net. W1DND reports that there is a group in the HCRA attempting to cultivate activity on 10-meter c.w. If interested, get in touch with him. K1JUI was the speaker of the month at the Valley Amateur Radio Club. Some of the gang there are working lots of 10-meter c.w. DX. K1YER is attending graduate school at the medical school of Louisiana State University. W1BMK is active in Air Force MARS and is working as a recruiter for the Air Force at Westover. W1NGUR, daughter of W1ACTP, is now operating in Norfolk, Va. Univ. of Mass., W1PUO, has the following operators: K1YHR, K1MEA and W1BXP. The West, Mass. C.W. Traffic Net (WMN) nightly at 7 p.m. on 3560 kc.) desper-

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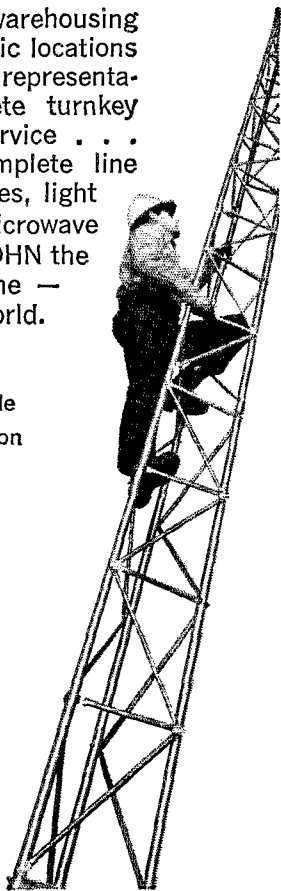
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ately needs active participants from the following areas: Worcester, Greenfield, Fitchburg. WA1FJW is a fairly new member of WMN and we wish to congratulate him on his efforts and interest. He is not yet a fast operator, but we sure could use a lot more like him. Net control will gladly adjust speed for any reporting in. Aw, come on. Don't be chicken. Traffic: W1DWA 130, W1BVR 62, W1DWW 36, WB2SCD/1 29, K1IJV 16, W1MING 5, WA1FJW 2.

NORTHWESTERN DIVISION

IDAHO—SCM, Donald A. Crisp, W7ZNN—The FARM Net convenes Mon. through Fri. on 3935 kc. at 0200 GMT. The Eagle Rock Club is sponsoring a code and theory class. W7DMIP, W7DZH and W7DQU have overhauled the Idaho Falls c.d. generator and antenna. WA7DNB is building a new SB-100. K7OAB is overhauling his station. The Lewiston-Clarkston Club held a going-away party for W7GMC, who is moving to Yakima. Lewiston area amateurs provided communications for the March of Dimes Telethon that was broadcast from Spokane. FARM Net traffic for Jan.: 21 sessions, 758 check-ins, 115 traffic handled. Traffic: K7HLR 458, K7OQZ 22, K7OAB 9, W7ZNN 5, WA7EWW 4. (Dec.) K7OAB 20.

MONTANA—SCM, Joseph A. D'Arcy, W7TYN—Asst. SCM/SEC: Harry Roylance, W7RZY, RM: K7ZIX. New appointment: W7OIO as an OES. A pioneering and test project is being launched in the Northwest Division. Its aim is to increase the public knowledge of amateur radio. If you are interested in helping please contact George P. Griffis, K7EIS, Chairman, Northwestern Division ARRL P.R. Committee, 2415 S.W. Schools Ferty Rd., Portland, Ore. 97211. K7EGJ has a new Heathkit SB rig on the air from Great Falls. K7DCH is out of the hospital after a bout with the flu. W7FL has a new SB-200 on the air. The Butte Amateur Radio Club held its Annual Installation Dinner in Butte. W7NPV had an average error of 3.1 parts per million in the recent Frequency Measurement Test. The Bozeman/Gallatin Amateur Radio Club sponsored a booth in the Mid-Winter Fair at Bozeman. The FCC will give amateur exams at Butte, the dates to be announced in QST. WB2UKO is a new ham in the Bozeman area. New officers of the Gallatin Amateur Radio Club are WA7ECP, pres.; WA7BQS, vice-pres.; W7NPV, secv.-treas.; WA7CAC, act. mgr. W7KOK, EC. Several Montana stations were active on 2 during the recent aurora openings. W7JRG, at Billings, worked 24 states on 2. W7CJN, at Butte, worked W7EGN at Whitefish. W7CJB worked several stations in various states throughout the West. W7JRG also worked a new state on 432 Mc. Traffic: K7EGJ 79, K7WPY 41, K7DCH 6, W7WYG 6, W7FL 5, WA7AEX 4, K7NIP 4, W8CJD 1.

OREGON—SCM, Everett H. France, W7AJN—SEC: W7AJN, RM: W7ZFH. Oregon section nets, inviting your participation follow:

Net	GMT	Freq.	Days	Mgr.	
OSN	0200	3685	T-S	W7ZFH	NTS
BSN	2030-0130	3825	Daily	K7IFG	NTS
AREC	0300	3875	Daily	WA7AHW	NTS

SCM official appointments for Jan.: K7WWR and WA7CPI as OPSs. Appointments are made to those who are active and ARRL members. WA7AHW reports for AREC, sessions 31, maximum number of counties 14, total attendance 435, QSTs 3, traffic 4, contacts 46, W7ZFH reports for OSN, sessions 21, total attendance 106, traffic 63. There is a lot of traffic being handled in Oregon and no reports are being received. My 1966 records show that the c.w. traffic men took top honors again with 96 percent of the traffic handled and reported. The breakdown is as follows: Of total reported, originations 734, received 3028, relayed 2342, delivered 463, total 6567. This is far below that of 1965. Seven c.w. operators and 12 phone operators made 1966 reports. No other reports were received this month. Traffic: W7ZB 144, K7IWD 129, W7BYP 89, W7ZFH 54, WA7CPI 30, WA7EES 30, K7WWR 8.

WASHINGTON—SCM, Everett E. Young, W7HMQ—SEC: W7UWT, RM: W7OEB, PAM: W7LEC. Section nets:

WSN	Daily	3535 kc.	0200Z	QNI 434	QTC 542	Sess. 31
WARTS	X-Sun.	3970 kc.	02001	QNI 1421	QTC 147	Sess. 26
NTN	Daily	3970 kc.	2130Z	QNI 1199	QTC 672	Sess. 31

W7ZIW is the new secv. for ARAB and also made the BPL. W7DZX missed the BPL by 20. Over 40 Washington sectionites report a QSL from WVV. W7BTB skeds KL7CAH on 21.310 Mc. at 2100Z. WA7CFN handles YMCA traffic for Arab-Land. W7MCW is building solid state transmit and receiver gear. K7JHA reports a new

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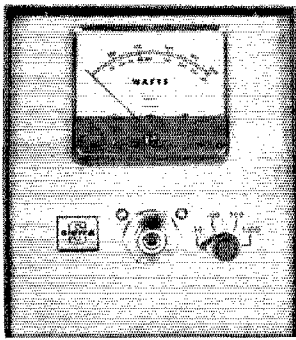
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Four power ranges, selectable by a front-panel switch, speed and simplify r-f power measurements on 50-ohm systems at levels of 250, 500, and 1000 watts. The 120-watt model provides two switch-selectable ranges. Nine models in the Sierra 401A Series cover frequencies from 2 to 1000 MHz.

Wide dynamic range, coupled with expanded meter scale, facilitates precise measurement of low-level signals. You can read to 2 watts on the 1000-watt scale, to 1 watt on the 500, to 0.5 watt on the 250. With one wattmeter, you could measure output of both low-power portable and base transmitters.

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tech net starting with Novice. W7OEB nailed 6W8BL on 14-Mc. A-1. W7YFO had the beam down and the dipole on the ground in the big recent blow. The Callam County Pen (AREC) Net operated at 0430Z on 3995 kc. A new call heard in Pasco is W7EOQ. A 10-meter contest is planned between the Twin City ARC and the Richland ARC. New officers of WSN are W7AIB, mgr.; W7HMA, assoc. mgr.; W7PI, net recorder. K7ZYA becomes an active Tacoma WSNr. K7OVN is the new mgr. for NSN 1967. W7PCY still is looking for public relations personnel. If you have had experience in this work, contact Bob. New officers of the Callam County ARC are K7ROZ, pres.; K7SGB, vice-pres.; K7RJV, secy.; W7AIB, trustee. W7GYF has earned a section net certificate on WSN. K7VNB is the Spokane outlet to NTN. WARTS and CBN. W7AXT is active on WSN and QCWA. K7YDS hooked 3N2AAW. KR6GI, CX9CO, ZS1JA, 9J2FK, DJ2-BW and LA1H. W7UVR has a new log periodic antenna. W7VPW is touring FO8-, ZL-, VK- and KH6-Land and will have an audio-visual recording of his trip for us in May. New officers of the West Seattle ARC W7EWP, pres.; W7HJW, vice-pres.; K7IMN, secy.; K7HSB, treas.; W7FKW, steward; K7JBZ, delegate to Puget Sound Council; K7GJQ, alternate; W7PVZ, sgt. at arms; W7AUK, W7TWU, W7LCS, W7EJD and W7GRAM, board members. WA7CSK sends Official Bulletins daily on 7.255 Mc. at 0500 and 1600 GMT. WA7DFE is a new OBS. The Big Tacoma fire on Jan. 20 brought out AREC members and other emergency crews. W7RGD, K7ATD, K7ATF, and K7USF spearheaded the public service effort. The Radio Club of Tacoma took in a tour of F.A.A. facilities at Auburn. W7MCU can arrange a tour for your group. A newcomer to our area is W7UU, ex-9DOA, SCM for Iowa 1925, also ex-K7AELK in Seward, Asst. Comm. Mgr. ARRL '29-'30, Midwest Division Director '29-'30. The QCWA is setting up a hospital radio fund to furnish communications for hospitalized hams. Small contributions are being accepted. K7CNE will help you in a worthy project. Traffic: (Jan.) W7BA 1320, W7HMA 1003, W7ZIV 1001, K7TCY 940, W7DZX 478, W7DXI 372, K7CTP 365, W7JEY 280, W7PI 244, W7BTR 139, WA7CFN 97, W7UU 84, W7MCW 74, K7JHA 62, W7JEU 52, K7VNB 52, W7OEB 47, W7AIB 44, W7APS 29, W7HMQ 24, K7ZVA 24, K7OVN 19, W7GYF 14, W7AXT 2. (Dec.) K7YDZ 117, K7MGA 24, W7GVC 18, W7RXH 13. (Nov.) K7VNB 59. (Oct.) K7VNB 84.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wical, KH6BZF—Asst. SEC: KH6BZF, PAM: WOPAN/KH6. RM: Vacant. V.H.F. PAM: KH6EEM.

Net	Freq.(Mc.)	Time(GMT)	Days
League Appointees	7.290	0700Z	Wed
Friendly Net	7.290	2030Z	M-F
No Ka Oi Net	7.290	2330Z	Sat.
50th State	3.895	0500Z	Tue.-Sat.

RACES Nets (40, 10, 6 and 2 meters) coordinate with KH6GG. I'd like to say thanks for all the help from our former SEC KH6CCL, who has resigned because of heavy business demands. **What:** Hawaii QSO Party. **Who:** All KH6 stations. **When:** 0001 GMT May 13 to 2400 GMT May 14, phone or c.w. **Where:** All bands. **Why:** For attractive QSLs, special certificates, awards and good contest fun. For more information watch QST or send a SASE to KH6 QSL Bureau, Box 101, Aiea, Hawaii 96701, Attn.: QSO Party. WOPAN/KH6 entertained vacationing VK4DA, from Queensland. KH6EPW reports he's QRT in Kailua. KH6FKB keeps the v.h.f. news coming in. K4PCC/KH6 is the C/S for US Army Strategic Communications Command-Pacific. Others out at STRATCOM-PAC are K4HAU, KH6COY, KH6CBS, ex-W4WBG, K6EWZ, ex-K4WBG and K8-HQ6/KH6. K8BR/KH6 is assistant to chief engr. of KHET. The Friendly Net closed its third year of operation Dec. 30, 1966, with KH6ATS (NC3) KH6s ELW, CPW, EJ, CXJ, BIH and GAY. KH6EWA radio operator on board the SS *Copper State*, can be heard on 20 and 15 phone and c.w. with his Swan 350, Traffic: (Jan.) KH6BZF 8, WOPAN/KH6 1, KH6ATS 1, KH6FBK 1, KH6FRO 1, KH6GBC 1. (Dec.) KH6FKB 1.

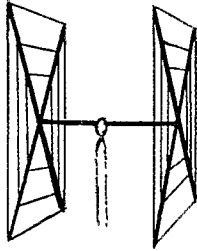
NEVADA—SCM, Leonard M. Norman, W7PBW—SEC: WA7BEU. The SAROC Convention, hosted by the Southern Nevada ARC at Hotel Sahara, was a success and plans are being made for "SAROC" in 1968. W7AAF has been /6 in Fresno. W7TFB and K7OHN now have their General Licenses. K7RKH has 88 elements on 432. WA7CFS is doing an FB job with the Nevada Emergency Net, which has moved to 3996.5 kc, Mon. and Thurs., and has a 16-ft. trailer for his communications gear. K7ICW and K7TKS provided communications for W7JU/K7JU and his NYL, who were involved in an auto accident in the isolated desert area near Pierce Ferry. W7LHQ has been so busy con-

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CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are *much lower* than even the bamboo-type:

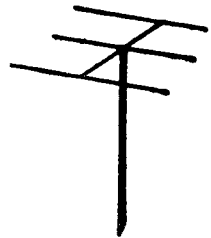
10-15-20 CUBICAL QUAD	\$35.00
10-15 CUBICAL QUAD	30.00
15-20 CUBICAL QUAD	32.00
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(all use single coax feedline)

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2 El 20	\$16	4 El 10	\$18
3 El 20	22*	7 El 10	32*
4 El 20	32*	4 El 6	15
2 El 15	12	8 El 6	28*
3 El 15	16	12 El 2	25*
4 El 15	25*		
5 El 15	28*		

*20' 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, T12FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWI, VE3KT. Moral: It's the antenna that counts!

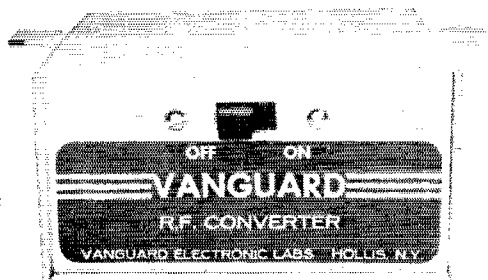
FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5CLK, OZ4IH, and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	\$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	\$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	\$18.95

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.45 Mc. to 475 Mc. AVAILABLE FROM STOCK.

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ducting hearings that he has not been able to get the BTI linear he got at "SAROC." WBIF has a new 2-meter beam. The Southern Nevada 2-meter f.m. group still is working on its repeater. WVYC has his pilot's license. WTEBY, ex-W9LON, and WOCXS are new amateurs in Southern Nevada. Traffic: WA7CFS 22, K7OHX 22, WA7BEU 10, W7PBV 4, W7K01 3.

SACRAMENTO VALLEY—SCM, John F. Minke, III, WA6JDT—SEC, WB6BWB, ECs, WB6MXD, K6RHW, W6SMU, WA6TQJ, RM: W6LNZ.

Net	Freq.	Time	Days	Mgr.
NCN	3635	0300Z	Daily	WB6HVA
NCN Slo Speed	3635	0530Z	Daily	
SCEN	146.28	0500Z	Wed.	K6IKV

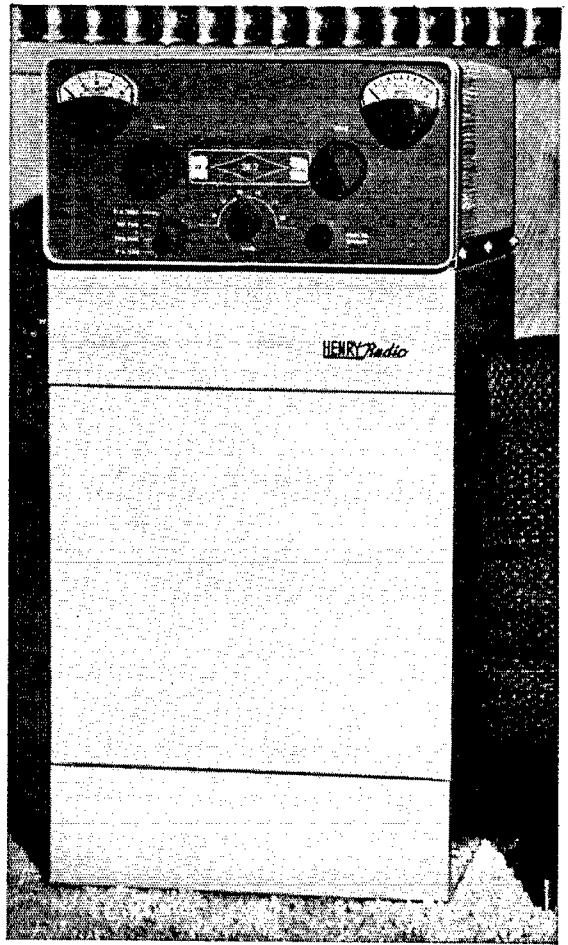
The Gold and Silver Net now has a Novice section which meets on 3740 daily at 0100Z. All Sacramento Valley Novices are invited to participate. WB6DEF, of Oroville, became a Silent Key Dec. 31 after a long battle with leukemia. W6DOR is interested in forming a group to operate in the June V.L.F. Party on the Nevada side of Lake Tahoe. If interested, contact Ev or your SCM. December participants in the FMT were W6GDO and W6ZJW. OBS W6NKR racked up over 138K in the January CD Party. New officers of the Sacramento ARC (W6AK) are W6GIA pres.; W6MZX, vice-pres.; W6HLAW, secy.; W6RVR, treas.; W62-OVB, sgt. at arms. WA6JDT finally made WAS. W6SMU and K6DLL have moved into their new home in Fair Oaks. WB6SHO won the first RAMS Rabbit Hunt of 1967. W6CEI lost his tower during a recent wind storm but is back in action. WB6MAE was out of town in Stockton, which limited Sarge's traffic-handling. WB6-QZL is completing an s.s.b. exciter for 75 meters. Recent quote from WA6UQT: "Ham Radio beats LSD any day." Traffic: (Jan.) W6LNZ 135, WB6RSY 112, WB6EAG 38, WB6MAE 9, W6NKR 7, K6IKV 6, WB6-QZL 6, WB6QMT 3. (Dec.) W6LNZ 120.

SAN FRANCISCO—SCM, Hugh Cassidy, WA6AUD—W6JXK has his TBK-12 running with a full gallon of power. W6IIF spoke to the Marin Radio Club on maintenance of amateur gear. The San Francisco Radio Club held its Annual Auction in March. Dick de Bolt is now General Class with the call WB6TUK. K6HZ is completing work on an 8B-40L. Out of the service and active again is WA6QCR. North Marin is covered by the Novato Club 2-Meter Net on 146.65 kc. Wed. at 1930 local time. WB6GVI will go on active duty with the Navy this fall. WB6DGJ put up a four-element yagi for 20 meters. WB6LYE also has added a tower and a TA-33. Heard in the Jan. CD Party were W6HSA, WA6RXM and W6GQA. WB6PDP has been appointed News Director for broadcast station KIXF. Flood conditions on the lower Russian River in Jan. brought out the Sonoma County Amateurs who provided communications until the flood crest passed. W6ARQ is experimenting with ARC-5s on v.h.f. W6BIP, W6ERS, WA6DJI and W6HSA attended the joint meeting of the Northern and Southern California DX Clubs in Fresno in Jan. W6WLW reports that conditions may hamper him running up another big traffic score in 1967. WB6-TBC ended his Novice career with 302 contacts in seven months, 26 states and 3 countries worked. WB6OGF is now using an SR-150. W6CYO's country total is over 80. W6SWG was at the Guide Dogs for the Blind School in San Rafael during Feb. to train with a new guide dog. Officers of the Tamalpais Club are WB6EFV, pres.; W6TCT, vice-pres.; W6SRA, secy.; WA6-SBA, treas.; WA6UTD and WA6QFV, board members. The new Marin Directory compiled by WB6IMO showed some 100 new calls added in the last year and close to 500 licenses in Marin County at the start of the year. W6GGO and XYL Rose celebrated their 41st wedding anniversary recently. W6BSE, W6CYO and WA6AUD attended the Jan. meeting of the Nevada Amateur Radio Assn. in Reno. W6IHB was looking for a mobile rig for the commute run—planning to work c.w. while mobile. W6PTS moved to Marin from San Francisco. W6RMM had his 6-meter antenna blown around in a Jan. storm and did not find the vertical polarization working too well. WB6FZH is rebuilding a vintage 8B-33. The K6GWE repeater group held a breakfast in San Rafael recently. The Marin Radio Club is participating in the Greater Bay Area Hamfest again this year. Traffic: W6JXK 242, W6KVQ 217, W6WLW 91, K6TWJ 30, WA6AUD 28, WB6KHI 18, WB6DGJ 14, W6BIP 12, WB6PDP 10, WB6OGF 9, WB6TBC 9, W6CYO 8, WB6-IMO 7, K6TZN 5, WA6BHX 4, WB6GVI 4.

