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amateur radio

January 1964

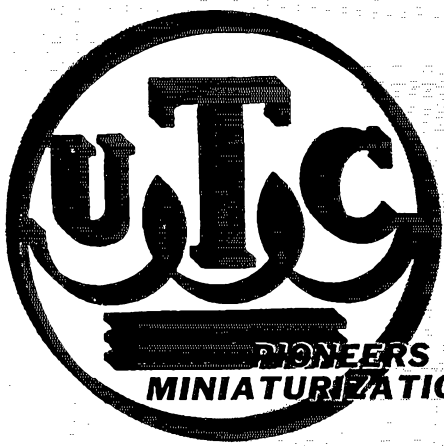
50 Cents

55c in Canada

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ULTRA-COMPACT™ "A-SERIES"

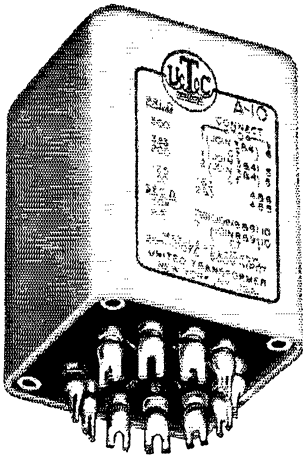
AUDIO TRANSFORMERS & INDUCTORS

FOR TRANSISTOR & TUBE APPLICATION

For over thirty years, UTC has pioneered in the design, development and production of transformers, inductors, electric wave filters, magamps and high Q coils.

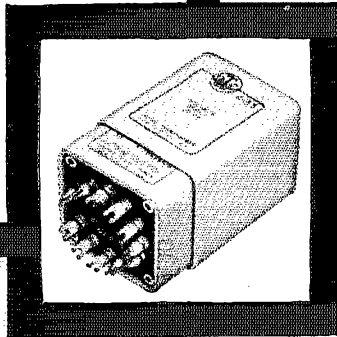
UTC's ULTRA-COMPACT, A-SERIES, are small lightweight audio units, ideally suited to remote amplifier and similar compact equipment. High fidelity is obtainable in all individual units, frequency response within the series extending from 10 to 50,000 cycles ± 2 db. All units except those carrying DC in primary, employ a true hum balancing coil structure, which combined with high conductivity outer case, effects good inductive shielding. The die cast case provides top and bottom mounting. These units are adaptable for printed circuit use.

The conservative design and manufacturing procedures employed make these units suitable for virtually all types of commercial equipment and ideal for quality amateur service.



TYPE A CASE

Length1½"
Width1½"
Height2"
Mounting1½" sq.
Screws4-40
Cutout1¾" dia.
Unit Weight½ lb.



Hipermalloy Shield (A-33)
shown slipping
over "A"-line unit

Write for latest catalog of over 1,200 STOCK ITEMS with UTC high reliability

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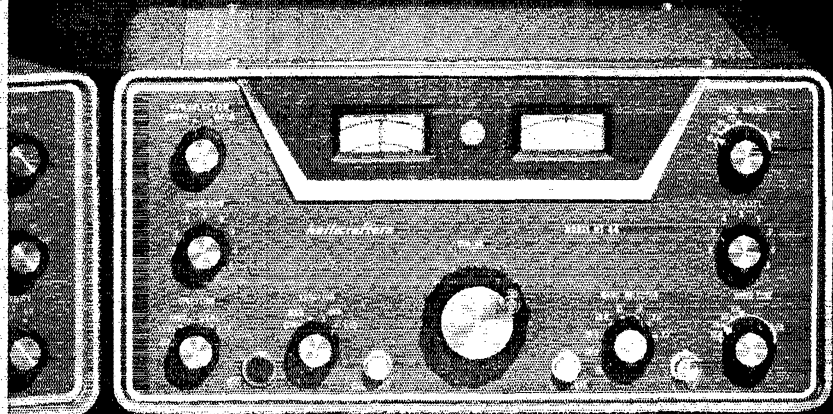


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or slave to your needs!

HT-44 SPECIFICATIONS

Versatile compact amateur band transmitter for independent operation or slaving with SX-117 receiver for function as transceiver. SSB, AM, or CW on 80 through 10 meters. Features Hallicrafters stabilized phasing system for sideband generation with -40 db of sideband suppression @ 1 kc and carrier suppression of -50 db. Distortion products, -30 db. VOX/CW break-in and PTT operation. Panel-adjusted VOX/CW delay for maximum Phone-CW flexibility. Exclusive AALC gives greater talk power with speech compression up to 12 db. Power input 200 watts DC on CW and SSB, 50 watts AM. Same size and style as SX-117. Furnished with crystals for 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, and 28.5-29.0 mc. Less transceiver cables, \$395.00. P-150 AC power supply, \$99.50.



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