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6JPU—A slow-speed net, not over 15 w.p.m., has been started on 3635 kc. at 0530Z. All interested in furthering their ambitions to handle traffic, are invited to attend. WB6PCQ is NCS. The Tulare County Amateur Radio

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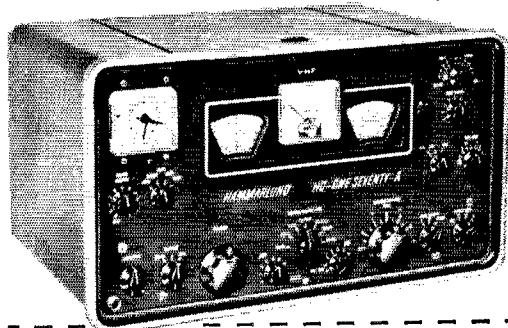
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Club and W6ARE monitor 145.62 Mc. and 146.7-Mc. f.m. WB6OSH and other mobiles obtained XEQ calls and mobiled in Mexico. Attending the SAROC in Las Vegas in Jan. were, W6IRV, W46TQL, WA6EDQ, WA6RLW, WA6ONZ, WA6LML, WB6JPU, WB6SDZ, WA6JZP, WB6STB, WB6ETQ, WA6ZGQ and W6NTK. A fine time was reported by all. Seen at the DX Convention held in Fresno were W6KTW, WA6WXP, W6PYM and W6JPU. W6KTW is building a 40-meter beam. W6JPS is having BCI with an electronic organ. WA6NAB is in the Air Force. W6ONK is heard on 20-meter s.s.b. with a Galaxy. K6RPH is active on 20-meter s.s.b. WB6UKB is building a 6-meter converter. WB6NCJ lost his 80-meter antenna. K6QPE is active on 15 meters running a kw. W6NCG is active with 2-meter repeaters. W6JXY is on 2-meter f.m. WB6JPU is active on 2 meters. Don't forget to reserve the 2nd week end of May for the 25th Annual Fresno Amateur Radio Club Hamfest. See you there. Traffic: W6ADB 325, WB6HVA 271, WB6PCQ 229, WB6NCJ 2.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W8ZRJ—Asst. SCM; Ed Turner, W6NVO. SEC: W6VZE. RM: W6QMO. Heavy rains during January caused flooding in various parts of the section, the greatest amount being in San Mateo County. W6VZE, SEC, and W6DEF, EC for Redwood City Area, both report amateur activity. Both K6ANN and W6DEF helped supply supplementary police communications, and W6VZE reports various types of communications activity by himself and WB6HZZ, W6PFV, WB6MZA, WB6MYN, WB6SUE, WB6OAG, WB6GZH, K6LVJ, WB6ODS, K6TMH and W6EDH. Others probably took part and should report their activity to the SEC in Burlingame. The Foothills Amateur Radio Club held its Annual Dinner in Sunnyvale and enjoyed a fine turnout. W6HC was the featured speaker at the SCCARA in January. WA6TZN was in the section on leave and is now operating /6 in San Diego. K6DYX gave a talk to the Seaside Lions Club on Jan. 19 using a 2-meter demonstration link. W6RSY made the BPL, as did W6EMS. WB6LZE reports for King City and operates WCARS. NCTN and WPSS. Ed attended the SAROC meeting in Las Vegas. W6YBV is busy building. WB6NXX is active in Army MARS. W6DEF is attending a first-aid class along with K6YKG. WB6FME, WB6FMP, K6MPN, WA6YSY, W6YQV and K6DRM. K6ANN is the instructor. W6AUC is active as OO and is keeping a regular schedule with W6WDY operating as XE6WDY at LaPaz. W6DY is the mayor of Belmont, Calif. W6ASH is very QRL work but keeps OO operations going. W6RFF works NCN. W6HC is busy with TCC as well as his teaching activities. Traffic: (Jan.) W6RSY 971, W4EMS 791, W6YBV 408, W6DEF 135, W6HC 80, W6VZE 56, W6PLS 41, WB6LZF 35, W6ZRJ 34, WB6NXX 30, W6AUC 14, W6ASH 13, W6RFF 8, WA6TZN 3. (Dec.) W6ASH 12.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, W4BNU—SEC: W4MFK. RMs: WA4ANH and K4CWZ. PAMs: W4AJT and WA4LWE. V.H.F. PAM: W4HJZ. WA4KWC reports the Buncombe County ARC is holding code and theory classes in the Court House Thurs. at 7 P.M. and that he had the pleasure of running a p.p. for a submarine several hundred miles at sea. K4BBK is now running a new (pair 4-400As) homebrew final. WA4NUO wonders if he is the only OPS who made more points in the c.w. portion of the CD Party than he did in the phone party. W4HJS received his 4RN certificate in Jan. and now his work is causing him to relocate in Michigan. NCN is going to miss you, Jerry. W4NAP has a new SB-100 and Mor-Gain all-band antenna on the air, and also has one class at Morehead High School (Spray, N.C.) that is about ready to take the Novice exam.

Net	Time	Freq.	Days	OTC	Mar.
NCN(F)	2330Z	3573 kc.	Daily	164	K4CWZ
THEN	0300Z	3865 kc.	Daily	81	K4ODX
NCN(L)	0300Z	3573 kc.	Daily	67	WA4ANH
SSBN	0030Z	3938 kc.	Daily	55	WA4LWE

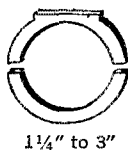
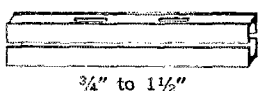
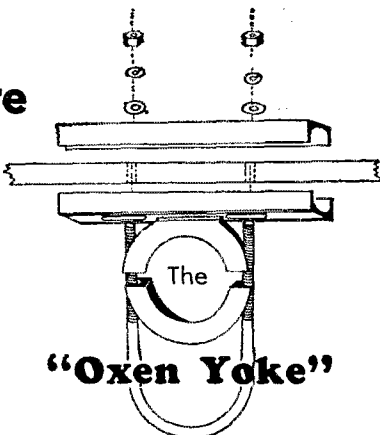
Traffic: (Jan.) WB4BGL 268, W4HJS 247, W4EVN 179, W4LWZ 132, W4IRE 83, W4RWL 46, K4CWZ 36, K4EO 30, WA4VNY 30, WA4UFQ 23, WA4TV 22, W4BNU 17, WA4FJM 17, WA4ZLK 17, W4AJT 14, K4ZKQ 13, WA4ANH 11, K4TTN 11, W4NAP 10, WA4UVH 10, WA4GMB 7, WA4ICU 7, K4AI 5, WA4CFN 5, W4UWS 4, WA4KWC 3, WA4NUO 3. (Dec.) K4BBK 32, WA4UVH 6, WA4GMB 4.

SOUTH CAROLINA—SCM, Clark M. Hubbard, K4LJN—SEC: WA4ECJ. Asst. SECs: W4WQM, WA4EFP. RM: K4LND. PAM: WA4RUB.

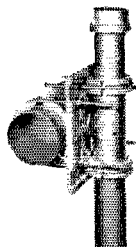
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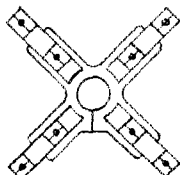
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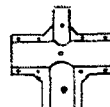
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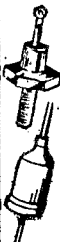
PRV	3 AMP	7 AMP	16 AMP	25 AMP
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100	50	70	1.05	1.20
200	80	1.05	1.30	1.70
300	1.05	1.60	1.90	2.20
400	1.60	2.10	2.30	2.70
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35	1.59	1.90	2.50	2.95



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10	27	62
12	30	68
13	33	75
15	36	82
16	39	91

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WB4DXX, 13 years old, is doing an excellent job as NCS for 4RN. K50H(O/K4BRP) is back in Charleston and ready and willing to go on the SCN. WB4BZA is making both c.w. and s.s.b. nets each night. W4NTO again makes the lowest percent error in the FMT. W4PED is publishing the SCN Bulletin on his own and needs help from nets and clubs. The Anderson Radio Club has 2- and 10-meter nets meeting Thurs. and Sun. at 2100 and 2130 EST. W4CE is working on state-wide 2-meter operation from RACES headquarters in Columbia. WB4EDD, a high school senior, went to British Honduras as the guest of a Canadian Geologist he met on the air. Traffic: W4PED 55, W4NTO 38, W3JA 36, W4WQM 35, K4LJNJ 34, WB4BZA 32, W4HMR 26, W4FVV 24, WA4QKQ 14, WA4HFA 10, K4EIB 4, WA4-ICF 4.

VIRGINIA—SCM, H. J. Hopkins, W4SHJ—SEC: K4LMB, PAM: W4OKN, RMs: WA4EUL and K4LJK. The new EC for Area 4 is W4SZZT. W4OP, W4YZC and WB4DHT were recently appointed as ORSs. The Eastern Area NTS Staff (EAS) met at ARRL Hq Feb. 4 and 5. W4DVT and W4SEJ were among the eleven members attending. Roanoke Division Director W4KFC kicked off his new term by attending a joint club banquet at Virginia Beach Jan. 27. The guests of honor were W6KG and his XYL, who reviewed some of their recent DX-plots in Europe and the Atlantic. All section leadership appointees and assistants are reminded that the Division LO meeting will be held Apr. 8 & 9 in Greensboro, N.C. Your attendance will make this meeting a success; other details from K4LMB or W4SHJ. The Roanoke Hamfest will be held May 27 and 28. Make your plans now. The best frequencies to monitor in emergency are your section nets. Become familiar with them; they are in session daily as follows:

3935 kc. 2300 and 0300 GMT
 3680 kc. 2330, 2400 and 0315 GMT
 3835 kc. 2400 GMT

Traffic: (Jan.) WA4DXJ 594, K4CG 239, W4SZZT 267, W4RHA 237, W4DVT 198, K4LJK 160, WA4EUL 157, W4NLC 90, W4BWF 89, W4ZM 83, K4PSS 70, K4ITV 59, K4LMB 49, WB4DHT 45, W4IA 33, W4SHJ 33, K4KNP 32, WB4EAE 31, W4OKN 29, W4TE 27, WB4-BXT 25, W4MPOJ 25, WA4PBG 24, WB4DRB 22, WA4TNS 16, W4KFC 14, K4VCY 12, WA4DAI 10, W4KX 9, WA4QOC 7, W4AMK 6, W4JUJ 2, WAOP 2, K4IXF 1, (Dec.) W4NLC 148, K4MLC 56, W4JXD 32, W4BZE 12, W4JUJ 4, K4IXF 4.

WEST VIRGINIA—SCM, Donald B. Morris, W8JMJ—SEC: W8SSA, PAMS: K8CHW, W8IYD, RMs: K8-TPF, W8HZA, W8LMF. Phone Mgr.: W8RQB, C.W. Net Mgr.: W8HZA. The WVN C.W. Net handled 152 messages in 31 sessions with W8CKX, W8HZA, W8IMX, W8IYU, W8APOS, W8APXF and K8TPF as NCSs. W8SSA has a new TR-4 in mobile and visited the Northern Panhandle ARC. I am very pleased to announce the appointment of W8HZA as RAI, K8CSG and W8QND are moving to Ohio. W8DFC renewed as ORS and, along with W8APXF and K8MYU, was active in the CD Party. The West Va. Phone Net, with 613 stations in 22 sessions, handled 66 messages. West Va. PON, in 12 sessions with 193 stations, handled 47 messages. W8NYH is quite active in the "Thumpin Keger" Net on 3927 kc. W8IYD, gen. chairman of the 1967 State Convention at Jackson's Mill on July 1 and 2 reports planning is progressing nicely. W8MSP is the new EC for Randolph and W8QR the new EC for Marion County. The Black Diamond ARC held a planning meeting for its fall Ham-Picnic, Aug. 27 at Bluefield. W8PZT, W8QR, W8EQJ and K8ELH are active on 29.6-MC. E.m. Traffic: W8APOS 176, K8TPF 152, W8APXF 101, W8HZA 93, W8SQO 59, K8MYU 56, W8QND 49, W8CKX 44, W8QZO 21, W8ARQ 21, K8BIT 9, W8AY 7, W8IMX 7, K8CHW 3, W8CKN 3, W8IMY 3, W8EII 2, W8AFKB 1, W8ALI 1, W8AFIE 1, W8AFIM 1, W8ALSW 1, W8MRK 1, K8QOL 1, W8QEC 1, K8SJK 1, K8TQR 1, W8WEJ 1, K8WMIQ 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Richard Hoppe, K0FDH—Asst. SCM, A. Hankinson, WAONQL, SEC: WOSIN.

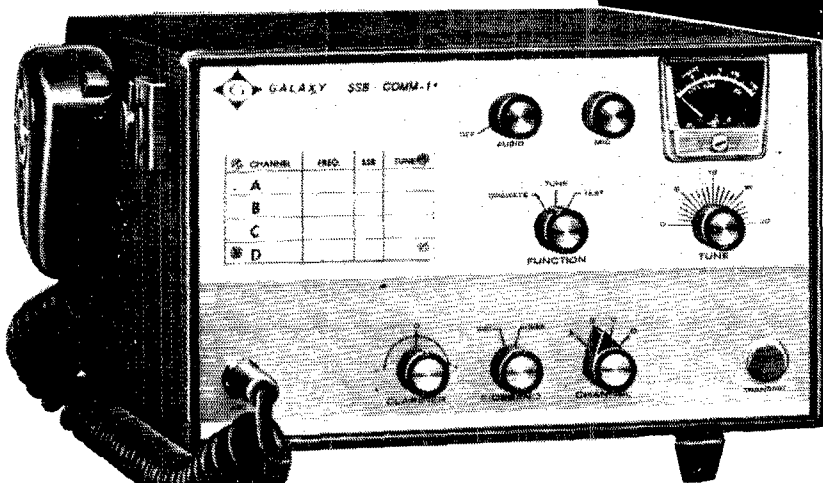
CCN 3780 Daily 6:30 p.m. MST
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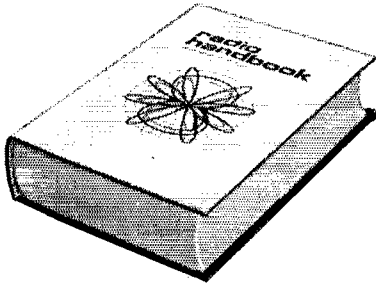


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Traffic and members reporting are on the increase. Membership is rising. WAØNQL, our Asst. SCM, was first in the nation to turn in 35 new members and win a gavel for the Arapahoe Radio Club. La Junta has a new club. WAØBBE is spearheading the organization. Groups planning hamfests should send information well in advance so we can publicize it. Lead time on QST report is six weeks. The Novice Rotundup was an unqualified success in the section. There were at least nine times as many entries as in 1966. Some of the participants were WNs ONQ, OOE, PRJ, OXMI, PVR, PUV, PRQ, PRE, PXY, PRI, PEH, PQN, QQG and QCV in the Denver area. PYU greatly assisted in promoting entries. ECs are requested to make monthly reports to WØSIN. The section membership drive will continue. Note to QRM News: Please put KØFDH and WAØNQL on the mailing list. Other papers follow suit, please. Traffic: KØFDH 335, KØZLJ 232, WØFEO 82, WØPPT 67, WAØLCM 58, WAØMNL 58, KØSPR 58, KØDCW 56, WØSIN 46, KØZSQ 40, WAØNQL 13, WOLEK 11, WAØNBZ 9, WØBWJ 7.

NEW MEXICO—SCM, Bill Farley, WA5FLG—SEC: W5ALL. PAM: W5WZK. The Albuquerque Amateur Radio Club now meets the 2nd Wed. of each month at C.D. Hq. The club also holds a breakfast the 1st Sat. at 8 A.M. at the Village Pancake House. Your SCM had a nice visit with W1SWX, the SCM of New Hampshire. Ever had your big rig go out and have to rely on a small setup? Poor old WA5FLG was faced with this recently. He sent his Swan 350 back to the factory and had to go to a Knight T60 transmitter and his son's Novice receiver. You should keep some old equipment around the shack for just such an emergency. Well, guess W5PTQ, the Weed Kid, has been married long enough to be able to get back into the swing of traffic-handling. Heard him passing some on 75 the other day. Congratulations to WA5MCX for his superb handling of the Roadrunner Traffic Net at 3,838 every night around 0100Z. Traffic has increased and the net is operating very satisfactorily. If you hold an appointment from the SCM be sure to check the endorsement. Certificates must be signed by the SCM every year to be valid. Traffic: W8ZBY/5 68, WA5RBU 42, WA5LFX 23, WA5JNC 15, W5WZK 14, K5VXJ 11, W5PNY 8, WA5MCX 7, K5WNV 3.

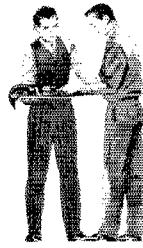
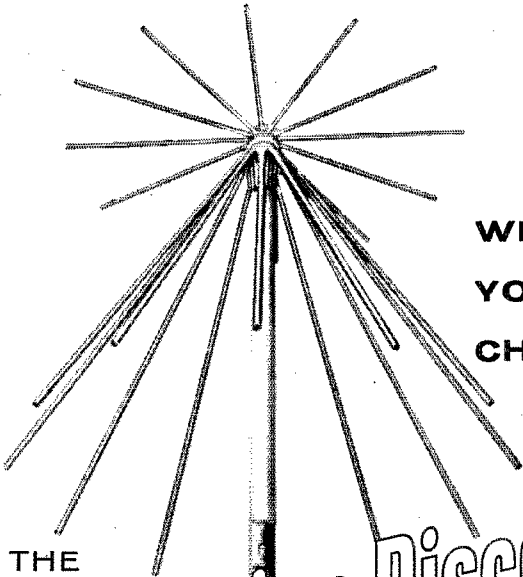
UTAH—SCM, Gerald F. Warner, W7VSS—SEC: W7-WKF. RM: W7OCX. Section nets: BUN, daily, 727Z kc., 1930Z. UARN, Sat.-Sun., 3987.5 kc., 1500Z. A v.h.f. section net is being organized using the Utah Relay Club's Lake Mountain repeater. The net will meet daily at 1830 MST, input frequency 146.2 Mc., output on 146.8 Mc. K7SAJ, secy. of the URC group, states that all amateurs in the Utah area are invited to join this traffic-only net. The Ogden ARC held its annual banquet Jan. 27. The Utah ARC has a membership contest underway and is sponsoring a homebrew contest in May. W7RQT racked up several new states on 2 meters during Jan., this time during an aurora opening. Long time c.w. man W7BAJ finally is on phone with 2-meter gear. W7EBR is a new ORS. Traffic: (Jan.) W7OCX 105, WA7BAE 89, K7AHD 6, W7FYR 4, (Dec.) WA7EBR 268, K7RAJ 42.

WYOMING—SCM, Wayne M. Moore, W7CQL—SEC: W7YWE. RM: WA7CLP. PAMs: W7TZK, K7SLM. ORSs: W7TZK, K7SLM, K7ZHT. Nets: Pony Express, Sun. at 0830 on 3920; YO, daily at 1830 on 3610; Jackalope, Mon. through Sat. at 1215 on 3920. Wyoming hams are saddened by the loss of K7IVK, who passed away Jan. 11. She had made innumerable friends in Wyoming and throughout the country since getting her license in 1959. K7ITH was instrumental in having WAØDGJ rescued from the snow-packed Colorado mountains in Jan. New officers of the Sheridan Club are K7HDP, pres.; K7RFL, vice-pres.; WA7BDI, secy.-treas. A couple of new signals on the air from Cheyenne are WA7EWE and WNGOW. The Annual Wyoming Hamfest will be held May 20-21 at the American Legion in Douglas. Traffic: W7DXV 53, WA7CLP 49, W7TZK 46, K7SLM 40, K7ITH 36, K7QJW 21, K7POX 16, WA7BDI 7, K7-AHO 4, W7CQP 4, W7ONZ 2, W7NKR 1.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4WHW—SEC: W4FPI. PAMs: WA4EC, WA4EEE. RM: WA4-EXA. W4FPI is the new SEC for Alabama. He needs several EC areas filled. Let's give him some help. The Birmingham Hamfest will be held Apr. 29 and 30 this year. The North Alabama Hamfest will be held Aug. 20 in Florence. Make your plans now. The AENT plaque for outstanding operator of the quarter was awarded to WB4EKK. Jan. net reports (times GMT).

Net	Freq.	Time	Days	Secs.	Ave. T/c.	Ave. QNL
AENB	3775	0100	Daily	54	1.8	3.6



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150 WATTS AT 470 MC
2.0:1 MAXIMUM
150-470 MC
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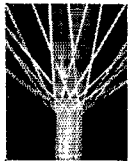


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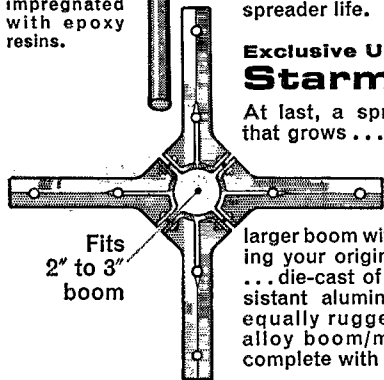
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AENH	50.7	0200	Sun/Tue..	9	2.1	20.1
AENM	3965	0000	Daily	31	4.83	54.3
AENO	50.55	0115	T/T/Sat.	13	.31	16
AENT	3970	2230	Daily	34	1.94	9.4
AENT/AENR	no report					

Better than usual DX activity was noticed. All DXers be sure to send in your contest logs. K4KJD has a new quad and is renewing his old acquaintances on 15 and 20. A fine group is working 2-meter t.m. in the Huntsville area and looking for others. Contact W4WGI for information and help with your t.m. gear. Traffic: (Jan.) WA4EXA 143, K4BSK 120, K4AOZ 92, WB4DIN 82, WA4UXC 76, WA4GNG 71, K4WHW 61, WB4DCR 54, K4NUW 49, W4FVY 43, WA4GGD 40, WB4ACJ 35, WA4PIZ 33, WA4OCM 32, WA4FYO 28, WB4BLX 26, WB4EKK 22, W4DGH 18, K4KJD 18, K4UEC 16, WA4FEC 12, W4YPC 12, WA4ROP 9, WA4ZDW 9, K4HJM 7, WA4OCL 6, K4TUT 6, WA4VTG 6, K4AJF 4, W4NML 3, WA4SUI 2, K4UUC 2, WA4JSM 1. (Dec.) K3SUH/4 15.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KZ5TT —Asst. SCM: Russell Oberholtzer, KZ5OB, SEC: KZ5MV, W5NW. 1st vice-pres of ARRL, was through the Canal Zone and met several of the local amateurs. New Crossroads Radio Club officers are KZ5OB, pres.; KZ5WR, vice-pres.; KZ5FN, secy.-treas.; KZ5NM, act. mgr. New KZ5s in Jan., Generals—KZ5AJ, KZ5CM, KZ5FK, KZ5FW, KZ5JO, KZ5LB, KZ5TS, Novices—KZ5FWN, KZ5GUN, KZ5MWN, KZ5OON, KZ5PLN, KZ5QAN, KZ5SFN. 2 meters is shaping up and the arrival of eight new beams has improved signals. The CN still is active, but needs more support. It meets Q200Z daily at 3543. KZ5OB and KZ5AD had W4HLE as a guest for three days. Traffic. KZ5CT 93, KZ5MV 36, KZ5FX 16.

EASTERN FLORIDA—SCM, Albert L. Hamel, K4SJE—SEC: W4YTT, RM C.W.: W4LE, RM RTTY: W4RWM, PAM S.S.B.: W4OGX, PAMS: W4SDR, W4AKB, W4TUB, V.H.F. PAM: W4BMC. In case you have forgotten W4MYB became your new SCM Feb. 15. I see where W4TRS, our former heart patient, is slowly getting back into the traffic whirl. See where W4TJS can now show his metal as the new editor of *Ham Salad*, the Lake Amateur Radio Assn. paper. That eager beaver Orlando outfit does it again by an assist to the March of Dimes effort up there. Here is what K4KXR said: "K4KXR reports he had been first Florida contact for his hundredth Novice. All with 20 watts and V-80 vertical." By now you all know that W4LE, our new RM C.W., has taken over the *QFN Bulletin*. Received lotsa nice notes re my departure as SCM of this outstanding section for which I thank all concerned. It was a pleasure working for you-all. BCNU, Traffic: (Jan.) W3CUL/4 1503, W45CKC 766, W4BMC 404, WA4NEV 404, WA4TWD 293, W4LE 274, WA4RQR 274, WB4AIW 266, W4FPC 203, WA4JH 192, WB4AHA 174, W4AKB 143, WA4FCH 139, WB4AJV 136, W4VR/4 109, K4SJE 87, W4DVO 81, WB4JD 60, K4EVY 78, K4KDN 73, W44HDH 70, WA4NBE 69, W4SDR 50, W4FP 43, WB4CAP 41, W4OGX 41, W4DEL 39, W4EHW 38, W4GM 37, K4BNE 36, K4ILB 33, W4IIZ 30, WA4HO 29, W4ACIQ 28, K4DAX 28, WA4LRW 28, W44ZEV/4 28, WB4DDO 27, WA4MRK 27, W4NGR 27, W4SMK 27, W4YXP 27, W4AD 26, W4MVB 26, W44BGW 25, W4IYT 24, W4BRC 23, W4VPC 23, W4YDC 22, W4KRC 20, WA4VOW 17, K4LPS 16, K4MTP 15, W4YRU 15, W4IE 14, W4TJM 14, W4GDK 13, K8LNE/4 12, K4EBE 9, K4CBV 8, W4OBY 8, W44TJS 8, WA4WZZ 8, W4TRS 6, WA4MOI 5, WN4EEY 3. (Dec.) WA4RQR 508, K4CBV 15, W4CWI 7.

GEORGIA—SCM, Howard L. Schonher, W4RZL—Asst. SCM: James W. Parker, Sr., W4KGP, SEC: W4DDY, RM: W4CZN, PAMS: K4PKK, WA4WDE, W4GGD participated in the FMT with an excellent report. K4HQI reports NEGEN has been discontinued temporarily and is reorganizing. K4HQI is the proud daddy of a second YL harmonic. K4OSE (DL4YT) was married recently. WB4EMQ is on 6 with a Thor. K4QLX is doing an outstanding job with Viet Nam traffic.

Net	Freq.	Time	Secs.	QNI	QTC
GSN	3595	0000 & 0300 Dy.	62	509	159
GTN	3718	2200 Dy.	30	145	31
GTAN	3855	1600 Sat. 2130 Wed.	8	66	15

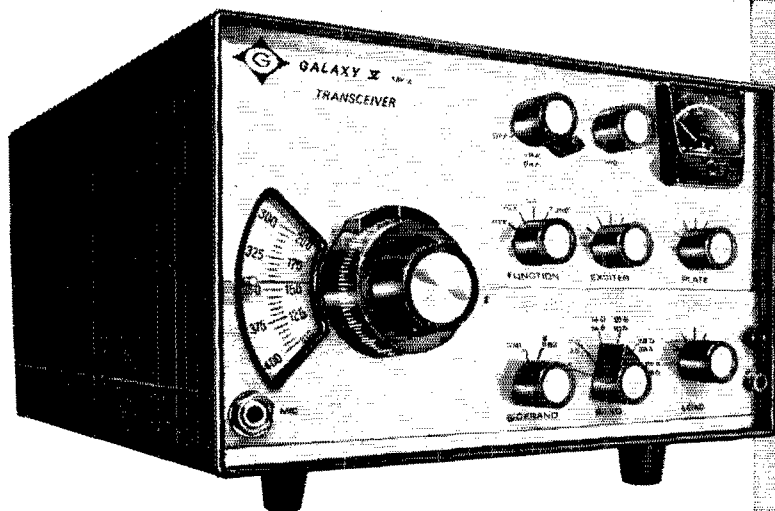
The Georgia QSO Party will be held the week end of May 14/16. WB4AYN reports more activity on 6. K4HQI maintains activity on 6 and is adding 2-meter gear. The Columbus Hamfest will be held the first week end in April. GSN is planning increased activity. WA4NAU worked in the Ark. QSO party. W4FQX is mobile again.

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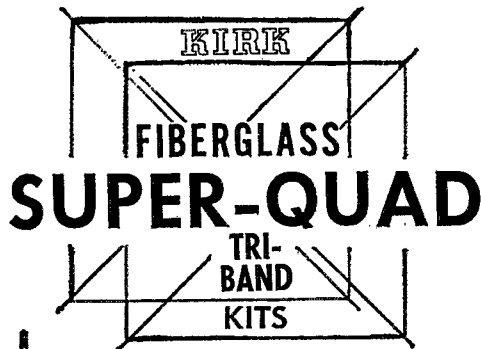
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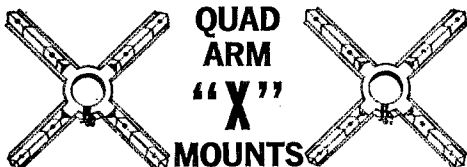
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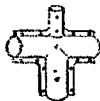
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W4HYW was active in the CD, Va., La. and Ariz. QSO Parties. W4GXU has SWL from his next-door neighbor, RST 229 on 1805 kc. (Not bad for 25 watts. HI. Traffic: W4FOE 234, W4ACN 143, W4TFL 39, W4ARAV 76, W4PIM 65, W4ANMU 53, W4WVQU 39, W4FDN 32, W4FQX 27, W4HYW 22, W4DDY 20, W4RZL 18, WB4AYW 16, WA4LLI 16, WA4WDB 16, WBAYP 15, K4QWX 6, K4BAI 4, W4GXU 4, WA4BVD 2.

WESTERN FLORIDA—SCM, Frank M. Butler, Jr., W4RKH—SEC: W4MLE. PAM: W4IKB. RM: W4BVE. Section net reports:

Net	Freq.	Time	Days	Sess.	QNI	QTC
WFPN	3950 kc.	2300Z	Daily	31	659	128
QFN	3651 kc.	2330/0300Z	"	62	—	388

Tallahassee: The 10-meter Net now has 12 stations on the roll. Check in on 28.8 Mc. at 2000 EST Mon. and Thurs. Perry: W4WUV is active on 75-meter WFPN. Marianna: WA4DED, EC, has acquired and equipped a vehicle for emergency communications with the aid of local merchants. W4KCA has a BC-640 with 100 watts on 2 meters. Chipley: W4SGII/4 is active on 89 meters. Panama City: W44FIJ is working on a 220-Mc. portable rig. W44ZGI's XYL is now WB4EZZS. W44ZGI, with the aid of W4SGG and W4IKB, delivered a death message to Africa from Port St. Joe, Delunyak Springs; W44PKR got married recently, but still finds time to handle traffic with South American missionaries. Fort Walton: W2TPV, with XYL WN2VYK, is stationed here. He is assisting WB4VE as QFN Manager. The Playground ARC heard an interesting talk on Panama at the Jan. meeting. The EARS Transmitter Hunt/Picnic drew a large crowd; the winner was W4AQN, followed by WN4EQU. Pensacola: New club officers are K4SOL, pres.; plus W4AIZM, K4SMB and K4BSS/4. Meetings are held the 1st Fri. of each month at 7:30 p.m. Traffic: K4VFF 406, W4BVE 179, K4BSS/4 126, W44EQQ 83, W2TPV/4 69, K4VWE 62, W4IKB 26, W44FIJ 24, W44JIM 20, K4NMZ 9.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Floyd C. Colyar, W7FKK—SEC: K7NIY. PAM: W7CAF. RM: K7NLL. New officers of the Arizona Amateur Radio Club are K7AAB, pres.; W7LXJ, vice-pres.; W47DSW, secy.; K7JJT, treas.; W7RIJ, act. mgr.; K7VOR, editor of *W7IO Newsletter*. W7BYF/K7YSE is now W6DGR. W7DQS has moved to Phoenix. New officers of the Amateur Radio Council of Arizona are K7VOR, chairman; W7GNP, vice-chairman; K7MLE, secy.; W7AREP, treas. W7FKK, W7MAE and K7NHL were visited by K8LVC. New officers of the Copperstate Roadrunners are K7GHS, pres.; K7HFP, vice-pres.; K7ZWL, secy.-treas.; W7GNP, act. mgr.; W7DRR, editor of the *Roadrunner Amateur Radio News*. Fine reports were received from K7RUR, K7NHL, W7TFQY and W7AAY. W7AWH is moving to Florida. New officers of the Old Pueblo Radio Club in Tucson are K7ICK, pres.; W47EQC, vice-pres.; W47CSN, secy.-treas. Traffic: K7NHL 282, W7FKK 18, W7DQS 2.

LOS ANGELES—SCM, H. G. Garman, W6BHG—Asst. SCM/SEC: W. R. Calkins, W1KUX/6. RMs: W6BHG, W6QAE, W6BBO. PAMs: K6MDD, W6MLZ, W6ORS. BPLers: K6EPT, K6IOV, W6DSC, W6GYH, W6WPF, W6BBO and W6QXY. The Eight Ball Net (EBN) is no longer able to qualify as a local/section net of the NTS. K6IOV put up antennas at a cabin near Barstow; the call is W6FJC at that location. W6QXY is busy typing a California Routing Guide for the use of traffickers. K6MDD is making preparations for the SADC and LA County Fair plus the Long Beach SA Camp meeting. W6KIL has his homebrew linear working (20 meters only). W6QAE has been on vacation. W6TXJ is now Civil Defense Radio Officer for the City of Los Angeles. W6OLD has a new keyer, EICO 717. *Attention all Novice operators:* If interested in a Novice slow-speed traffic net contact W6OLD, 17173 Lisette St., Granada Hills, Calif. 91342. We are very sorry to hear that K6IUV's OM, K6YDJ, is very ill. W6QMF, Asst. EC Long Beach, has two AREC nets in operation on 3568 and 3862 kc. W6QMF, frequently operating W6YRA, says he has a new "inverted L" antenna at home. W6TMC has a new antenna system for 80 meters. Welcome to K5ANS/6, moved here from Texas, who operates nightly on SCN, 3600 kc. His station consists of the S/Line and Mod. 19 RTTY. W6HUU's working hours prevent him from being more active. K6UMV gave a talk to the Valley Club on antenna modeling techniques and antenna theory. He has obtained RT34/APS-13 gear for 432-Mc. as a transceiver. W6MPF lost his antennas in a storm. WB6AEL has the new black box at 100 watts input, Drake 2-NT, crystal only, and a companion v.f.o. an order. W6MLZ is busy attending amateur gatherings. W6TN received a 35-w.p.m. ARRL CP sticker. W6ORS

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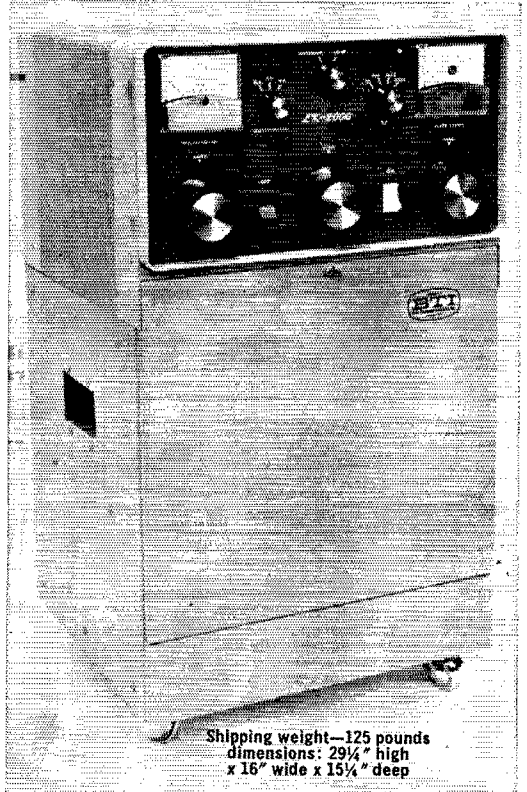
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is getting organized in the new shack and plans to get back on the v.h.f. bands with gear on 220 Mc. and a beacon antenna to further OVS. WB6OUD is expecting a new s.b. transceiver for his birthday. K6EA is now partly active at the home QTH. W6SRE still is trying to get the new shack in order. WB6MSU is QRL Air Force MARS and is starting the John Muir Radio Club. WA6YKP now has a radiotelegraph 2nd-class FCC ticket. WB6QEL is secy. of the Inglewood Amateur Radio Club. Support your section level nets: SCN daily 0300Z on 3600 kc.; SCS, daily 0230Z and 2000Z on 50,400 kc. Traffic: (Jan.) K6EPT 1889, W6GYH 935, K6LOV 826, WB6BBO 718, WB6QXY 692, W6WPF 380, W6MLF 321, K6CDW 213, K6MDD 203, W6BTY 144, W6DSC 141, WB6KLL 110, WA6WKF 107, WA6KZI 106, K6ASK 103, W6FD 92, W6QAE 88, W6TXJ 75, W6BHG 62, W6BVXJ 62, WA6TWS 57, WB6GGL 50, WB6OLD 49, K6IWW 39, WB6QMP 37, W6KKG 36, WB6QGM 33, W6EO 29, WA6TYR 24, K6KA 18, W6DQX 17, W6PCP 17, WB6TMC 14, K5ANS/6 13, W6HUJ 12, K6UMIV 11, WB6MPF 10, WB6AEL 8, W6MLZ 8, W6TIN 8, WA6UCR 8, WA6WJT 7, W6ORS 6, WB6OD 6, W6CXC 4, W6DGH 4, K6EA 4, W6USY 4, W6IUX/6 3, W6BUPH 2, W6SRE 1. (Dec.) WB6OLD 163, WA6KWV 65.

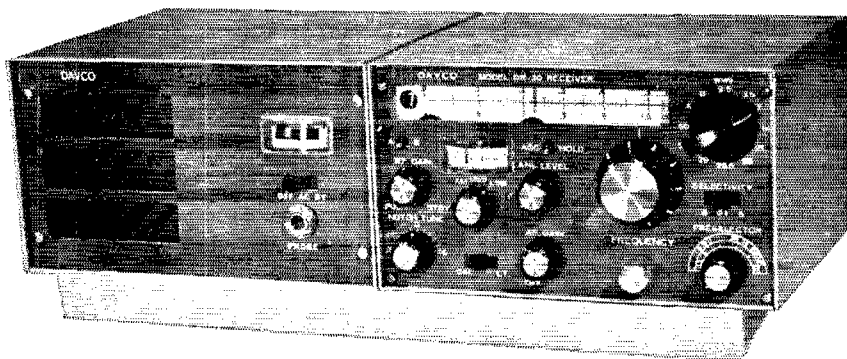
ORANGE—SCM. Roy R. Maxson, W6DEY—The 2-4-6 Net, 145,080 Mc., 1845 PST daily reports for Jan. had 542 check-ins, traffic 116; for Nov. 66 and 560 check-ins, traffic 119; for Dec. 66, per K6DLY. The Gold and Silver Novice Net is being promoted by WB6UTC and WB6OLD to meet daily on 3740 kc. at 0100 GMT. It is for Novices and Generals for training and traffic. Send call and nearest crystal frequency to be placed on roll-call. W6FB advises that WB6PDC is the new treas. of the Desert RATS and that WA6DNI and WA6TAG, recently in Mexico and Minnesota respectively, kept in touch with home via transceivers. WB6CJS is back on the air with an EICO 753 on 40 mobile. WA6TAG advises of two new AREC members, WN6VCT, 11 years old, and WN6VGA. SEC W6WRJ advises that K5CID has been appointed EC for the Riverside Metropolitan Area. Traffic: WB6JFO 303, WA6ROF 116, WA6OBM 114, K6IME 103, WB6RJK 64, WA6KVA 48, WB6UTC 36, W6WRJ 27, K6GMA 16, K6YVN/6 13, WA6TAG 12, W6FB 9.

SAN DIEGO—SCM. Don Stansifer, W6LRU/WA6VUI—Officers of the Palomar Club for 1967 are W6LLE, pres.; W6LKC, vice-pres.; W6YZV, secy.; WA6HYC, treas. The V.H.F. officers are K4AFS/6, pres.; K6GAO, vice-pres.; WA6SKT, secy.-treas. San Diego Council Officers are WA6TAD, chairman; K6YRF, vice-chairman; W6BLL, secy.; K6KX, treas. Remember the Division Convention here in 1969. The Council is planning now and needs your help. W6YKF now is active on SCN, 3600 kc. c.w., 0300Z daily. A new AREC/AREPSC Net, primarily for Novices, meets at 8:30 A.M. Sun. on 3737 kc. with WA6TYF as NCS. He will tune around the Novice band for check-ins. This is the only c.w. Novice AREC net in the Section. Two recent Silent Keys were W6VFO and W6LYF. The latter was C.D. Radio Officer and Red Cross Radio Officer, and was active in emergency communications in the section for years. The SOBARS-San Diego Council Ham of the Year Award went to K6ZBE, who organized the Eye Bank in San Diego and kept daily schedules with other stations on an international basis so this work could be done. Traffic: (Jan.) K6BPI 8406, W6EOT 480, W6VNO 425, W6BGF 380, W6LRU 44, WB6MPD 7, WB6NMT 3. (Dec.) WB6MPD 263.

SANTA BARBARA—SCM. Cecil D. Hinson, WA6OKN—SEC: WB6NDP. W6HE has just returned from a 3-month tour down under where he visited numerous VKs, ZLs, VSs and KHs. W6HE now plans to get up a better antenna and chat with some of the friends he has made. New officers of the Santa Barbara ARC are W6MEL, pres.; K6EAG, vice-pres.; WB6MME, secy.; WB6SNH, treas. New officers of the Simi Valley ARC are K6GV, pres.; WB6LNF, vice-pres.; W6UTY, secy.-treas. WB6DPV, of Santa Maria, is attending UCSB and is pres. of the college ARC, where they use a Swan 350. New officers of the Satellite ARC are WA6UUA, pres.; WB6LDW, vice-pres.; W6KNV/6, secy.; W6QMV, treas. W6MSG held the highest score (2 parts/million) in the recent Frequency Measuring Test. W6ORW reports that he is ready for 10 meters when it returns. Traffic: WB6DPV 10.

WEST GULF DIVISION

NORTHERN TEXAS—SCM. L. L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO. SEC: W5PYI, PAM: W5BOO, RM: W5LR. Now that the holidays have come and gone I hope that everyone has his new rig and equipment adjusted and is ready to settle down and do some real hamming. Now is a good time to get lined up with a good traffic net and start handling some traffic. The new *Manual* for operators is a good investment for anyone wanting to know the principles of handling traf-



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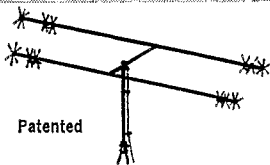
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fic. In it you will find all the information you need to become a good traffic man. Congratulations to Mr. F. E. (Ed) Handy on his retirement, which became effective Feb. 1. I have known Ed for more than ten years and I hate to see him leave the League as Communications Manager but I think he will enjoy being able to be just a ham again. Good luck in your new occupation. George Hart, WINJM, has been appointed to take Ed's place and because of his experience will be able to carry on in fine style. N'T'N reports 1407 stations, with 425 pieces of traffic handled. K5HUG is avionics officer at Tinker Field. The KC Club, Ft. Worth, has been offered a permanent meeting place in the Children's Museum and as soon as all arrangements can be worked out will start meeting there. W5BCB has moved to Arkansas. Traffic: W5PBN 166, K5DBJ 146, WA5EGH 135, K2EIJ/5 110, WA5EVS 58, WA5RAN 20, W5BOO 13, WA5JLJ 12.

OKLAHOMA—SCM, Daniel B. Prater, K5CAY—Asst. SCM: Sam Whitley, W5WAX, SEC: K5ZCJ, RM: W5-QMJ. PAM-75: WA5BTQ, PAM-6 meters: K5VFR, PAM-2 meters: WA5LBI. Tulsa amateurs provided emergency communications during the tornado alert Jan. 25. Most of the traffic was through the Tulsa repeater on 2 meters. The Oklahoma Central V.H.F. Amateur Radio Club elected W5VCI, pres.; W5EXL, vice-pres.; WA5HUN, secy.; WA5LBI, treas. A modulated c.w. net on 50.50 Mc. for training purposes is headed up by W5-LVO and WA5LBI, who is PAM for 2 meters. The Central V.H.F. Club also has started a theory class for prospective amateurs in the Oklahoma City area. Results of the Wheat Straw Amateur Radio Club training classes have paid off with several new amateurs in the Calumet area. They are WA5WPK, WA5PRJ, WA5RJW, WA5-RGY, WA5RJX, WA5RJV, WA5RLE, WA5RLQ and WA5RLR. K5DSR, of Mulhall, is working into the Tulsa repeater now. WA5KNR/5, of Moore, has his TDQ back on the air at a new location. WA5FVJ, EC for Garfield County, has an AREC net operating every Tue. at 1930 CST using 2 meters. A new club was organized called the Pawnee County Amateur Radio Club with WA5KZA, pres.; W5LNC, vice-pres.; and WA5OWT, secy.-treas. The Sooner Traffic Net reports QNI 523, QTC 84, OIZ, 17 sessions. QNI 49, QTC 48. Traffic: (Jan.) K5TEY 954, W5QMJ 49, W5FKL 29, WA5KZA 29, WA5NTI 16, W5-MFX 15, WA5KNR 14, WA5BTQ 12, WA5IMO 12, K5-WPP 12, WA5MDN 11, W5PML 10, WA5OEHX 6, WA5-DZP 4, K5OCS 4, WA5FVJ 1. (Dec.) K5TEY 1351.

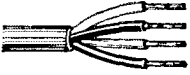
SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5-AIR—SEC: K5QQG, PAM: W5KLV, RM: W5EZY. Congratulations to other new Southern Texas appointees: W5AC as OPS and ORS, K5HMF as OO, WA5NHL as EC Walker County. New RM W5EZY was heard on the Tex. Traffic Net getting a campaign started for more efficient traffic-handling. Come on, fellows, and join the fun at 1900 and 2200 Central Time on 3770 kc. K5WIC reports that W5AC is starting code classes and is erecting a 50-ft. crank-up tower topped with a Hi-Gain TH6DX and eight-element 2-meter beam. OPS K5GJQ advises that 61 eye tissues were passed during Jan. from Eyebank Net operation. EC W5TFW advises a large group participated in the March of Dimes Telethon. W5-BCE has a new Galaxy 300 on the air. EC WA5ABU has a new HW12A and reports W5AUM has a new SB-200 and W5FUW an RICO 753 Tri-Bander, W5URW, former EC is now Administrator for the Bohne Hospital in Brenham. W5KLV advises the STEN Convention will be held June 16-17-18. OPS K5WYN is keeping skeds with several 75- and 2-meter nets. WA5BUI, just out of the Navy, is now at Texas A. & M. U. and with room-mate WA5PHB working on v.h.f. keeping skeds daily with Brenham 2000 CST on 145.2 Mc. OO W5EJL is back on the air with "Random Wire" and "L" Network. OPS WA5KHE, in Nacogdoches, hopes to develop a slow-speed c.w. net on 2 meters for traffic and experimental work on transmission over the Southern Texas section. Watch for his c.w. on 2 meters. A ham demonstration was given to the Knights of Columbus at Victoria by W5WB/5. Several 2-meter stations participated. EC K5GDH, along with K5VQG and W5FJD, have returned from a trip to Las Vegas. They operated on 146.940 Mc. car to car and made many nice contacts en route. K5-GDH now has a new SB-200 amplifier so he must have won. We regret the loss of K5ZAD, of LaMarque, Tex., who became a Silent Key Feb. 1. The Tex. Traffic Net handled 243 pieces of traffic in 62 sessions. Traffic: K5-HZR 185, K5GDH 157, WA5MXY 114, WA5IQL/5 71, W5AC 69, WA5QKE 49, WA5LNW 48, K5HMF 42, W5-DNR 38, W5AIR 34, W5EZY 33, W5KLV 18, W5HWY 14, W5TFW 13, WA5BQ 12, W5AQN 11, K5GJQ 4, K5WIC 4.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FK, PAM APN: VE6ADS, ASBN: VE6ALQ, ECs: VE6SA, VE6SS, VE6XC, VE6AFC, VE6PL, ORSs: VE6BR, VE6ATH, VE6ATG. OPSS: VE6HM, VE6SS,

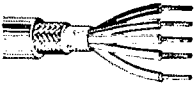
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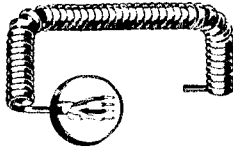
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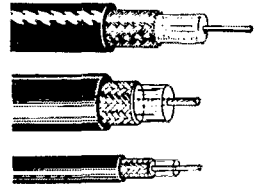
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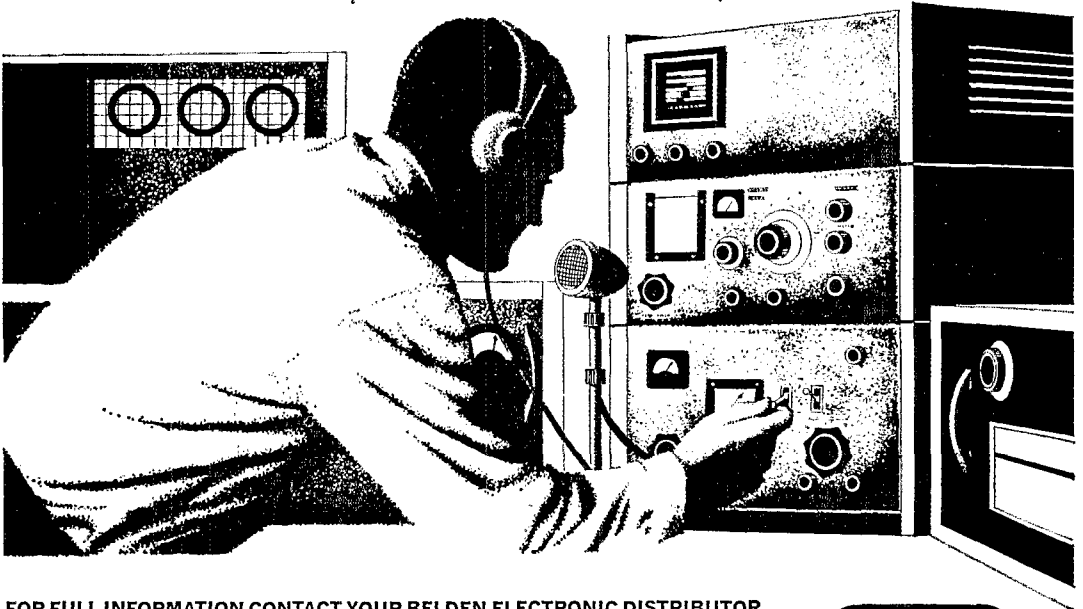
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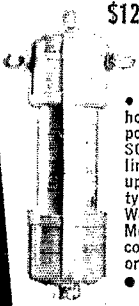
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VE6ADS. OOs: VE6HM, VE6TY, VE6AKV. OBSs: VE6HM, VE6AIF. Calgary CARA will host the Alberta Centennial Hamfest July 8 and 9. The AREC in the province will give communications for the balloon races July 7 and 13 from Calgary. VE6PL will look after the Alberta end of the Centennial Canoe Pageant. The NARC is busy with a questionnaire. There is no news from Vulcan, Red Deer or Medicine Hat. The SARC of Lethbridge is busy reorganizing. VE6ATH is very busy with traffic as well as making contacts with all the XYLs she can in the province. VE6AO is heard on ASBN quite often. APN and ASBN report that traffic is heavier. More and more are using the 3C calls these days. Traffic: VE6ATH 73, VE6HM 46, VE6XC 30, VE6FK 25, VE6PL 23, VE6AET 11, VE6AKV 7, VE6ALQ 7, VE6ALS 7, VE6WN 7, VE6XX 5, VE6AHV 4, VE6AL 4, VE6AOO 4, VE6KS 4, VE6AKA 3, VE6PZ 3, VE6SA 2, VE6ALU 1, VE6YW 1.

BRITISH COLUMBIA—SCM. H. E. Savage, VE7FB—Nanaimo ARC is calling a dinner reorganization meeting as soon as VE7GR finds the place. Pentiction, North and West Centennial certificates are worth going after. VE7WS's father passed away at 82 years young. VE7BOI has a homebrew transceiver on 144.7. VE7BOQ is on 160. VE7AC is looking for a 160 net. VE7BAY has moved his station to school so the school station and students will be active. VE7BLO received his WAS and came in second in the 1966 QRP club. VE7BCJ/VE3 weekends on 14.140 while in Ottawa. VE7BUX is an old-timer starting all over. Point Grey ARC pres. is VE7JY, secy. VE7SL, VE7OT, was secy. for more than twenty-five years. The BCARA, with the help of VE7ZQ, visited VE7HR, the QSL Mgr. and picked up all the QSL cards he had. Royal City ARA then took the job of seeing they were sent on to the addressees. This now leaves the QSL Manager's office clear for the centennial 3C7 QSLs request which most B.C. DX operators feel will be very heavy. We are sorry to report that the North and West ARC is disbanding its 10-meter net. Our QSL Mgr. has held this post for twenty-nine years. Do we have any longer? The B.C. Motor Vehicle Branch has removed the five dollar surcharge for amateur call plates. The Burnaby ARC has been doing all the work of registering the amateurs for call plates. 1968 registration is now open. Traffic: (Jan.) VE7BHH 114, VE7BQA 20, VE7AC 19, VE7DH 11, VE7BLO 10, VE7AMW 9, (Dec.) VE7BCJ 96, VE7BLO 54, VE7BLS 46, VE7BOQ 2.

MANITOBA—SCM, John Thomas Stacey, VE4JT—Two-meter I.m. activity is on the upswing in Winnipeg. The calling frequency is 147.33 Mc. VE4SC and VE4EQ at Flin Flon, are active on 6, as are VE4MA and VE4HI in Winnipeg and VE4RE in Brandon. VE4NW reports the Flin Flon area AREC is very active and that VE4TM is equipped with a 1-kw. portable generator and SB-34 transceiver available for emergency work. VE4OT is active with a Swan 350. VE4AE is the new pres. of the ARLM. Brandon ARC has code and theory classes underway. The 6-Meter Net meets at 1600Z each Sun, on 50.280 Mc. with an average of eight active stations. VE4HI has completed an r.f. switching system for his v.h.f. station. As a Centennial Project ARLM is trying for a membership of one hundred. VE4JT continues propagation experiments. The traffic nets had a good month. The phone net reports sessions 31, QNT 514 and QTC 8. The c.w. net reports sessions 31, QNT 207 and QTC 176. Traffic: VE4JT 126, VE4LG 125, VE4EI 90, VE4RW 63, VE4NE 43, VE4EF 18, VE4GN 11, VE4XN 11, VE4LI 9, VE4DL 5, VE4MK 5, VE4JA 4, VE4PW 2.

MARITIME—SCM, J. Harley Grimmer, VE1MX—Asst. SCM: R. P. Thorne, VO1EI, SEC: VE1HJ. Our deepest sympathy is extended to the XYL and family of VE2BE. Alex was well known in this area and made many friends during the years he was associated with amateur radio. VE1HD was in the hospital after too much snow-shovelling but is progressing favorably. VE1ACD/W4 has been operating from Port Charlotte, Fla., this winter. VE1AMR has a pair of 811As in linear service on 80 now. The 1967 officers of the GBARC are WA4-DST/VO2, pres.; Michael Kelly, SWL, vice-pres.; and VO2AW, secy.-treas. Ex-VO1CM is now F7CZ. Congratulations to VOIDS and his XYL on the arrival of a new XL and to VO1BL on his being elected to the Saint John's Municipal Council. VO1AA is now an Honorary Life Member of SONRA. New appointees are VE1AMC as OVS and VE1AMR as ORS. Please contact me and I will be glad to furnish details if you are interested in ORS, OPS, OVS, OBS or OO appointments. This year's VE1 Contest found many keys and mikes being dusted off and enjoyable contacts made by those who participated. Many stations outside this area were heard calling and perhaps the contest should be opened to all comers to assist them in obtaining WANB and WANS wallpaper. Traffic: VE1RT 108, VE1DB 27, VE1AMR 15, VE1OM 2.



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- Broad-banded 3-32 mc. • Center hang-up hook for inverted Vees • Handles full legal power, 2KW PEP • Built-in lightning arrester • SO239 RF connector for coax transmission feed line eliminates center insulator • Withstands up to 600 lb antenna pull • For use with all type antennas fed with unbalanced coax line • Weighs only 6½ oz. 1½ diam. 6" long • 2 Models: 1:1 matches 50 or 75 ohm unbalanced coax to 50 or 75 antenna load. 4:1 matches 50 or 75 ohm unbalanced coax to 200 or 300 ohm.
- W2AU Super Vinyl jacketed 2 element 10-15-20 meter quad. Complete quad \$64.95
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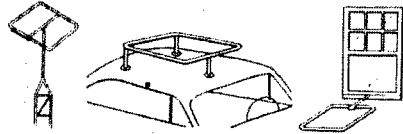


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2 - 6 - 10 - 15 - 20 - 40 METERS

SQUALO is a full half wave, horizontally polarized, omni-directional antenna. Outstanding all around performance is achieved through a 360° pattern with no deep nulls. The square shape allows full electrical length in compact dimensions. Direct 52 ohm Reddi Match feed provides ease of tuning and broad band coverage.

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ASQ-2	2 Meter,	10" Square	\$ 9.95
ASQ-6	6 Meter,	30" Square	13.95
ASQ-10	10 Meter,	50" Square	19.50
ASQ-15	15 Meter,	65" Square	23.50
ASQ-20	20 Meter,	100" Square	32.50
ASQ-40	40 Meter,	192" Square	66.50

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The newest in the line of fine tuning aids from Jackson Bros. Direct/Slow Reverse (5:1 ratio) Vernier Drive. Easy fixing — requires only one 3/8" hole. High torque, low-back lash, smooth and permanent movement, coaxial spindles, 1/4" shaft dia.

Model 4111/RV \$1.95



actual size



VERSATILE MINIATURE TRANSFORMER

Same as used in W2EWL SSB Rig— March, 1956 QST. Three sets of CT windings for a combination of impedances: 600 ohms, 5200 ohms, 22000 ohms. (By using center-taps the impedances are quartered). The ideal transformer for a SSB transmitter. Other uses: interstage, transistor, high impedance choke, line to grid or plate, etc. Size only 2" h. x 3/4" w. x 3/4" d. New and fully shielded.

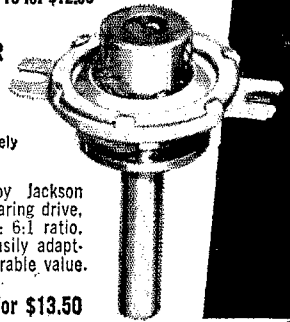
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Shown approximately actual size

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- AM, CW or SSB
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- No tuning required
- Up to 60 Mc
- Will handle 5W to 1 KW
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- Size: 9 1/2" deep, x 5 1/2" high, x 3 1/2" wide
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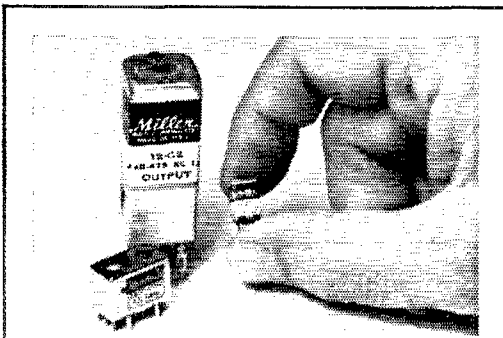
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and added punch?

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ONTARIO—SCM, Richard W. Roberts, VE3NG-I regret to advise you of two Silent Keys in Jan. Our beloved Alex Reid, VE2BE, Vice-President of the ARRL and former Canadian Director of the Canadian Division for 25 years, has passed away. Alex will be missed by his many, many friends and may we pass along our sympathy and heartfelt condolences to Mrs. Reid and family. Also we regret to record the passing of VE3BLEY, of North Bay. Our condolences to his loved ones. Harry was quite active on s.s.b. and will be missed but not forgotten by his many friends. The Sault Ste. Marie Club elected VE3ENY, pres.; VE3AXH, vice-pres.; VE3EGJ, secy.; VE3ALV, treas.; VE3FWC, act. mgr. The club call is VE3SOO and a ham TV station is its Centennial Project. I would like to thank the Sudbury group for a very enjoyable visit with them. Those of you in the London area will be interested to know that the London ARC meets in the R. E. Crouch Public Library, 550 Hamilton Rd. I am looking for many more Official Observers. Mail your SCM a card for information to 170 Norton Ave., Willowdale. Once again, chaps, check the date of expiration on your appointment certificate. VE3CBE is now residing in Ottawa. The Belleville and Kingston clubs visit each other. Many have made bids for the teleprinters made available to Ontario hams by the Canadian National Telecommunications Dept. Thanks to our Canadian Director for making this possible. Traffic: VE3BZR 118, VE3CYR 107, VE3DPO 101, VE3NG 02, VE3GCE 72, VE3ATI 05, VE3AWE 54, VE3BII 48, VE3BLZ 44, VE3DVE 31, VE3EBC 31, VE3BUR 29, VE3RWAI 29, VE3LV 27, VE3VD 24, VE3AFA 22, VE3BQL 21, VE3HFV 21, VE3EEL 18, VE3DGB 16, VE3FTN 16, VE3ETM 14, VE3FTJ 12, VE3WW 11, VE3EIG 7, VE3DI 4, VE3EZY 4.

QUEBEC—SCM, J. W. Ivey, VE2OJ—SEC: VE2ALE, RM-VE2DR. At a well-attended meeting of the MARC in January the members heard a most interesting and well-executed talk on DX by VE2NV, a pro at the DX facet of amateur radio as the country list he has to his credit shows. VE2ANK now has 250 countries confirmed. The January issue of *Marcogram* contained a very hard-hitting editorial at those over-anxious people who can't wait for their license before going on the air. Licensed amateurs should remember that they may contact only other licensed amateurs. The Quebec AREC Net now is on at the usual time, 1600 GMT Sun., but on 3780 kc. for a trial period. It is hoped the QRM problem some had at 3755 kc. will be overcome. The Canadian NEC, VE2AUU, is hard at work getting the groundwork for amateur communication to follow the progress of the canoe race from Western Canada to the EXPO 67 site. At this writing, the site atop Rigaud Mountain has been confirmed and by now the new repeater on 2 meters should be an established thing, giving a new link to the west area of the section and with Ontario. It gets nearer to the time for the biggest ARRL National Convention ever—Montreal—June 30, July 1 and 2. Traffic: VE2BVI 94, VE2DR 66, VE2OJ 52, VE2AJD 35, VE2BRD 35, VE2ALE 34, VE2DCW 26, VE2EC 22, VE2BWL 17, VE2CP 14, VE2UN 13. **QST**

World Above 50 Mc.

(Continued from page 90)

Low-Band V.h.f. Nets

At least three low-band v.h.f. nets are now in operation offering a means of information exchange weekly.

One group meets at 2000Z, Sundays, on 28.630 Mc. s.s.b. and another, which is just getting started, nightly at 2345Z on 3.577 Mc. c.w.

The principle net meets at 0330Z, Mondays on about 3.810 Mc. s.s.b. The frequency may vary some week-to-week because of QRM, but not more than 5 kc. The net begins with the Central States and is then joined by the West Coast group about one hour later. A few East Coast v.h.f.ers also check-in. The net members reads like a "who's who" of v.h.f. and provides an excellent source of up-to-the-minute news of existing schedules and propagation information. **QST**

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BRAND NEW BOXED TUBE TYPE 4D32 (in orig. Raytheon Govt. cartons). Lab certified "Mint", new. (current net \$74.30). Sale price **\$23.00**.

JOHNSON 4X150A AIR SYSTEM SOCKETS, Johnson #124-110-1. Basic Socket with By-Pass Screen Grid Capacitor. Cathode Terminals insulated. Mounts above chassis thru 2 1/4" hole with 3 clips drilled for 6-32 screws. Brand new (reg. net \$11.75). Special sale price **\$7.50** each.
NATIONAL NCX-3 TRANSCEIVER. Brand new. **\$195.00**.

GONSET SUPER-6 MOBILE CONVERTER. All Ham Bands and SW BC. **\$22.00**.

ELECTRO-INSTRUMENTS Model 4000 Digital Voltmeter. Rack mtd. Used. Good appearance, with detailed book. Needs some work. Only **\$125.00**.

P & H MODEL LA-400C 800 Watts PEP SSB Linear Amplifier with built-in power supply. Like new. With book. 7 Bands, 10 thru 80. **\$125.00**.

LETTINE MODEL 242, 6 meter VHF Transmitter. **\$45.00**.

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KARG UNIVERSAL FM STEREO MULTIPLEX ADAPTOR, Model MX-5, for receiving Stereo FM Broadcasts with ordinary FM Tuner or Receiver. Factory wired. Brand new with instruction sheet. Sale priced at **\$13.95**.

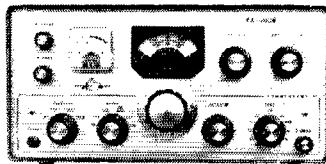
RCA COLOR BAR GENERATOR MODEL WR-61B. Orig RCA Carton. (orig. net \$259.50) Sale Price **\$120.00**.

VIDICON TYPE 7038 @ \$62.50 — Brand new imported.

VIDICON TYPE 7735 @ \$77.50 — Brand new imported.

6 HY. @ 1.2 AMP. CHOKE. Hermetically sealed. Porcelain insulators. 3,000 V. insulation. **\$17.50** (two for **\$30.00**). shipped via economical motor freight.

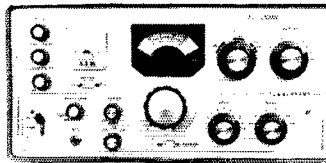
HI-PAR 2M6 6 element 2 meter beam only **\$6.50**.



SOMMER-KAMP FR-100B

DOUBLE CONVERSION SUPERHET

80, 40, 20, 15, 10 mtrs. 1 st i.f. 5355-5955 kc; 2nd i.f. 455 kc; one mech filter 4 kc for a.m.; one mech filter 2.1 kc for s.s.b.; one xtal filter 500 cycle for c.w. 100 kc xtal calib; b.f.o.; noise limiter; built-in pwr sup 115/230 vac, 60 cps. Sensitivity 0.5 microvolts. Transceiver plug, 12 tubes, 10 diodes. dial calib 1 kc. 12 x 15 x 7 inches. **\$250.00**



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130 WATTS s.s.b./c.w./a.m.

Same bands and size as FR-100B. v.f.o.; one mech filter 2.1 kc; carrier, and sideband suppression 50 db; built-in ant relay; vox, anti-trip; built-in pwr sup 115/230 vac, 60 cps; upper & lower sideband; transceiver plug; 13 tubes, 7 diodes. Supplied with plugs. **\$350.00**

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IARU News

(Continued from page 76)

ITU SECRETARY-GENERAL DIES

ITU Secretary-General Dr. Manohar Balaji Sarwate died February 19th in Geneva, Switzerland. He was 56 years old.

Deputy Secretary-General Mohamed Mili will serve as Secretary-General of the ITU until the next plenipotentiary conference, scheduled for 1971.

Dr. Sarwate was engaged in the development and research on aircraft radio and radar equipment in the United Kingdom during the first part of World War II. After returning to India in 1941, he worked mainly with radar, entering government circles in the communication field.

Dr. Sarwate was a founder-member of the Institution of Telecommunication Engineers of India and was active in ITU affairs since 1959. At its plenipotentiary conference that year he was chosen as Deputy Secretary-General. He was elected Secretary-General of ITU in October, 1965.

LMRE CONVENTION

The Mexican IARU society, *Liga Mexicana de Radio Experimentadores* (LMRE) will hold its National Convention May 27-30 at Tulancingo, Hidalgo, Mexico. Further information on the convention is available from LMRE, P.O. Box 907, Mexico D.F., Mexico.

RAL QSL BUREAU

The address of the OD5 QSL bureau is *Association de Radio-Amateurs Libanais* (RAL) P.O. Box 1217, Beirut, Lebanon.

DECEMBER IARU CALENDAR

The current issue of the IARU Calendar contains the vote sheet for proposals 119 and 120, the admission of the *Faroese Amateur Radio Society* (FRA) and the *Malta Amateur Radio Society* (MARS) into the IARU, and the annual questionnaire. Headquarters urges each member-society to complete and return both the vote sheet and the questionnaire.

1967 IARC CONVENTION

The 1967 IARC Convention is scheduled for September 23 and 24 in Geneva, Switzerland. The convention coincides with the meeting of the World Administrative Radio Conference on matters relating to the maritime mobile service.

LIBERIAN FIELD DAY

The Liberian Radio Amateur Association is holding its Third Annual Field Day April 29 and 30. Club station EL2FD will operate s.s.b. on 14.303 and 21.303 Mc. between 1400 and 0100 GMT April 29, and from 0900 to 0100 GMT April 30. C.w. transmissions will be on 14.103; RTTY will be attempted around 14.090 Mc. QSL cards will be sent to each station contacted. **QST**

TILTED PANELS the easy way!

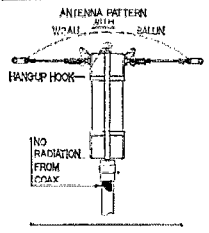
CAB-PAC includes everything: four soft plastic feet with brass inserts, two rigid front feet extenders and four 6-32 mounting screws. Give your chassis that modern look. At your dealer's, or postpaid.....only



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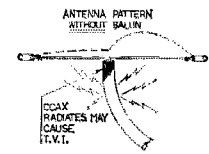
W2AU BALUN LETS ENTIRE ANTENNA RADIATE!



STOP WASTING YOUR SIGNAL! REMEMBER, YOUR ANTENNA IS THE MOST IMPORTANT PIECE OF GEAR YOU OWN.

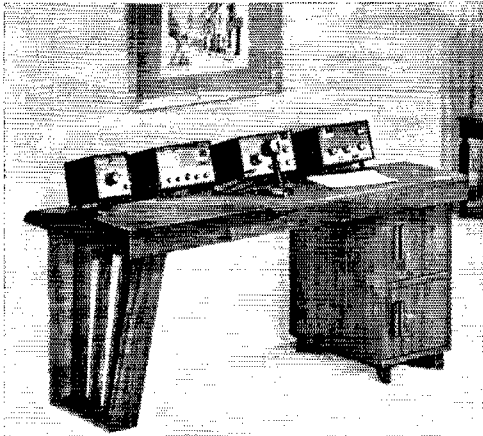
- No Radiation from Coax
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- Perfect for Inverted Vees (Use Hang-up Hook)
- Built-in Lightning arrester
- Broad-Band 3 to 30 Mc.
- Takes Legal Power Limit
- Two Models:
 - 1:1 50 ohm coax to 50 ohm balanced
 - 4:1 75 ohm coax to 300 ohm balanced
- A must for Inverted Vees, Doublets, Quads, Yagis etc.

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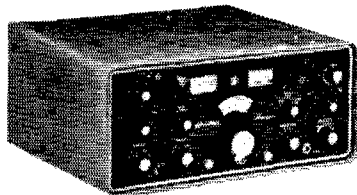
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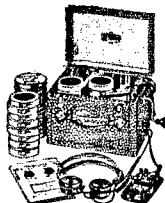
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Box 19, Boston, Mass 02101 Tel: 617-742-0048

Electronic Crossword

(Continued from page 87)



TVI Prevention

(Continued from page 82)

on the other end of the QSO. Happily this has not been the case. As nearly as can be determined, the transmitter plate tank circuit (when SC is used) is operating in a superregenerative condition (that is, in and out of oscillation at a high audio rate). This condition so sharpens the signal and narrows the bandwidth of the receiver that this high tone is completely lost.

Others, when first hearing of this method, have felt that because the transmitter is off part of the time there would be gaps in the received speech pattern. While in fact there are such gaps, they are of such short duration that the human ear will blend them over and the interruptions will not be noticed.

Since using this form of TVI prevention the author has not had a single complaint. Reports from all who have built SC units indicate that they too are experiencing complete freedom from TVI. Whatever your TVI problem, the Synchronization Control Unit is the ideal way to solve it permanently

QST

YL News

(Continued from page 85)

Submit standard log information as proof of contacts.

Suggested meeting times and frequencies are:

Time GMT	Frequency
1700	7235 kc.
1900	3895 kc.
2100	14,265 kc.
2200	21,350 kc.
0200	lower part of 75-meter band

Send copies of logs to: Helen Drake, K5ECP, 1717 Virginia Street N.E., Albuquerque, New Mexico.

Plan Ahead!

The 16th annual Mid West YL Convention will be held on May 19, 20, 21, 1967, at Holiday Inn, Lafayette, Indiana. It will be hosted by the Hoosier Amateur Women's Club. Pre-registration fee of \$2.00, should be sent to Mary Alice Koetur, K9BJJ, 3116 Blackmeyer Road, Richmond, Indiana 47374. After April 1, 1967 registration will be \$2.50.

QST



telrex "BALUN" FED INVERTED "V" ANTENNA KITS

SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

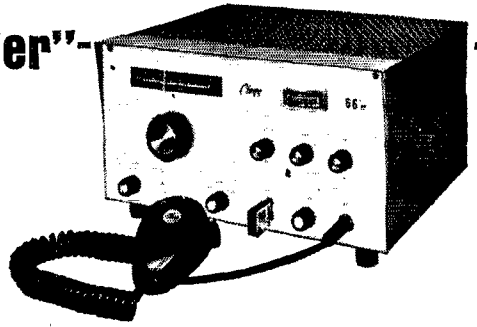
1.5-2.5 P.E.P. Mono and Duo-Band I.V.'s from . . . \$23.95
NEW! All band, I.V. Conical — 80 thru 10M . . . \$49.95
Kits contain "Balun", copperweld wire, insulators and installation and adjustment instructions.



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this is the new Clegg "66'er"

plenty of power, fixed or mobile operation—all the features you'd want in a top quality, 6-meter transceiver.



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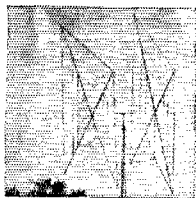
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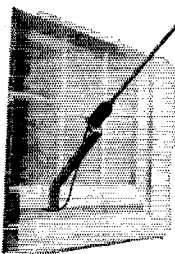
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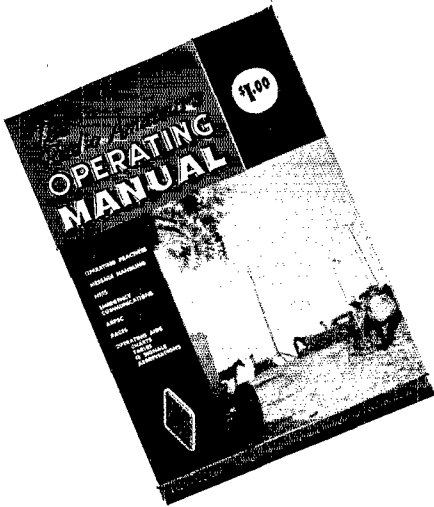
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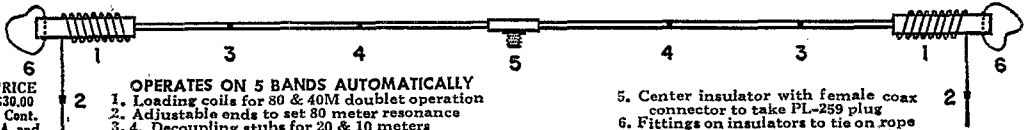
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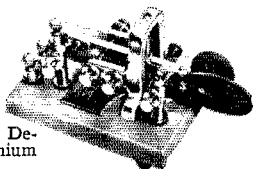
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(Continued from page 19)

former from an old TV set can be used. With silicon-diode rectifiers and capacitor input filtering, most TV transformers will deliver approximately 450 volts d.c. at 200 milliamperes or more. The screen-grid voltage can be taken from a dropping resistor or bleeder tap for Class C operation. The screen voltage should, however, be regulated for Class AB₁ conditions. The control-grid bias can be secured by placing a 6-volt filament transformer back-to-back with the 6.3-volt winding of the TV transformer, then using a half-wave rectifier and voltage divider on the filament transformer's 115-volt winding to secure the desired negative voltage.

A 5894 tube can be used instead of the 829-B in this circuit. If this is done, the length of L₃ will have to be increased approximately 2 inches over the dimensions given. This is necessary because the output capacitance of a 5894 is somewhat lower than that of an 829-B. The operating voltages for a 5894 are different than those used with 829-Bs, so the tube data sheet should be consulted before setting up the amplifier. The tube socket connections, however, are the same.

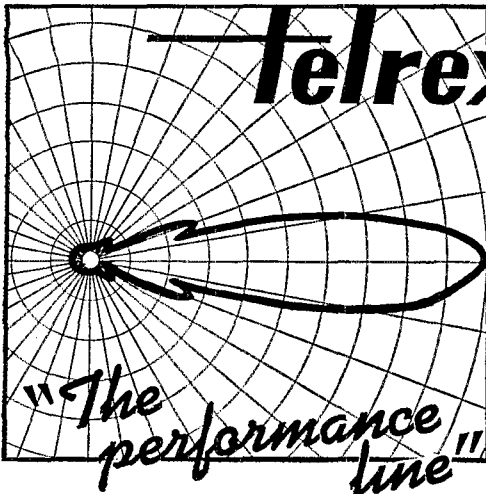
In Class C, this amplifier produced 55 watts of r.f. output into a 50-ohm dummy load. The driving power was secured from a Hallicrafters SR-42 and measured 3 watts. The input power to the 829-B was 80 watts, using 600 volts on the plates. S.s.b. tests were not run because an exciter was not available at the time. Information on tune up and operation of an 829-B in s.s.b. service was given in a recent issue of QST.³ The best way to adjust a linear amplifier is to observe the waveform on an oscilloscope during tune up.⁴

A grid-current meter can be placed in the bias line to the amplifier if desired. Compressing or spreading the turns of L₂ will produce a peak in grid current when resonance is established. A peak in output power should be noted when C₃ is tuned through its range (amplifier connected to a 50- or 75-ohm non-reactive load) and with C₂/L₃ tuned to resonance. If there is no such peak, change the spacing between L₃ and L₄ experimentally until the peak is obtained. In the author's amplifier, a spacing of approximately 3/8 inch was required.

Whether this amplifier is to be used as a separate assembly or as an integral part of a 2-meter transmitter, it should satisfy the need for an amplifier stage in the moderate-power class. Archaic or not, the 829-B is capable of doing a good job. Better still, this amplifier is easy to build and the cost is within reason for small-budget hams.

³ Hall, "A 100-Watt 2-Meter Transmit-Receive Converter," QST, Jan. 1966, p. 35.

⁴ The Radio Amateur's Handbook, 43rd edition, p. 316.



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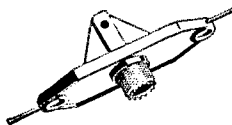
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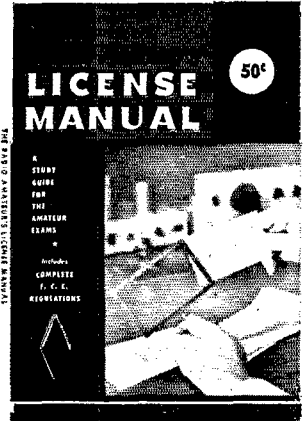
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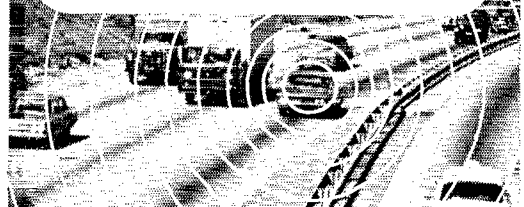
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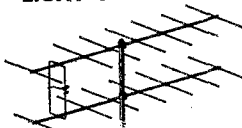
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- Arrays to 128 elements available

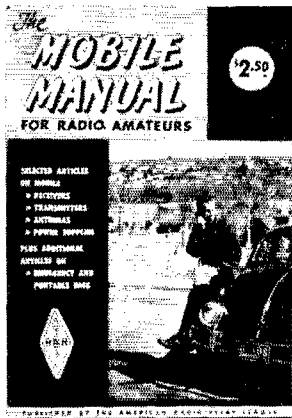
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Mobile Emergency Portable . . .



3rd Edition

In addition to a wealth of mobile material, the Third Edition of The Mobile Manual for Radio Amateurs includes numerous articles on Emergency and Portable gear, thus making it useful not only to mobileers but to all amateurs interested in lightweight, compact gear designed for field and emergency operation.

The Mobile Manual assembles under one cover the most noteworthy articles on mobile and portable operation that have appeared in past issues of QST. It includes articles on construction of receiving converters, transmitters, antennas, power supplies and suppression of noise in vehicles; contains excerpts from FCC regulations governing portable and mobile operation. A valuable "how to do it" manual for all amateurs.

\$2.50 U.S.A.
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**American Radio
Relay League, Inc.**

NEWINGTON, CONNECTICUT 06111

Peruvian Adventure

(Continued from page 70)

many youngsters living under such conditions for at least a week was frightening. The only thing to do was to ask for help.

At 11 A.M. we sent our first SOS, using the ARRL national calling and emergency frequency, 7.100 Mc. Five minutes later the call was picked up by OAINAN, a YL in Piura, northern Peru, who relayed it to OAHFO in Lima, who passed our QTC to the local Jesuit high school. By then the rig had turned into the only hope for the entire ship. People crowded around me as I worked the rig under a burning tropical sun. The temperature was over 100 degrees, the humidity 95 per cent.

Word of our plight spread quickly. The Peruvian Air Force Minister was flooded with telephone calls from local hams, informing him of our desperate situation. To make the story short, he ordered a PBY Catalina aircraft dispatched to our rescue. The aircraft was only 470 miles away and within flying distance. Less than six hours from our first SOS we sighted the first plane. Cheers broke out from all of us as we waved to the aircraft. It was a beautiful sight to see as it touched down on the river. We had been in contact with the capital city all day, so we flashed the news. As a consequence, the Air Command heard it first from the hams rather than from the pilot, who was still busy parking the aircraft at the river bank.

That night we kept Lima hams busy running local and even long-distance message deliveries for the youngsters on board. The papers that evening and the following morning broke the news to the country and the world.

The following morning the first 26 of us were rescued and flown to Iquitos, an hour and 10 minutes away by air. It took more than six flights to evacuate the ship entirely. With the news that we were in Iquitos, there were a lot of families in Peru thanking the hams for their work. Incidentally, we made our air connection back to Lima.

QST

First-Day Covers Still Available

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1964, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn't want anyone to be disappointed. We still have some of these left. They are all singles, unaddressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.

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we will grant you *instant credit* on Open Account or Time Payments—on either brand new equipment, or like-new equipment. Just pick up the phone and call us (no collect calls, please) or write and your goodies will be on their way the very same day. If you live in the Chicago area, drop in and take the merchandise home with you. What's more, there is no carrying charge, up to 25 days, on Open Account. Or you can take advantage of Trigger's easy budget terms at a *very low* interest rate. Merely give us the name of your credit card, and its number, and tell us what you want. You can also get a substantial trade-in on your present gear.

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DRAKE 2B..... 198	NC155..... 99	EICO 723..... 37
DRAKE 2B0..... 29	NC303..... 269	KNIGHT T60.... 47
SWAN 350..... 349	NCX3..... 199	T60 KIT FORM... 39
SBE34..... 339	NCX5 AC SUPPLY. 79	SWR BRIDGE.... 12
SB2LA LINEAR... 209	NCX5 LATE MOD. 495	24 HOUR CLOCK.. 7
CLEGG 22ER.... 177	VX501 VFO..... 179	100 KC CALIBRAT 9
885..... 67	NCL2000..... 549	HEATH STER0 A11 27
SX100..... 179	HX11..... 57	FISHER FM90X... 39
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SX130..... 129	HW50 2ER..... 44	TRIGGER HAS LATEST NEW MODELS IN STOCK FOR IMMEDIATE SHIPMENT TO YOU.
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HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a box number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 35¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy, since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 10¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 10¢ rate. Address and signatures are charged for, except there is no charge for those who furnish it. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 35¢ rate. Provisions of paragraphs (1), (2) and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested that name and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking-copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of Ham-Ads already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.

DAYTON Hamvention April 15, 1967. Dayton Amateur Radio Association's 16th Annual Hamvention. Wampler Arena Center, Dayton, Ohio. Participate in the technical sessions, forums, banquet, hidden transmitter hunt. Bring **XYL** for best in women's activities. For information write Dayton Hamvention, Department B, Box 44, Dayton, Ohio 45401.

ROCHESTER, N.Y. is Headquarters for Western New York Hamfest and East Coast Spring VHF Conference, Saturday, May 13. Top programming plus huge "tea market." For more information write: Rochester Amateur Radio Assn., P.O. Box 1388, Rochester, N.Y. 14603.

The Rockaway Amateur Radio Club Spring Auction will be held Friday evening April 14th at 8:00 P.M. at the American-Irish Hall, Beach Channel Drive (at Beach 81st St.) Rockaway Beach. Come to the best auction in the New York area. For detailed directions write to P.O. Box 205, Rockaway Park, N.Y. WA2TAQ.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLS to its regular monthly meetings. Second Monday of each month at George Washington Hotel, 23rd St. and Lexington Ave., promptly at 8 P.M. All are welcome. W2AIT, New York Radio Club.

HAMFEST: Sunday June 4. Save this date for Annual Starved Rock Radio Club Hamfest at Ottawa, Illinois. Write G. E. Keith, RF1 J, Box 171, Oglesby, Illinois 61348 or see Hamfest Calendar in May QST.

GRAND RAPIDS Amateur Radio Association presents their 19th annual Amateur Radio Convention Friday and Saturday, April 21-22, in the Civic Auditorium, Pantlind Hotel, Grand Rapids, Michigan. Write: G.R.A.R.A., Box 1333, Grand Rapids, Michigan 49501.

DETROIT Area Annual Swap 'n' Shop: Sunday, April 23, 10 to 4 at K of C Hall, Grand River Avenue at Lesure. No dealers; just hams!

OLD Old Timers Club now over 650 members with verified 2-way contacts before 1926. Life membership \$15.00. Bi-monthly "Swap 'n' Shop" \$2.50 annually. Koster fees for members. Write Secretary: W5VA, Box 840, Corpus Christi, Texas 78403.

MOTOROLA used FM communication equipment bought and sold. W5BCQ, Ralph Hicks, 813B No. Federal Hwy, Fort Lauderdale, Florida.

WANT Callbooks, catalogs, magazines, pre-1920 for historical library. W4AA, Wayne Nelson, Concord, N.C. 28025.

WANTED: all types of aircraft or ground radios, 171, 618F or S388, 390, GRC, PRC, 51 JRVX, Collins linear amplifier, Type 294; Especially any item made by Collins Radio, ham or commercial. Also large type tubes and test equipment in general. For fast cash action contact Ted Dames W2KJW, 308 Hickory, Arlington, N.J.

SEE, swap and buy ancient radio set and parts magazines. Lavery, 118 N. Wycomb, Landsdowne, Penna.

WANTED: Military and commercial laboratory test equipment. Electronicraft, Box 13, Binghamton, N.Y. 13902.

SAVE On all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Road, Swampscott, Massachusetts: 617-598-2530 for the gear u want at the prices u want to pay.

TUBES Wanted. All types higher prices paid. Write or phone Ceco Communications, 120 West 18th St., N.Y. 11, N.Y. Tel: 242-7359.

QSL'S? "America's Finest"!!! Samples 25¢. DeLuxe, 35¢. Sakers, W8DED, P.O. Box 218, Holland, Michigan 49423. (Religious QSL samples, 25¢).

QSL'S, samples 20¢. QSL Press, Box 281, Oak Park, Ill. 60303.

QSL'S "Brownie" W3CJI. 311 Lehigh, Allentown, Penna. Samples 10¢. Catalog 25¢.

C. FRITZ—QSLs that you're proud to send, bring greater returns! Samples 25¢ deductible. Box 1684, Scottsdale, Arizona 85252 (formerly Joliet, Illinois).

QSL'S: Moyers Printing, 846 Rising Sun, Telford, Penna. Samples, stamped envelope.

QSL-SMS. Samples 10¢. Malgo Press, Box 373, M.O., Toledo 1, Ohio 43601.

DELUXE QSL's Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638. Samples 10¢.

QSL'S. See our new "Eye-Binder" cards. Extra high visibility. Samples 5¢. Dick, W8VXK, 1944 N.M. 18, Gladwin, Mich.

10¢ Brings free samples. Harry R. Sims, 3227 Missouri Ave., St. Louis, Mo. 63118.

QSL Specialists. Distinctive Samples, 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago, Illinois 60639.

CREATIVE QSL Cards. 25¢ for catalog, samples, 50¢ coupon. Personal attention. Imaginative new designs. Wilkins Printing, Box 787-1, Atascadero, California 93422.

SUPERIOR QSLs, samples 10¢. Hamsco, Box 773, Hobbs, New Mexico.

QSLs, finest, YLRL's, OMS, samples 10¢. W2DJH Press, Warrensburg, N.Y. 12885.

QSL's, SWLS, XYL-OMS (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing, eye-catching, comic, sedate, fabulous, DX-attracting, protypal, snazy, unparagoned cards (Wow!) Rogers K8AAB, 961 Arcade St., St. Paul 6, Minn.

RUBBER Stamps. 3-line address \$1.50. J. P. Maguire Company, 448 Proctor Avenue, Revere, Massachusetts 02151.

3-D QSL cards add prestige with spectacularly different glittering colors and raised designs. Samples 25¢ (refundable), 3-D QSL Co., Monson 2, Mass.

QSL, SWLS, WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

QSLs 300 for \$4.35. Samples 10¢ W9SKR, George Vesely Rte. #1, 100 Wilson Road, Ingleside, Ill. 60041.

QSLs 3-color glossy 100, \$4.50. Rutgers Vari-Typing Service. Free samples. Thomas St., Riegel Ridge, Milford, N.J.

Blue On white glossy QSL's, 100; \$3.00. Don, WILMS. Sheehan Press, 23 West St., Stoneham, Mass. 02180.

QSLs-100 3-color glossy \$3.00; silver globe on front, report form on back. Free samples. Rusprint, Box 7575, Kansas City, Mo. 64116.

QSL stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

RUBBER Stamps \$1.15 includes tax and postage. Clint's radio W2UDO, 32 Cumberland Ave., Verona, N.J.

COLORFUL QSLs. Samples 10¢ or SASE. K8LNL Print, 510 Riddle Rd., Cincinnati, Ohio 45220.

ORIGINAL EZ-1N double holders display 20 cards each in plastic, 3 for \$1.00 or 10 for \$3.00 prepaid and guaranteed. Free sample to dealers or clubs. Tepabco, John K4MNT, Box 198T, Gallatin, Tenn. 37066.

QSLs Glossy coated, 3 and 4 colors, 100-\$2.00. Samples dime. Bob Garra, Leighton, Penna.

QSL's: Quality with service. Samples free. R. A. Larson Press, Box 45, Fairport, N.Y. 14450.

QSLs, 30 sharp samples. Catalog, 10¢. Filmcrafters, Box 304X, Martins Ferry, Ohio 43935.

BEST Quality rubber stamp or 1000 address labels, \$1.25 postpaid. Joe Harms, 905 Fernald, Edgewater, Fla. 32032.

QSL's. Free samples, attractive designs. Fast return. W7IIZ Press, Box 2387, Eugene, Ore. 97402.

QSLs. Kromkote glossy 2 & 3 colors, attractive, distinctive, different. Choice of colors. 100—\$3.00 up. Samples 15¢. Agent for Cali-D-Cals, K2VOB Press, 31 Argyle Terrace, Irvington, New Jersey 07111.

QSLs. Radio Press, Box 17112, San Diego, Calif. 92117.

QSLs. Catalog 10¢. Filmcrafters, Box 304, Martins Ferry, Ohio.

QSLs. Fast service. Free samples, Boiles, W5OWC, Box 9363, Austin, Texas.

QSLs. Your personal combination from large selection, glossy reds, blacks calypso, Pinecraft, etc. Silver, gold, rainbow inks. Many card styles, types, cuts, photos. Fast service. Samples 25¢. Ray, K7HLR, Box 1176, Twin Falls, Idaho 83301.

QSL-SWL-WPE samples, 10¢. Gates Print, 317-11th Ave., Juniata, Altoona, Penna. 16601.

NCX-2 with power supply, \$375.00. Excellent condition. VE3-NM, 20 Cathness, Welland, Ont., Canada.

CANADIAN Ham wants Johnson Navigator. State condition and price. Stan Dane, 326½ Bloor Street West, Apt. 1, Toronto (5), Ont. P., Canada.

CANADIANS: Best used gear list in Canada. Free. Etco, c/o Marv. VE2ANN, Box 744, Montreal 3.

CANADIANS: HRO-50, with matching speaker, all coils, perfect condition (usually and electrically) \$250.00. Globe Scout, \$35.00. HW12AC with SB-600 and HP-23 supply, never used, \$175.00. Will professionally pack for safe arrival. VE1SH, Box 418, Saakville, N.B., Canada.

FOR Sale: in excellent condition: Drake Model 2-B receiver Drake Model 2-BQ "Q" Multiplier; Johnson Viking Adventurer transmitter with key and 40M-80M crystals. All for \$350.00. Will sell separately. Write Wayne Banks, 1207 Loch Lomond, Ct., Richmond, Va. 23221.

DUMMY Loads, 1 KW, all-band, kit, \$7.95; wired, \$12.95. Ham Kits, P.O. Box 175, Cranford, N.J.

HEATHKITS: HX-20, factory serviced; HR-20, HP-20, HP-10, mobile mount, make, \$275.00, or reasonable offer. W4LED, 595 West Drive, Memphis, Tenn. 38112.

TRADE: Bell & Howell Model 240, 16 mm Electric eye camera and case, mint condition, plus cash for late model Collins receiver or transmitter or Henry 2 K linear, Andrew L. Freeman, 1805 North Third St., Grand Forks, North Dakota 58201.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, 118 S. Clinton, Chicago 6, Ill.

TOPPING All offers for any piece of aircraft or ground radios, tubes or test equipment. In a hurry? Cash-in-advance arranged. Turn those unused units into money. Air Ground Electronics, 64 Grand Place, Kearny, N.J.

MANUALS for surplus electronics. List 10¢. S. Consalvo, 4905 Roanne Drive, Washington, D.C. 20021.

WANTED: Collins Parts, BC-610, GRC-2, Autodyne, Bethpage, L.I., N.Y.

WANTED: Collins Parts, BC-610, GRC-27, Autodyne, Bethpage, L.I., N.Y. 11714.

TELETYPE: Buy 28s, sell parts, W4NYF, Schmidt.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 9:30 to 1:30 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 37 E. Hoover St., Ann Arbor, Michigan. Tel. Normandy 8-262.

WE Buy all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co., Box 516, Hempstead, N.Y.

HW12.22.32 owner convert your rig to three bands for a total cost of \$28.50. This price includes new front panel and dial. DRC Kit, 215-28 Spencer Ave., Queens Village, N.Y. 11427. Complete assembly manual only 30¢ or send for free brochure.

RTTY Gear for sale. List issued monthly, 88 or 44 mv to tubes, five for \$1.75 postpaid. Elliott Buchanan, W6VPC, 1067 Mancana Blvd., Oakland, Calif. 94610.

TOO OOBES: 6146B, \$4.00; 6CW4, \$1.40; 417A, \$3.95; 6360, \$3.45; 6146, \$2.55; 5894, \$15.50. All new, boxed guaranteed. No pulls, seconds or JAN. Catalog of many other types, free. Vanbar Distrib., Box 444Z, Stirling, N.J. 07980.

CASH Paid for your unused Tubes, and good Ham and Commercial Equipment. Send list to Barry, W2LNI, Barry Electronics, 512 Broadway, NYC 10012. Call 212-WALKER 5-7000.

WANTED: Tubes, all types, write or phone Bill Salerno, W2ONV, 243 Harrison Avenue, Garfield, N.J., Tel: Garfield Area code 201-471-2020.

WANTED: For personal collection; OST, May 1916; How to Become a Radio Amateur, Edition 10; The Radio Amateur's License Manual, Edition 1, 12, 15 and 16. W1CUT, 18 Mohawk Dr., Unionville, Conn. 06085.

HAM Discount House Latest amateur equipment. Factory sealed cartons. Send self-addressed stamped envelope for lowest quotation or order. H. D. H Sales Co., 170 Lockwood Ave., Stamford, Conn. 06902.

STAINLESS Steel Hardware. Small quantities. Send SASE for list, Arlington Stainless, Section B, Box 2641, Baltimore, Md. 21215.

ESTATE Liquidation offers. Big list. Paradd Engineering Service, 284 Rte. 10, Dover, N.J. 07801.

WANTED: Model #28 Teletype equipment, R-388, R-390A. Cash or trade for new amateur equipment. Alltricon-Howard Co., Box 19, Boston, Mass. 02101.

WANTED: Electronics Instructor. Generally indispensable. Theory and workshops. Science Camp, Lake Placid, New York. Write Eppstein, 440 West End Ave., N.Y. 24.

RTTY Channel filters, \$5.95 pair, 88 mh toroids, \$52.50; FSK units for 325-3, complete, variable shift, easy installation. \$14.95. Herman, Zachry, WA6GJI, 3232 Selby Ave., Los Angeles, Calif. 90034.

FOR Sale: Antique radios; Grebes, RORR, RORD, RORN, CR18; CR12; Grebe Synchronphase, Marxvox horns, drivers, many types and models, audio amps, Western Electrics, Radiola X, Jewett Parkay, Westinghouse Type, T.F. 10W phone, 20W c.w., etc., etc. Write Al Tatrault, 139 Maine, Northport, L.I., N.Y.

WANTED: Johnson Viking desk Kilowatt amplifier. Joseph Johnson, K9YNG, 300 North Walnut, Clinton, Illinois. Phone: a.c. (217) 935-5507.

CINE special, other professional 16 or 35mm cameras or lenses, video recorders wanted for cash or trade. Ted, W2KUW, 64 Grand Place, Arlington, New Jersey.

TOROIDS, 88 mh uncased, \$52.50. Postpaid. Humphrey, WA6FKN, Box 34, Dixon, Calif.

COLLINS: For the very best in servicing done with the personal touch, it's W2VCZ, 75-A-4 front end mods, \$69.95, 75-S series front end mods, \$34.95, VCZ Sales, W2VCZ, 5 Pinetree Road, Ramsey, N.J. Tel.: 201-327-9494.

SELL: CO, QST, Handbooks, old radio magazines, any quantity. Buy: Old radio gear and publications. Erv Rasmussen, 164 Lowell, Redwood City, Calif.

NOVICE Crystals, all bands, \$1.30 each. Free list. Nat Stintette, Umanilla, Fla. 32784.

NCX-5 Mk II, NCX-A, NCX-D, \$425.00. I've no use for SSB. Want 75S-3B and/or X455KQ200, F455FA-05 filters. Bill Myers, K2SIL, 3023 Woodland Hills Dr., Ann Arbor, Michigan 48104. Tel: (313) 761-8361.

HX-30 Heath 6 meter transmitter, excellent condition, with manuals. Trade even for Ameco TX-62 and WFO-621 or \$150.00. K3ZIB/1. Pal Littleton, 54-C Nob Hill Rd., New London, Conn.

QSTs Jan. '45-complete thru Dec. '65 and some '66. Single lot sale only \$110.00. W6GHU, 933 Third St., Hermosa Beach, Calif. 90254. Fone (213)-374-2070.

600 Piv at 750 Ma. Tophats, includes by-pass capacitors and resistors, 10 for \$3.00. Postpaid U.S.A. Fully guaranteed. Over 5000 sold. East Coast Electronics, 123 St. Boniface Rd., Buffalo, N.Y. 14225.

WANTED: BC-348, BC-224, BC-375. Please state condition and price. Charles Lee, 69 Madison St., New York, N.Y. 10002.

FOR Sale: FR-100 revr, FL-2000 xmttr, FL-1000 linear amp, all in mint condx, \$500 or best offer takes all three. Also, Lafayette FR-100 revr w/Heath Q-mult., Heath AT-1 xmttr and VFL-1 \$500 gnd condx make, all gnd condx offer. Franklin 6013 28th Ave., S.E. Apt. 103, Wash., D.C. 20031.

VOTE! Hams: A national Incentive Licensing poll is being conducted by The Southern Cayuga County Amateur Radio Club! You are requested to vote on a QSL or postcard either For or Against Incentive Licensing, also please sign your call and handle. Ham Clubs: please publish this poll in your club paper! Net Controls: please air our poll over your net! Results will be sent and petitioned to the FCC and announced as soon as possible. Tell every ham to vote in the United States. Rush your vote now to: SCCARC-WB2NOD, Dept. P., Box 685, Moravia, New York 13118.

SELL Complete Collins S/Line. One year old. Mint condition. 75S-3B receiver with 2.1 kc, 4 kc, 500 cy, and 200 cy filters. 312B-4 control box, 32S-1, 62S-1, 30S-1. Spare tubes, all cables, manuals, original cartons. Price includes 9-TO keyer, Mosley TA-36 beam, Ham-M rotor, 60 ft. Rohn 25-G tower, all new, and KW Matchbox, \$3100 takes all. H. M. Grant, 1115 Fulton St., Albertville, Ala. Phone 878-3802 or 878-0255.

INCENTIVE Licensing? You need Post-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to IBM type answer sheets, a very good aid to learning and a Must in preparation for FCC Amateur exams. General Post-Check consists of 297 questions and explained answers for only \$2.98. Extra Class, 115 questions and diagrams with explained answers, \$2.00. 139 questions of the 297 in the General Post-Check apply directly to Extra Class also. Get both for only \$4.50 postpaid. Post-Check, P.O. Box 3564, Urbana Station, Des Moines, Iowa 50322.

FOR Sale: Globe Champ, 300A in good condition. Best offer. Will ship in continental U.S. Otto Fieck, K9LAB, New Hradec, N.Dak., 58648.

COLLINS 30S-1 amplifier, \$795.00 or will accept 30L plus \$500.00 Ham M rotor and Telex Tribander antenna, both \$225.00. Pick-up here. Vocaline 5W CB transceiver portable, \$125.00; Sonar Model "G" CB transceiver, \$160.00; Ameco PV-50 preamplifier, \$10.00; X150 Navy pulouts, \$5.00; Drake 1000CLP filter, \$10.00 plus postage insurance fee. WA2FMC.

WANTED: Old model airplane engines. Trade for ham gear? Frank Schwartz, W4KFK, 2400 West End Ave., Nashville, Tenn. 37203.

SELL: HT-44 with matching P-S 1500 power supply. Both in excellent, like-new condition: \$300.00, WB2OHK, Art Caccia, Jr., 16 Hillwood Rd., East Brunswick, N.J. 08816. Tel: (201) 257-0705.

STOLEN: Swan 350, serial number C172505, original model using individual plug-in filter crystals. Further quickly identified by two holes drilled in chassis near filter to allow uncoiling wires for experimental tests. Stolen in January, NYC. May be offered to you as exceptional bargain, but do not buy or trade to avoid laws prosecuting the receiver of stolen property. If asked to repair, do send name and address of the purported owner to the undersigned. Your own name kept strictly confidential, and a substantial award offered if information leads to thief's conviction. Theft rendered two large engineering notebooks utterly useless. W2CJ Harold Churchill, 252 Snowden Lane, Princeton, New Jersey 08540.

SELL: Convert your Monoband beam into a Tri-Band. Never used set of Hy-Gain TEL-4 traps. Original set \$60. Complete set \$45.00. Dimensions furnished. Mint condition. UTC, LMI, BMI and HMI bandpass audio filters, (original cost \$32.00 each): \$12.00 each. W1OUG, 150 Brook Run Lane, Stamford, Conn. 06905.

QSTS. Sell complete only. Years 1938 thru 1966 inc. (1 copy missing: Nov. 1938). Unbound. \$75.00. U pay shipping. Jack Modica, W8UDS, 1720 Oakmount Rd., South Euclid, Ohio 44121.

SELL: Collins 75A3 with 2 kc. and 800 cycle filter, Drake multiplier, variable audio filter, speaker and manual. \$275.00. F.o.b. C. Getter, 58 Felch Road, Natick, Mass. 01760. W1MII.

FOR Sale: SB-101, SB-200 wanted. Kits to wire, Heath preferred. 12% of cost, some in stock. Professional wiring. Lan Richter, K3SON, 131 Florence Drive, Harrisburg, Penna. 17112.

FOR Sale: TA-33 antenna with 40-meter conversion kit, 32 ft. EP-5 tower, antenna rotator, William G. Coleman, 417 Madison Ave., Ossining, N.Y. 10562. Tel: (a.c.) 914-941-5064.

HAM Radio Counselor, male, for co-ed camp in the Berkshires, Massachusetts. Able to instruct campers in fundamentals of ham radio. Fully equipped ham radio station. Write to Robert Kinoy, Camp Taconic, 451 West End Ave., New York, N.Y. 10024.

FOR Sale. Johnson factory-wired 6N2 mint condx. With 6N2 VFO. Both for \$115.00. Frank Susnik, Jr. W0ARZ, R.R. 4, Pittsburg, Kansas 66762.

CUBEX Fiberglass quad. Triband. Cost me \$99.50. For sale: \$45.00. Works well; too windy here. Will ship. K2IRS, Stan Teich, 34 Bridle Road, Spring Valley, N.Y. 10977.

COLLECTORS Item for sale: 1915 bound volume Electrical Experimenter, also Radio News full years 1918 and 1919. Make offer. W3DUG, 612 Elder Road, Silver Spring, Md. 20904.

GONE Full power: Sell SB-200 with spare set tubes, A-1 in and out. Ship collect. First check for \$160.00. W. P. Steinhauer, W3LHZ, RD #1, Dallas, Pennsylvania 15612.

DRAKE 2B receiver and Q-multiplier: \$195.00. Ameco 2 meter converter model CN-1, and power supply Model PS-1, both for \$45.00; Semi-keyer, \$4.00. All for \$230.00. Pete, WB2PAA, 11 Woodview Road, W. Hempstead, N.Y. 11552. Tel: (516)-IV9-4295.

Viking II xmtr; Knigh. VFO. Knight compressor; JT-30 xtal mike. Complete. Good cond. with all manuals. \$75.00 or your best offer. Gone SSB. Cliff Myers, W1HEN, 425 Samuel Gorton Ave., Warwick, R.I. 02889. Tel: RE7-5895.

WANTED: Early wireless receivers before 1922. Bermatelli, Silver Marshall, Kennedy, also Scott 40-tube all-wave. John H. Caperton, 516 Country Lane, Louisville, Kentucky 40207.

COLLINS 32S-3, \$600.00; 755-1, \$400.00. Top condition. KP4-BJG, Box 1449, San Juan, Puerto Rico 00903.

SELL: Knight T-150A, superior condx. will deliver within 100 mile radius, \$75.00. C. B. Glowienka, WB2AXO, 29 Apple-tree Dr., Rhinebeck, N.Y. 12572. Tel: (914)-876-6162.

T-150 converted to T-150A, working cond., but TVL \$50.00. WA1BQC/1, Mike Gourd, Salisbury School, Salisbury, Conn. 06068. Tel: 435-9051.

WILL Sell separately: Drake TR-4, used 5 hours, like new, \$515.00. Drake mobile power supply, mount, and cables \$105.00. Hallman, WA4UAO/4, Apt. D-213, University Village, Athens, Ga. 30601.

TELETYPE Model 19, Model 14 tape distributor, table and power supply. Sell or trade for a mobile SSB rig. W8BYB, 16069 Woodring Ct., Livonia, Michigan 48154.

ELMAC AF-68 PMR-8 and 1070 power supply. Short and long cables, mike, complete station for mobile, portable and Novice operation. \$125.00. No shipping, sry. W2RJC, 325A East 72nd, New York City 10021.

WANTED: HRO-7 coils B, C, broadcast, and L.F. W3OQU, 295 Constitution Dr., Pittsburgh, Penna. 15236.

HEATH Mohican receiver WAC, battery supplies, manual. Excellent condition. \$75.00, prepaid. William G. Maloney, WA6RZT, 5311 W. 98th St., Los Angeles, Calif. 90045.

HEATH Mohican GCLA, like new. Battery p.s.s., \$75.00. W8BNO, John Petrick, W8BNO, 424 Lewis Seifert Rd., Hubbard, Ohio.

NATIONAL NCL-2000, perfect condition, less than 20 hours on air. Entering military service. Must sell, \$470.00. You pay shipping. Dave Shores, 938 Marshall, Apt. B, Webster Groves, Mo. 63119.

APACHE \$100.00; SB-10, \$60.00. Both in mint condition. A. B. Watson, WA4VPK, 3606 Skyview Dr., Huntsville, Ala. 35891. Tel: (205)-536-9776.

HT-44 w/PS-150 AC, \$250.00; SX-117 w/HA-10 transceiver cables, \$200.00; HA-10 w/PS-26 cables, crystals, \$150.00. All like new. SSB needs work \$70.00. All w/manuals. Richard Busted, K3TYD/2, 44 Thomas St. Rear, Bloomfield, N.J. 07003.

FOR Sale: NC-270, 80 thru 6 meters, mint condition, recently factory aligned, \$140.00. Wanted: Matchbox 250 only. K1VMT, 46 Oak Hill Dr., Arlington, Mass. 02174. Tel: 648-5474.

TRADE Eico grid dip meter, Model 710, for surplus mine detector or metal locator. Also unmodified ART-13 xmtr and other items to trade for 35 mm camera or ???, Robert Thornton, 2182 Wellons, Memphis, Tenn. 38127.

HEATH Warrior HA-10 Kw amp., in xclnt condx, \$150.00; GSB-10 SSB, CW, AM, xmtr, xclnt condx, \$180.00; Hallcrafters SX-111, SSB, CW, AM rcvr, \$125.00. WB2KJL, 8 Nirvana Ave., Great Neck, N.Y. Tel: (516)-J12-2488.

SELL: SX-110, \$95.00; HT-40, used 2 months, \$65.00; T-60, \$35.00; Knight VFO, \$18.00; all in good condx w/manuals. Will ship express collect, first certified check. WA8SCZ, 3831 Cumberland Dr., Youngstown, Ohio 44515.

SELL, Swap 1925 Norden-Hauk HC radio. Also issues/years QST, CO, 73 postpaid, WRGL, Route 2, Box 2378-B, Bainbridge Island, Wash. 98110.

NEEDED AC power supply with cable and connector for Collins KWM-2. Write H18XHS, 3260 Bigham Blvd., Fort Worth, Texas 76116.

SELL: SB-110, \$250.00; HP-23, \$40.00; NC-188, \$80.00. Apache, \$110.00. Ed Gray, Apt. 309, 4925 Brownfield Rd., Lubbock, Texas 79407.

Heath SB-400, \$295.00; SB-300, \$195.00; excellent condition. Also Heath HW-22, HW-32. Jim Gilbert, WA0LHS, 4845 Cresthaven, Lincoln, Nebraska 68516.

WANTED: Hustler resonators 10 through 40 meters. W3HTF, 506 Dreshertown Rd., Ft. Washington, Penna. 19034.

WANTED: Long wave and broadcast coils for old HRO. Harold Parsons, 1646 Aline Dr., Grosse Pte Woods, Michigan 48236.

FOR Sale: Galaxy III and AC power supply. Both in new condition. Will demonstrate on the air. Also have RCA Master Voltmaster WV-87B and RCA VOM WV-38A, Heath S.W.R. bridge with built-in tuner, and other relays and parts. Any reasonable offer will be accepted. Contact WB2NMQ, 15 Erwin Place, Caldwell, N.J. 07006.

SELL: HQ-110 with Heath 2-meter converter, mint condx, \$110.00; Hi-Bander VHF 62 xmtr, \$75.00. Frank Hubbard, K1FTY, 49 Davenport Road, West Hartford, Conn. 06110.

HP-23 AC power supply. Brand new, never used, works perfectly. \$32.50. WA8RDI, 1333 Neptune, Akron, O. 44301

SELL: HA-20 amp., in mint condx, \$95.00. K2ARO, 177 Roosevelt Rd., Hyde Park, N.Y. 11040.

WANTED: DX-100B in excellent condition. Robert O. Routh, W9DJW, RFD #2, Lebanon, Indiana 46052.

CHRISTIAN Ham Fellowship now being organized for Christian Ham Fellowship and gospel tract work among hams. Christian Ham Calbook for \$1 donation. Free details on request. Christian Ham Fellowship, 5857 Lakeshore Drive, Holland, Michigan 49423.

CLIFF-DWELLER Model CD-40, brand new, \$49.00. W5WM, Rt. 2, Box 127H, Lake Charles, La.

P&H Electronic Linear amplifier, Model LA-400C \$140.00; Micro-Match Model No. 261, 262 (New), \$25.00; Eico signal generator, wired, Model 315 (new), \$45.00. No shipping on amplifier. Cost, plus postage on others. EA7-8506 after 6 PM. Mrs. Herbert S. Wilcox, 39 Woodbine St., Auburndale, Mass. 02166.

WANTED: Viking desk model kilowatt. Please send information on condition, price, what tubes in final, etc. Hardash, 2505 North 22nd St., Phoenix, Ariz. 85006.

SELL: HQ-105-TR mint condx, \$125.00. Express in original carton. F. Knapp, KGGAJ, P.O. Box 854, Scottsdale, Ariz. 85252.

BIRD Wattmeter, model 43, less case with 500 watt plug-in, \$40.00. Philip Seine, Box 1026, Rochester, N.Y.

BEAUTIFUL SB-300, \$210.00 and SB-400, \$280.00 or combination for \$450.00. WA1CTL, 16 Woodside Dr., Wilbraham, Mass.

75A-4, very clean. Serial 2316, "B" filter. Collins speaker with fluorescent light and clock, \$450.00. Prepaid. John Cunningham, 3401 Sue Mack Drive, Columbus, Georgia 31906.

SB-100, SB-600, and HP-23. Wired and aligned by FCC licensed electronics engineer. In new condition; used only ten hours. Your satisfaction assured. \$450.00. A. C. Emerald, KG-ELV, 8956 Swallow Avenue, Fountain Valley, Calif. 92708.

SO, CALIFORNIA: 30S-1 linear, mint, one owner only; \$795.00 or will swap for KWM-2 and mobile power. 729 E-V mtr, \$80.00; Eico 710 grid dipmer, \$20.00; MT-1 TX with A.C. supply, \$25.00; HM-11 SWR mtr, \$10.00. Ralph Thomas, WB6PCZ, 4717 Oakwood, Los Angeles, Calif.

WANT To start SSB operation? My complete station up for bids. HQ-170A, mint condx, Apache xmtr, SB-10 SSB Adapter, D-104 mike, Johnson S.W.R. bridge and Hallcrafters 10" speaker. For complete details contact K1GXU/4 or write: Larry Langevin, 4442 F.M.S. Box 523, Sewat AFB, Tenn. 37168.

FOR Sale: Complete SSB mobile rig, SR-160, DC supply, Hustler antenna and PTT microphone, \$325.00. Used 30 hrs. R. Goltberg, 4263 Warren Way, Reno, Nevada 89502.

SELL: Minibeam B24 with Alliance U-100 Tenna-Rotor, \$30.00. Albert Martin, G4 8th Army, Box 74, US Army HQ, APO San Francisco, Calif. 96301.

COLLINS 75S-1 with 312B-3 speaker. Excellent. \$260.00. Dave Allen, W3DFL, 13112 Oriole Dr., Beltsville, Maryland 20705.

HAMMARLUND HQ-180, \$200; Collins KWM-1 and 316F-1 supply, \$225.00; Heath HA-14 linear and HP-24 supply, \$130.00. Eico 460 scope, \$60.00; Elmac AF-67, \$25.00. Ives firm, Philip Schwelber, W9GCC, 4336N 50 St., Milwaukee, Wis. 53218.

HAVE Two HW12's, perfect, expertly wired. Would like to swap one for HW22 equal condition. W1KGU, 294 Summer St., Brockton, Mass. 02402.

WANTED: 136A1 blander and F455Q5 filter. \$5c for 75S-1 Collins. WB6PJD, 7800 Brentwood Drive, Stockton, Cal. 95207

WANTED: New CV-89 converter with manual, etc. Also schematic for CV-71 converter. Advise terms. W1CNY, Bob Rinaldi, 228 Hickory Hill Lane, Newington, Conn. 06111.

DRAKE 2B excellent. \$185.00; reconditioned HT-37, \$210.00, perfect. 30L-1, \$300.00. Clean as a whistle. Dwyer, 2285 Holly Court, Northbrook, Illinois 60062. Tel: 272-2443.

SELL: Hammarlund Pro-310 matching speaker, \$225.00. Heath HO-10 monitor scope, \$45.00. 1B2A imp bridge, \$25.00. QM1 meter, \$25.00; Viking II xmtr, 122 VFO and Matchbox, \$160.00. Floyd Phillips, 63 Lent St., Poughkeepsie, N.Y. 12601, W2PC1.

OLD TIMERS Night—April 20, 1967, at 8:00 P.M. To be held at the Egyptian Radio Club, Inc., W51U, Located near Granite City, Illinois. All hams welcome. Don't miss this evening of entertainment, Refreshments. Admission free.

EICO 720 transmitter, Dow-Key relay, key, code records to 18 wpm. Ameco code practice oscillator, \$75.00. WB2TW, Alan G. Gilixon, 9 Elmwood Lane, Syosset, N.Y. 11791. Tel: (516)-WA1-3090.

FOR Sale: Harvey-Wells R9-A receiver, \$40.00; HT-40 transmitter, \$50.00; 60-watt modulator, complete, \$35.00; 60-watt modulation transformer, \$7.00; CN-144 converter, w/p.s., \$40.00; transformer 2800 VCT at 300 Ma., \$20.00. Jack Farrow, WB3QZZ, 41 Concord Ave., Metuchen, N.J. 08840.

TRADE QST July 1917 good condition for September 1917. W8HG.

INVADER 200, mint condition, \$250.00. King, Box 450, Cary, W. Lafayette, Indiana 47907.

FOR Sale: Volumes One, Two, Three, Four, Frederick Research Corp. Test Equipment (military) Data Handbooks, 1961 publication. Four new bound books, \$5.50 postpaid, payment with order. Wanted: Military, Commercial, Surplus, Airborne, Ground, Transmitters, Receivers, Testsets, Accessories, Especially Collins. We pay cash and freight. Ritco Electronic, Box 156, Annandale, Virginia. Collect call: (703)-560-5480.

FREE Catalog. Loads of electronic Bargains, R. W. Electronics, Inc., 2244 South Michigan Ave., Chicago, Illinois 60616.

2M Gonset Communicator III, excellent condition, \$140.00; Big wheel, \$10.00. W3BXC, 1215 Township Line Road, Phoenixville, Penna. 19460.

HALLICRAFTERS SX-110, \$69.00; Ranger II, \$169.00. Both in perfect condition. J. Doubrawa, WB2PCY, P.O. Box 1077, Mattituck, N.Y. 11952. Phone (516)-629-4704.

SELL: Hallcrafters SX-110, \$80.00; Heath DX-60A, \$60.00. Excellent condition. Barry Skobel, 10 Lynnwood Rd., Edlson, N.J. 08837.

SX-111 in excellent condition. DX-60A, new. Will sell or trade for Swan 35D. L. Herber, Thief River Falls, Minn. 56701.

SELL: R100A receiver with "S" meter and xtal calibrator in mint condx, \$75.00. David Levin, WA1FVH, 44 Seminole Circle, West Hartford, Conn. 06117.

TWOER: Halo, 12V supply; Cheyenne MT-1, \$40-B, Gonset Super Six, 80M, 15W, VFO transmitter and dynamotor. Make offer. K5BCQ, 2405 Oldham, Austin, Tex 78705.

EUROPE: Heath Marauder, excellent condition. Second owner, \$200.00. Prepaid to authorized APO/FPO. Capt. J. Leech, DL4XQ, Det. 4 ARRC, APO New York 09012, or Bldg. 1119B7, 6792 Ramstein, Germany (International Mail).

TOWER: 50 ft. Rohn with 12 ft. extension pole, guys and guy poles, \$55.00. Hy-Gain 2-el. 40 meter beam with balun, \$70.00. Together, \$110.00. Will not deliver. Hy. Berliner, K8LNL, 510 Riddle Rd., Cincinnati, Ohio 45220.

UNOPENED Eico 753K, \$150.00; 751K AC supply, \$50.00; Prime Drake ZB \$190.00. Challenged with 6-meter stabilizer, \$75.00. Ranger I, \$89.00. W9IHZ, Brown Electronics, Inc. 1032 Broadway, Fort Wayne, Ind. 46802.

WANT: R278/GRCR7. Have SP-600JX, Collins 2-32 Mc SSB automatic exciter, one part in 10⁸ per day accuracy, Model 15, Eico 753 and 9/8, ARC-27, ATV equip 6M. Gonset, Thermo-Fax RCA 21" color, ask! H. Pfeiffer, Room 454, 466 Lexington Ave., New York City . . .

JOHNSON Navigator 40W CW transmitter, VFO and xtal. Outstanding keying. Included coax relay and lo-pass filter. \$65.00. Gonset G-63 receiver. Like new condx. Ham bands only 80-6. Excellent for c.w. \$75.00. W7GSB/6, 1984 San Leandro, Calif. 94577.

SLOW Delivery on new rig? Immediate delivery on my real nice Clegg 99'er. K4JXC, Box 162, Oak Ridge, Tenn. 37830.

FOR Sale or trade: DX-60, good condition. With 9 xtals, \$50.00. F.o.b. OTH. Want: 250-75 watt Matchbox, Shure 444. State age, condition and price. Carl Stecker, WNZZCX, 1531 Deer Path, Mountainside, N.J. 07092.

SBE At a discount. SB-34, \$315.00; SB-2LA, \$195.00. New with warranty. Have all accessories. Reinhardt, 1152 Park Ave., Vineland, N.J. 08360.

VIKING 500, SX-73, CCVT, FM 2-way gear. Cleaning house. No junk! Send SASE for list. A. Carmody, K2BZC, 260 Jefferson Ave., Fairport, N.Y. 14450.

HRO-7. Have two, for rack mtr., and power supplies, FB condx. coils 3.5 to 14.4 mcs. Art Trick, #7 Abrew St., Bayshore, N.Y. 11706.

COLLINS 32-V2, excellent condition with spare 4D32 and other extras. Hammarlund HQ-170A with 24 hour clock, like new condx. First certified check for \$400 will ship. R. Schwendt, W2ZEW, 5 Brook Lane, Bordentown, N.J. 08505. Tel: (6 9)-298-1493.

VACUUM Antenna relay, quiet and compact, handles 5 kw. \$20.00. Philip Sienkiewicz, Box 1026, Rochester, N.Y.

4-1000A, \$18.00; 450TH, \$7.50; new 4-400A, \$16.00. Homebrew "T-O" keyer and paddle. \$20.00. Free list of much more. John Kanberas, 559 Rocky Way, Redwood City, Calif. 94062.

WANTED: QST magazines before 1924. Both covers and in good condition. Write: R. Kampf, 9 Black Birch Lane, Scarsdale, New York 10583, or call (914)-723-1467 for immediate cash.

WRITE, Phone, or visit us for the best deal on new or reconditioned Collins, Drake, Swan, National, CDR, Galaxy, Gonset, Hallcrafters, Hammarlund, Hy-Gain, Johnson, Millen, Mosley, SBE, Henry Linear, and most other equipment. We try to give you the best service, best price, best payment terms, best trade-in. Write us for price lists. Your inquiries invited. Henry Radio, Butler, Missouri 64730.

HEATH Mohawk 175; Apache, \$120.00; HO-10, \$55.00; Hallcrafters Panadapter SP-44, \$70; B&W 51SB, SSB adapter, \$85.00; Comm IV 2M, \$150.00; 5894, new, \$9.50. List available. W2FNT, 18 Hillcrest Terr., Linden, N.J. 07036.

COLLEGE Costs too much! Must sell Heath SB-300 with c.w. filter, \$235.00; Heath SB-600, \$15.00; Heath SB-400, \$290.00. Expertly wired and no scratches! Prefer package deal. Will sell all three for \$500.00. Shipped via REPA express, in original cartons. Richard J. Law, K9SXZ/Ø, Box 513, McCook, Nebraska, 69001.

COLLINS KWM-2A, #12572, MP-1 #10271, 516-F2, #14968, MM-1, #9086, 351D2 and all connecting cables, etc. New cost \$1798.00. Sell for \$25.00 in original cartons. F.o.b. shipping point. W5UJI, Box 739, Lamesa, Texas 79331.

QST, Complete from January, 1941, to present: \$50.00. Dr. B. M. Chambers, 44 Broad St., Atlanta, Ga. 30303.

FOR Sale: Transtenna 102A T-R switch with Sidetone, \$49.00, W9BVL, 816 N. Clay St., De Pere, Wisconsin 54115.

WANTED: Fibreglass quad arms, Bird Thru-line wattmeter, AC power supply for SR-500, 8236 tubes. WAØIUM, Box 59, Mohrville, So. Dakota 57601.

LAFAYETTE K1-200 rcvr, w/spkr, phones, Q-multiplier, xtal cal, \$50.00; Viking II w/manual, \$75.00; Knight T-50 with T-R switch, key, xtals, \$25.00. All in gud wks. condx. WA7EEP, Rte. 2, Box 216L, Gresham, Oregon 97030.

INCENTIVE Licensing? You need Post-Check, Amateur Extra and General Class FCC type exams, complete in detail and style, even to IBM type answer sheets. A very good aid to learning and a must in preparation for FCC Amateur exams. General Post-Check consists of 297 questions and explained answers for only \$2.98. Extra Class, 115 questions and diagrams with explained answers. \$2.00, 139 questions of the 297 in the General Post-Check apply directly to Extra Class also. Get both for only \$4.50 postpaid. Post-Check, P.O. Box 3564, Urbandale Station, Des Moines, Iowa 50322.

INTERESTING sample copy free! Write: "The Ham Trader," Sycamore, Illinois 60178.

TRANSCIVER Hallcrafters SR-160, in exclnt condx, with 12 volt DC supply (PS-150-12) and home brew 110 volt AC supply, similar to PS-150-120. All complete with cables and manual. Price \$300.00. R. Fowler, K2ADJ, 379 Hollybrook Road, Rochester, N.Y. 14623.

SELL: Heath HO-13 Panadapter wired, good condition with parts for changing I.F., \$55.00. Eico 710 grid dip meter, wired new, in factory carton, \$35.00. I will pay shipping. Bernard Grossman, WB2NDL, 1505 Grand Concourse, New York 10452.

HALLCRAFTERS HT-44 and AC \$275.00; SX-117, \$250.00, mint condition, less than twenty hours. HO-10 Monitor, \$50.00; Instructograph, two sets of tape, \$40.00; SB-33 with DC, \$200.00, F.o.b. Don Vaughan, 4607 Briarcliff Road, Atlanta, Georgia 30329.

MUST Sell: SX-99 rcvr, \$75.00; Eico 720 xmt, \$65.00; Eico 730 modulator, \$45.00; Heath VFI VFO, \$10.00; \$140.00 takes all, in good condition. Will ship! Stanley Ermsar, WB6MCA, 1305 Payne Ave., Modesto, Calif. 95351.

PAY \$30.00 for 500 cycle filter for 75S-3B; \$700 for 30S-1; \$90.00 for 312B-4, insured, delivered here. Must be late model, no modifications, perfect condition, with manuals. All cables, wrenches, etc. WA8UGU.

RTTY Model 14, \$25.00; Model 15 with table, \$50.00. Heathkit Twoer, \$35.00. Heathkit 0-12 'scope, \$50.00. Viking Valiant, \$150.00. W7MKB, 802 North Rodney, Helena, Montana 59601.

HA-14 Heath Compact linear with AC and DC supplies, \$225.00 or trade for VX501 VFO for NCX5, WA2FSD, Marty, 516-HU2-7857.

FOR Sale: HQ-160, \$160.00. Dennis Royal, 3900-11th, Des Moines, Ia. 50313.

WOULD You believe a KW of fixed and mobile SSB for \$600.00. SBE-34 with VFO and calibrator, SB2-LA, 12meter digital clock, Knight SWR/power meter, Shure 444 and mobile mics, fixed dipole and Big K (20/40/80) mobile antennas, all cables. All mint; package only; will ship collect express to certified check. About \$850 value; priced to sell, WA5EXD, Route 3, Box 720, Seguin, Texas 78155. Tel: (512)-379-7317.

FOR Sale: Heath AT-1 xmt, \$15.00; Lafayette 6M ground plane, WA8JXW.

CLEARING House: NC-303 cal and matching speaker, \$230.00; Knight T-60, \$40.00; D-104 mike, \$10.00; Heath SWR bridge, \$6.00. John Gonzalez, WB2KPR, 42-37 Union St., Flushing, L.I., N.Y. HI-54609 nights.

HT-40, SX-140, VF-1, acc: 1000v, 500 Ma. xfirm, (2) 4-125As, 7B7, Veeder-Root counters, Photo equip., coins. Sell or trade, any or all for? WB6RIU, 1016 Oaktree Dr., San Jose, Calif. 95129.

AMECO Power supply PS-1 and 6 mgr. converter CB-6, \$25.00; APR-4 receiver, complete with 3 tuning units (2) 38 to 95 Mc (1) 74-320 Mc complete with APA, 38 Panadapter converted to 60 cc, \$150.00. RBA receiver, 15 kc, to 600 kc, with 100v, P.S., \$50.00. Ken R. Hancock, K2SGZ, 2108 Richmond Road, Endicott, New York 13760.

SELL: Brass pulleys, threaded 10-32, 1/4", 12"-634, washers #6 through #12; 1/4" through 1/2", 2 ounces #24; small, large assortments, 2-oz. 96". Write for brass, other, screws, hardware, insulators, lists. Include postage. Wait, WB8LR, 29716 Briarbank Court, Southfield Michigan 48075.

SELL: Complete Heathkit station for SSB and c.w. SB-400 xmt, RX-1 (Mohawk) rcvr, and Thunderbird Jr. 3-cle. beam. Will sell only as complete station. No trades. Original cost over \$700. Will sell for best offer over \$400.00. William G. Carlson, WA0MBX, 10105 Grant Ave., Silver Springs, Md. 20910. Tel: (301)-LO-5-3492.

HQ-145XC rcvr, \$150.00; S200 speaker, \$5.00 Seneca 6 and 2 transmitters, \$50.00; Johnson 6 and 2 meter converter, \$50.00. Package deal gets Finco 6 and 2 meters antenna free. Frank Miller, Clarkson, Nebr. 68629.

DRAKE TR-3-AC-3-DC-2, Mosley TA-33 beam, in gud condx, \$300.00 takes all. A. J. Luber, 3524 Homestead Way, Ceres, California 95307.

SBE-33 Transceiver, SB1-LA linear amplifier, SB-2 DC power supply, excellent condition. \$350.00. Polycorn 2 meters, like new, \$165.00; BC-221 frequency meter, regulated AC supply, spare xtal and tubes, \$75.00; Ralphatwood-K 21B1, 577 Seventh St., Brooklyn, N.Y. 11215. Tel: HY9-9094.

COLLINS 75S-3 receiver in excellent condition, like-new, \$400.00. WA3FZX, Box 11, Glenside, Penna. Tel: (215)-884-6287.

FOR Sale: SX-100, mint condition, \$150.00 or your best offer. 10 meter 10M309B Telrex beam, \$20.00. W2EWS, 17 Sedgewick Road, Trenton, N.J.

SX-101A receiver, \$175.00, in exclnt condx. Harold Higley, WA1DAJ, 78 Bourbon St., Portsmouth, R.I. 02871.

COLLINS 62-S-1, clean, \$465.00. Takes Collins, Drake trade. Tom Nash, M. D., WSNWA, 1100 N. Canterbury Court, Dallas, Texas 75208.

2000 P.E.P. linear parts, cabinet, power supply, tubes, meters: \$35.00. W3KG, 4 Knox, Monessen, Penna. 15062.

SELL: CE-100V, immaculate condx, #941 (abt 1K made) factory-converted for 160 M. With set of spare tubes, original crate, \$385.00, 100 mfd. 7.5 kv. dc. G-E Pyranol caps, new, \$40.00 each. All f.o.b. Paul Bittner, WØAIH, 814 4th St. South, Virginia, Minnesota 55972. Tel: (218)-749-1600.

WANTED: Gonset G-28 10-meter Communicator. Send particulars. Jerome McKane, RD #1, Honesdale, Penna.

GOING SSB: Want all-band transceiver. Must be in excellent condition. Sell NC-300, Ranger with grid-block keying, Matchbox, BC-221, Dumont 'scope, VTVM, (all with manuals). Write to W6UTE, 4406 Motor, Culver City, California 90230.

SWAN 240, SW-12VC supply, Hustler mobile antenna (75-40-20), excellent, \$260.00. Firm. L. Barnard, W2KIM, 224 N. Jensen Rd., Vestal, New York.

BABY'S Unexpected medical expenses force sale of HT-37 SN-292704, excellent condx, \$200.00, HT-31 linear modified to GG with pair UE572B, 1200 P.E.P. \$125.00. Certified check or money-order. F.o.b. or will deliver 150 miles. Robinson, 1219 Stamford, Kalamazoo, Mich. 49001.

H-44 w/AC, \$250.00; SX-117 w/LT and transceiver cables, \$250.00; SB-24 and mike, new, boxed, \$345.00; BT-1-LK-2000, \$690.00; Collins 75S-3, \$290.00; 4-1000, \$30.00. Frank Baker, McComb, O. Tel: 419-293-3363.

FOR Sale: Ranger I, gud condx, \$75.00; National HRO-50T with 7 coils and product detector, \$150.00; Hy-Gain TH-4 Tri-Bander, \$60.00; Hallcrafters HA-1 keyer w/Vibro-Keyer, Standard Model, \$75.00; Johnson T-R switch, \$20.00; Ham-R rotator, \$65.00, with 90 ft. cable. I will pay shipping. WN9RF, L. M. Yancy, Wadesville, Indiana.

FOR Sale: Heath DX-40, \$35.00; VFI/VFO, \$14.00; Hallcrafters S-72, \$10.00, Hallcrafters S-38E, \$30.00. Georaa Peck, Jr., 204 No. Boyd, Caldwell, Kansas 67022.

HEATH Kits for sale. Over 50 built. The following brand new, for sale: 10-12 Lab scope, \$95.00; IT-11 capacitor checker, \$35.00; IG-42 Lab generator; IG-102 RF generator, \$45.00; IG-72 audio generator, \$50.00; IT-10 transistor checker, \$10.00. WIKAM, 31 Lafayette St., Millford, Conn. 06460.

SX-122 with lat calibrator, A-1 condx. Best bid over \$160.00; Tri-Band conversion for HW-32, \$25.00. WA8JWR, 2501 Lipincott, Flint, Mich.

BILL Ogg at Evansville Amateur Radio Supply, 1306 Division, Evansville, Indiana says check these Spring Bonus Savings! Bonus #1) A free, matching, AC Supply with the purchase of a Swan-550 or Galaxy MK II at \$20.00 each. Bonus #2) A free, matching AC supply plus a MS-4 speaker, and a D-104 with the purchase of a Drake TR-4 at \$399.00 or a T4-X, R4-A combo at \$799. We pre-pay most shipping charges. Send us a stamped envelope for a deal you've been looking for.

ESTERLINE-Angus chart recorders wanted, Model AW preferred, but will consider others. For private use. State price, condition in letter. Louis Breyfogle, W8MOX, Box 417, Boulder, Colo. 80302.

LM-8 Frequency Meter, with calibration book, AC power supply, cables, schematic and spares, \$74.50; SX-101, Mk III, \$124.50, Adjust-a-volt, 115 v, 3 amps, \$8.75; Heath VFO, \$9.50; antenna impedance bridge, \$9.75. RME 10-20 converter, \$29.50. W2BEE/2, 152 Hawkins Road West, Centereach, N.Y. 11720.

88 mhz. Toroids, center-tapped, unpopulated, \$31.25 pwr. 14 TD syringe \$35.00; 800 Ma. loop supply, \$8.00; HC-100A.C. \$110.00; SX-28, \$60.00; Johnson 250w. Matchbox with SWR, \$65.00; new SNT #5P355, 200w. modulation transformer \$10.00. Van. W2D1T, 3022 Passaic, Stirling, N.J. 07980.

BANDSPANNER antenna, \$15.00; 12VDC mobile high voltage P.V.M., \$25.00; pair new 5867 tubes, \$18.00; HP 400D VTM, \$70.00. All new condition. Cleaning house. List available. William, 34 Nassau Rd., Huntington, N.Y. 11743.

HW-32 with AC/PS, \$130.00; Johnson Challenger, \$60.00; 122 VFO, \$15.00; SX-140, \$75.00. Wanted: SB-33, WA90BA, 1724 Oakton, Evanston, Illinois 60202.

SELL: BC-3480, \$50.00; OSTs 1932, 1933 complete; 1939 bound, \$4.00 year, some 1937, 1938 issues, W8YMB.

SELL: Peak Prescaler, excellent, \$12.00; Globe King 500, \$85.00, G-10 mtd, 250v. v. capacitors, \$4.00 each. W9WIO, 3827 West 83rd Place, Chicago, Ill. 60652.

FOR Sale: SB-100, in mint condition: \$395.00. WA0NVE, Ernie Dake, Lester Prairie, Minn. 55354.

SX-101, Mk III, in exlnt condx: \$139.00. You won't be disappointed. Kim Speare, WA8PMI, Olivet, Michigan 49076.

WANTED: Self-supporting crank-up tower in good condition, cheap. K9CML, 9615 W. 98th, Overland Park, Kansas 66212.

COLLEGE Expenses: Eico 753, transistor VFO, factory aligned. All offers closed. Also homebrew supply, Ray Jorgensen, Englehardt Hall, Durham, N.H. 03824.

HEATH Marauder transmitter HX10, \$200.00; Johnson K.W. Matchbox, 250-30-3, \$125.00. W6OHP, 1475 Rubenstein Ave., Encinitas, Calif. 92024.

DRAKE 2B, 2BQ, call. \$200. K5BCQ, 2405 Oldham, Austin, Texas 78705.

WANTED: 275 watt Matchbox, Specific condition, price. WA0OAT, 716 28th St., Bismarck, N.D. 58501.

GONSET G50 6-meter rig, in excellent condition, \$175.00, plus shipping. K9ADY, 10748 So., Ridgeway, Chicago, Ill. 60655.

SELL: Heath HW12, \$75.00; SB-100, \$300.00. Details! K2JSA, 113 Henderson, Syracuse, N.Y. 13209.

FOR Sale: 20-40 meter Duce-Bander Hy-Gain beam, \$90.00. Would prefer pick-up deal. Notre Dame Amateur Radio Club, P.O. Box 176, Notre Dame, Indiana 46556.

COLLINS KWM-1, \$250.00; 516F-1 AC supply, \$75.00; 516F-2 AC supply, \$75.00; NCL-2000, \$450.00; Drake 1A, \$15.00. All equipment in mint condx. Don Droese, 3308 Braddock St., Kettering, Ohio 45420.

S.O.S. Want 1.5-3 Mc. ARC-5. In exlnt condx. Original w/tubes. Send price with ur reply. Tnx. WA8NDO, 207 Coolidge, Bay City, Mich. 48706.

SBE-33 with 6-volt with power supply, mike, Hustler ant., mint condx. \$300.00. Drake 2A with Q-multiplier, perfect, \$150.00. Bandsanner mobile ant., \$15.00. K6LJA, 1009 River Lane, Santa Ana, Calif. 92706.

HEATH HA-14 "KW Compact", linear amplifier with HP-24 AC and HP-14 DC power supplies, \$210.00. GR-64 shortwave receiver, \$25.00. Like new condition. Built by Heath engineer. W8NDG, RR-3, Box 400, Stevensville, Michigan 49127.

LIKE New condition: Swan 350 Swan AC and DC power supplies, new low-noise filter SWR bridge, 100 kc. calibrator, Motorola automatic key, 80 m. mobile antenna, body and bumper mounts, PIT mike, \$475.00 buys all. WA4CUH, John, P.O. Box 71, Cayce, S.C. 29033.

DIAGRAMS. Complete service manuals, TV, Radio, \$1.00. Technical Service Associates, Box 1167, Berkeley, Calif. 94701. TR-4, \$480.00; AC-4, \$83.00; R-4, \$330.00; T4-X, \$330.00. L-4, \$580.00. Factory sealed boxes. Sell Separately. Used excellent SR-160, \$265.00, Mel Palmer, K4LGR, Box 10021, Greensboro, N. C.

WANTED: Heath Compact, SBE or any commercial or gold Hi-grade home constructed linear. Will consider trading any of the following new items: Curtis-Mathes eleven inch TV, new production 1967 Motorola transistor nine inch TV or 20" Motorola table TV. All with UHF and brand new. George Magera, W4YLT, Mullins, S.C.

WRL's Used gear saves money! Guarantee and trial. These low prices without trades: Thor 6 and AC, \$249.95; G-76, \$69.95; SR150, \$339.95; 753, \$159.95; Galaxy V, \$299.95; Galaxy 300, \$169.95; DX-100, \$89.95; King 500A, \$184.95; Valiant, \$149.95; HT-37, \$239.95; HX-10, \$249.95; SX-101, \$139.95. Hundreds more—free list. WRL, Box 919, Council Bluffs, Iowa 51501.

TRANSMITTERS, Receivers, repaired; Kits wired, custom-building. Product detectors added, J-J Electronics, Windham Road, Canterbury, Conn.

CRYSTALS Airmailed; SSB, Nets, MARS, Novice, Marine etc. Custom finished etch stabilized FT-243 .01% any frequency or fraction, 3500 to 8600 kilocycles \$1.90. (Five or more this range, \$1.75 each.) (Nets: Ten or more same frequency \$1.40.). 1700 to 3499 and 8601 to 20,000 \$2.50. Overtones supplied above 10,000, 10,000 to 13,500 fundamentals \$2.95. Add 50¢ each for .005% HC-6/u metal miniatures above 2000 and 75¢ each. Crystal groups for "IMP", "SSB Package", "Crystal Converter and other ARRL projects. State specific requirement. Write for order-bulletin. Crystals since 1933. Airmail 10¢/crystal, surface 5¢. C-W Crystals, Marshfield, Missouri 65706.

MOVING: Priced to sell: 75A3 with .8, 3 and 6 kc filters, speaker and 100 kc. calibrator, perfect condx, \$250.00; W2AU Fiberglass quad, never used, \$50.00; Collins 1308 exciter, good condx, \$50.00; Jennings Vac. Var. condenser UCS 400 mm. 10 Kv., brand new, \$35.00; Sig. Corp., Heavy Duty aluminum telescoping mast, 7 in. base, 3/2 in. top, extends to 66 ft. \$75.00; Homebrew KV, 4-400A final, AM mod, speech amp., individual power supplies, fully metered in 5 ft. rack, plus large assortment of parts, meters, condensers, etc. All for \$195.00. TR-44 rotor, 20 mtr. 3-el. beam 100 ft. RG/8-U. All for \$35.00. Sorry, no shipping! W2JDR/W2MWY, Phone (212)-BA4-7362.

COLLINS Filters wanted for 75A-1, Models 353C-14 and 353C-31. Centimeg 432 mc. transmitter. Please state price, condition and if modified. Bill Smith, 102 West St., Apt. B-6, Rocky Hill, Conn. 06067.

WANTED: Old advanced Candler Code Course. State price. W3MEY, 48 Bedford St., Bradford, Penna. 16701.

APACHE Xmitr and misc. equipment for sale. Richard Bennett, K2CCV, 381 Franklin Blvd., Somerset, N.J. Tel: (201)-346-9572.

CONAR 500c Novice receiver for sale: \$30.00. Also want two BC-1000 (SCR-300A) surplus v.h.f. transceivers, William Weir, 406 Prospect, Berea, Ky. 40403.

GONSET G-50 6 meter Communicator with D-104 mike, in gud condx, \$170.00, Vibroplex (Original) semi-automatic key, like new, \$17.00. W2B0ZF, tel: (914)-968-3295, Yonkers, N.Y.

HEATH Special: Excellent Warrior linear, \$145.00; HX-20 SSB-C.W. 80-10 exciter with HP-23AC supply, \$145.00. SWR meter, \$10.00. Manuals, Ship anywhere, Tel: (714)-838-4079. W6BSBJ, 18062 Norwood, Tustin, Calif. 92680.

HY-GAIN 2048A four-element 20 meter beam for sale. In perfect condx, with BN-12 balun, manuals. On air since purchased new in December 1966. Moving to new QTH. \$80.00. Will ship collect. Larry Guenther, W9ACS, 428 South 7th St., Lafayette, Indiana.

WANT: HP-13, sell: New, sealed, guaranteed 4-125A5, \$17.50; 4-250A5, \$19.95. Used 4-1000A, \$29.00. WA2WB/5, Rte. 5, Lewis Trailer Park, Columbus, Miss. 39701.

WANT: HP, Northeastern frequency counter, plug-ins 100-500 Mc. Sell: Wheatstone code perforator, Bouhne keyer, Excellent, \$295.00. W8RHM, 1910 Longpoint, Pontiac, Mich. 48053.

JOHNSON Viking SSB Adaptor Model 240-305-2. Purchased new at \$369.00 and used less than two hours. Original carton with operating manual, \$140.00, Hammarlund HQ-150 with speaker and instruction manual in operating condition, \$95.00. W3LL, 324 Broadmoor Road, Baltimore, Maryland 21212. Tel: (301)-435-0226.

GALAXY 300 Transceiver, Matching console pwr supply w/ spkr, new PTT mike, in exlnt condx, \$250.00. F.o.b. H. L. Tate, W4NTS, Box 388, Southern Pines, North Carolina 28387.

RANGER I TX and HQ-110 rcvr, also Heathkit SWR. Will sell package for \$255.00 or separate. WA1GNA, tel: (203)-274-6341, Oakville, Conn.

FOR Sale: 1919 Northern Electric radio, loose coupler, tuner and two stages of audio. Working original parts. Alf W. Ackerman, Westbridge, B.C., Canada.

21 QSL samples free. Ace Printing, 3298 Fulton Road, Cleveland, Ohio 44110

SWAN 250SSB 6M transceiver, with Swan power supply 117V and factory installed crystal calibr, and all factory installed mods: \$295.00. Also TR20-50 Tecraft 6M transmitter with power supply, \$40.00; NC-300, all-band receiver, built-in crystal calibr, and 6M converter, all in topnotch condition, best offer. WA2GAW, Box 538, Teaneck, N.J. 07666. Phone: (201)-836-7000.

SPRING Specials: 32S-1-\$395.00; HF44-\$245.00; SW250-\$265.00; GSB100-\$169.00; SX100-\$129-139.00; 2A-\$139-149.00; AF67-\$32.50; NC183-\$99.00; HA6 with a.c. \$199.00; SW-175-\$129.00; HW12-\$89.00; and HQ-129X-\$79.00. Free List. Howard Radio, Box #1269, Abilene, Texas 79604.

CLEGG 99'er, 6-meter transceiver, in excellent condition, \$79.00. Kellersman, Stonybrook Road, Darien, Conn.

BARGAINS: Drake 2A, like-new, \$130.00; Eidico SSB-100A, superior most stable built-in scope xmitter: \$180.00. K2KGU, Tel: (212)-666-8513.

SELL: Collins 75S1, excellent, clean, \$260.00; Shure 44A 55B mike, \$15.00; J.M-10 frequency meter, original book, 115V power supply, \$50.00. D. L. Robinson, 501 Keystone Drive, New Kensington, Penna. 15068.

QSL w/your photo. 1 color: 500—\$8.50; 1000—\$12.00. Sample 10¢. 2-color 500, \$10.50, 1000, \$14.00. Send check or money-order to Modern Graphics, 11604 Seminole Blvd., Largo, Florida 33540.

COMPLETE 6-Meter Station: Thor-6 and AC supply, in mint condition, 5-el. Telrex, CDR-22 rotor and Clegg lowpass filter for \$335.00. Also Eico 720 and HG-10 VFO and spare 6146, and HR-20 with supply for \$149.00. WB2IEC. Tel: (201)-939-2824.

HRO with Coils with or without power supply wanted. WA2JVA, 14 Scotch Pine Drive, Voorheesville, N.Y. 12186.

WANTED: Will pay \$75.00 for Heath SB-10 if perfect. WA4TK, 4031 Waveridge, Miami, Florida.

WANTED: SBE 33 transceiver, also LPA-MU B&W cathode tuner. K3BBH, 903 Western Ave., Jeannette, Penna. 15644.

SELL: Partially assembled SB-300 and un assembled SB-401 in original factory carton. Heath speaker and electronic keyer with first offer over \$400.00. Will ship anywhere within 1500 miles. Write P.O. Box 696, Gulf Breeze, Florida 32561.

MUST Sell: DX-60, R100. Both A-1 condx. \$45.00 for each, \$80 for both, or you make an offer. No first reasonable offer refused. K8MGT, Apt. 3-D, 292 East 15th, Columbus, Ohio.

"HOSS-TRADER" Ed Moory Offers opened and displayed equipment, with Factory Warranty only 2 each at this Price: Swan Mark-1 Linear, \$389.00; Swan 350, \$339.95; NCX-5, \$449.00; NCL-2000, \$539.00; Swan 500, \$419.00; Galaxie 5 Mark 11, \$349.00; SB-34, \$349.00; Demo-Ham-M, \$96.95; New Classic 33 & Demo Ham-M, \$219.00; Demo Drake TR-4, \$449.00; TR-4-X, \$349.00; R4-A, \$334.00; Package Deal: New Galaxie 5 & A.C. Supply: \$419.00; Package Deal: New NC-200 & A.C. Supply Regular Price, \$400.00. Special, \$359.00; Re-conditioned Gear: Swan 240, \$159.00; Drake 2-A, \$149.00; DX-100, \$69.00; B & W 5100, \$69.00; 75S-3-B, \$429.00; 32S-3B, \$519.00; 301-1, \$389.00; TR-3, \$379.00; Used Ham-M, \$85.00; KWM-2, \$699.00; Ed Moory Wholesale Radio Co., DeWitt, Arkansas, Box 306. Phone Area Code (501) 946-2820

FOR Sale: Collins 75S-3 receiver and 32S-1 transmitter, \$395.00 each. Both have serial numbers over 10,000. National NCL-2000B, late model; \$485.00. All like-new condx. 10-day money-back guarantee. E. Shafer, W8MSG, 3479 Kersdale Rd., Cleveland, Ohio.

SELL: SB-300, \$230.00; Heath 10-12 'scope, \$60.00. Will trade for either SR-160 or SB2-1A. WA5OJG, 2002 Evangeline Drive, Hattrop, Louisiana 71220.

NCX-3 with NCXD trade for SBE-34 or SB-200. W8DRV, 6890 Parma Park, Cleveland, Ohio 44130.

QSTs 1946 through 1966. 3 issues missing. CQ's 1948 through 1966 one issue missing. Make me an offer. B&W all-band transmitter tuner Model 850A, cost \$35.00 brand new in original box. \$15.00. Big prop-pitch motor, \$15.00. Transformer for motor, \$6.00. E. H. Collins, W6JFO/W6ZSH, 711 Fair Oaks Avenue, South Pasadena, Calif. 91030.

3rd Edition ARRL Handbook, in excellent condition, 10th edition in good condition, 1936 Radio Handbook, in good condition. Will trade for old callbooks or 3rd edition ARRL Handbook, or QST's prior to May 1920.

OSL cards. Free samples. Send stamped envelope to George WA4QKD, Box 282, Valparaiso, Fla. 32580.

FOR Sale: Heathkit SB-400, \$240.00. Casmaer, 7527 Astoria Place, Goleta, Calif. 93017.

SELL: DX-100 with Heath recommended grid-block keying, modification and ant. relay: \$75.00. WA2OLC, J. Lauricella, 66 Juniper Port Washington, N.Y. 11050. Tel: (516)-883-9561.

WANTED: By former employe and collector; Atwater Kent model 48 or 49; also any A-K "breadboard" sets or parts. K2PI, 1011 Eldridge, W. Collingswood, N.J. 08107.

CLEGG 22, new, \$165.00; Mosley vertical RV4-RK, \$39.00; Monitor 'scope HO-10, \$39.00; Eico 425K 'scope, \$15.00; Sylvania modulation meter, \$8.00; pair Bendix MK II selsyns, \$12.00. Home-brewed 90-watt modulator. Best offer. W2WHK, 210 Utica, Tonawanda, N.Y.

HENRY 2K, mint condition, \$550.00. Central Electronics MM-2 multi-phase analyzer. Need 312B5. Will not ship, sry. Delivery within 100 miles radius. W2AWK; phone: (516)-WA1-0783.

QSTs for sale: issues from November 1931 to December 1966. Complete. Make offer in cash. Alfred P. Wyland, W0INR, Box 756, Hemingford, Nebr. 69348.

HQ-170 and matching speaker, for sale. Excellent condition. Must sell for college exp. \$280.00 or your best offer. WB4BXT, Bill Roberts, 7004 Monument Ave., Richmond, Va. 23226.

SELL: Eimac 4X250B tubes. Guaranteed and condx. \$6.50 each. \$10.00 paid repair in U.S.A. Send check or m.o. Everett Stidham, Jr., WS1Q, 722 So. 30th, Muskogee, Okla.

FOR SALE: SB-200, two months old. Guaranteed, \$195.00. WA0JUM.

HQ-170C, AM/CW/SSB receiver. New condition. Original carton. \$165.00. W5RKR/4, 1009 Dalebrook, Alexandria, Va. Tel: (703)-765-7036.

COLLINS PTO: 70E-24 for 75A4, new, \$49.00; 70E-23 for KWS-1, new, \$39.00; Hunter Bandit 2000B, factory wired, like new, \$325. Richard E. Mann, 430 Wilmot Rd., Deerfield, Ill. 60015.

FOR SALE: Elmac AF-67 with mike. Best offer. Ed Ballard, W3KKH, 3021 Fendall Rd., Baltimore, Md. 21207.

GOING S/Line, must sell SX-101A, \$190.00 and HT-37, \$215.00 or both for \$375.00. Equipment now in operation. Prefer pickup deal only. Contact me all day Thursday or Friday at 201-391-6450. Mike Tarnowski, WB2YJS, 24 Middletown Road, Montvale, N.J. 07645.

WANTED: KWM-1, good condition, also traveling case and PM-2 power supply for KWM-2. Alexander Speyer, 1202 Bendum-Frees Building, Pittsburgh, Penna. (412)-281-7225 (phone collect).

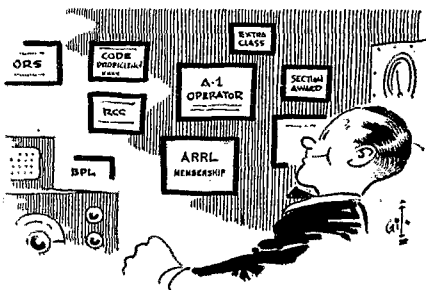
BOTH Excellent condx. NC-300 wid 100 kc. xtal, new tubes, manual: \$115.00. Ranger brick block keying manual \$100. No shipping, sry. Adam Holzmueller, W8GFB, 390 N. McElroy Rd., Mansfield, Ohio 44905.

FOR SALE: SB-101, SB-200, Wanted: Kits to wire. Heath preferred, 12% of cost, some in stock. Professionally wired. Lan Richter, K3SON, 131 Florence Drive, Harrisburg, Penna. 17112.

G-76 Transceiver with both power supplies; Apache SB-10 combination; send \$425.00 money-order or certified check for all—or make an offer. Will ship. Norm Preston, K4PRO, 3 Hull St., Newport News, Va. 23601.

WANTED: Heath DC, HP13 supply, H. Griffiths, W2OQR, 39-82 65 Place, Woodside, N.Y. 11377. Tel: Illinois 7-1549.

A HAM'S HISTORY



JOE HAM put away the box of thumb tacks, leaned back in his chair and gazed at his latest "wall-paper". A brand-new Extra Class license certificate hung next to the A-1 Operator sheepskin that had arrived only the week before. Many others adorned the wall — their brightly colored faces telling the whole of this ham's history.

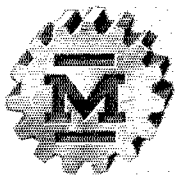
FIRST on the wall was his ARRL Associate Member certificate, later flanked by several marked "Full Member". Then came the ten-word code proficiency award now festooned with silver stickers; RCC; Novice Roundup Section Award; Section Net certificate and then ORS; and finally BPL and the Public Service Award, both earned during the Hurricane, when Joe handled 534 messages in less than a week.

JOE HAM has come from the ranks of the newcomers to the status of a crack operator in a few short years. All along, he has helped organized amateur radio — and it has helped him — through full participation in League activities. How about you?

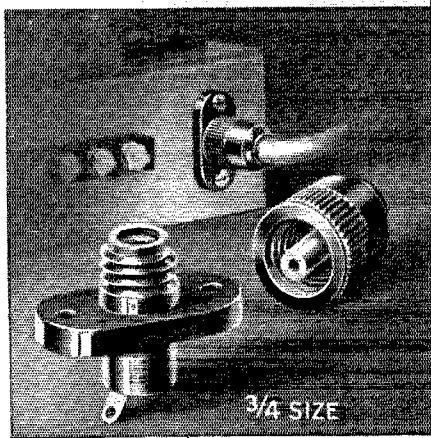
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THE NO. 37001 SAFETY TERMINAL

An old favorite in the line of exclusive Millen "Designed for Application" products. Combination high voltage terminal and thru-bushing. Tapered contact pin fits firmly into conical socket providing large area, low resistance connection. Pin is swivel mounted in cap to prevent twisting of lead wire. Easy to use. $\frac{1}{4}$ " o.d. insulation high voltage cable fits into opening in cap. Bared conductor passes thru pin for easy soldering to pre-tinned tip of contact plug.

Standard 37001 available in either black or red bakelite. No. 37501 is low loss mica filled yellow bakelite for R.F. applications.

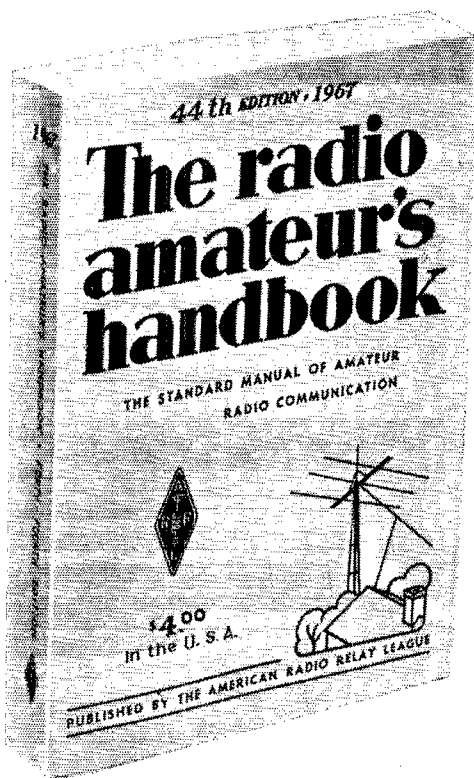
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Index of Advertisers

Alltronics-Howard Co.	142
AMECO Subsidiary of Aerotron, Inc.	137
Arrow Electronics, Inc.	157
American Radio Relay League, Inc.	136
<i>QST</i>	149
<i>Decals</i>	158
<i>Handbook</i>	149
<i>License Manual</i>	147
<i>Membershop</i>	160
<i>Mobile Manual</i>	145
<i>Operating Manual</i>	148
<i>Publications</i>	148
Barry Electronics	139
Belden Manufacturing Co.	135
Bookbinder Publishing Co.	144
P. T. E.	131
Budwig Manufacturing Co.	140, 148
Codemaster	146
Collins Radio Co.	127
Communication Products Co.	127
Cortlandt Electronics, Inc.	149
Cubex Co.	136
Cush Craft	138
Dahl Co., Peter W.	146
Dames Co., Theodore E.	136
Davco Electronics, Inc.	133
Dayton Hamvention	148
Design Industries, Inc.	141
DPZ Corp.	144
Editors & Engineers, Ltd.	126
ELMAC a division of varian	109
Electro-Voice, Inc.	141
Electrophysics Corp.	143
Evans Radio	140
Fair Radio Sales	145
Fugle Labs	146
Gain, Inc.	149
Galaxy Electronics	113, 125
Gentec, Inc.	145
Gotham	119
Grand Central Radio, Inc.	142
Hallett Manufacturing Co.	149
Hallicrafters Co., The	1
Ham Hobby Directory	147
Ham Radio Center	146
Hammerlund Manufacturing Co., Inc.	122, 134
Harrison Radio	160
Heath Co., The	104, 105
Henry Radio Stores	121
Hotel Beachcomber	145
Hunter Sales, Inc.	143
Instructograph Co., Inc.	142
International Crystal Manufacturing Co., Inc.	7
Jan Crystals	148
Kirk Electronics	123, 130
Lampkin Labs., Inc.	143
Lattin Radio Labs	145
Millen Manufacturing Co., Inc., James	158
Miller Co., J. W.	138
Mini-Products, Inc.	184
Mor-Gain	139
Mosley Electronics, Inc.	182
National Radio Co., Inc.	Cov. III
National Radio Institute	114
Poly Paks	124
Polygon Plastic Co., Inc.	128
Raytheon Co.	103
RCA Electronic Components Devices	Cov. IV
R. F. Communications Associates, Inc.	117
Rohn Manufacturing Co.	116
Shure Brothers, Inc.	138
Slideband Engineers, Inc.	115
Sierra/Philco	118
Skylark Products	144
Sound History Recording	148
Space Electronics	147
Squires-Sanders, Inc.	143
Swan Electronics Corp.	111
Telrex Communication Engineering Labs	142, 147
Tri-Ex Tower Corp.	112
Trigger Electronics	161
Unadilla Radiation Products	140
Uncle George's Radio Ham Shack	108, 107
United Transformer Co.	Cov. II
Van Sickle Radio Supply	136
Vanguard Electronic Labs	110, 120
Vibroplex Co., Inc., The	146
Webster Manufacturing	4
World Radio Labs	129, 143



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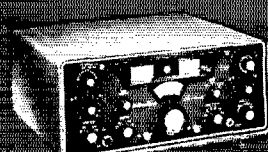
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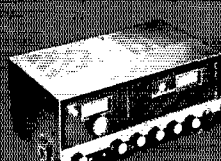
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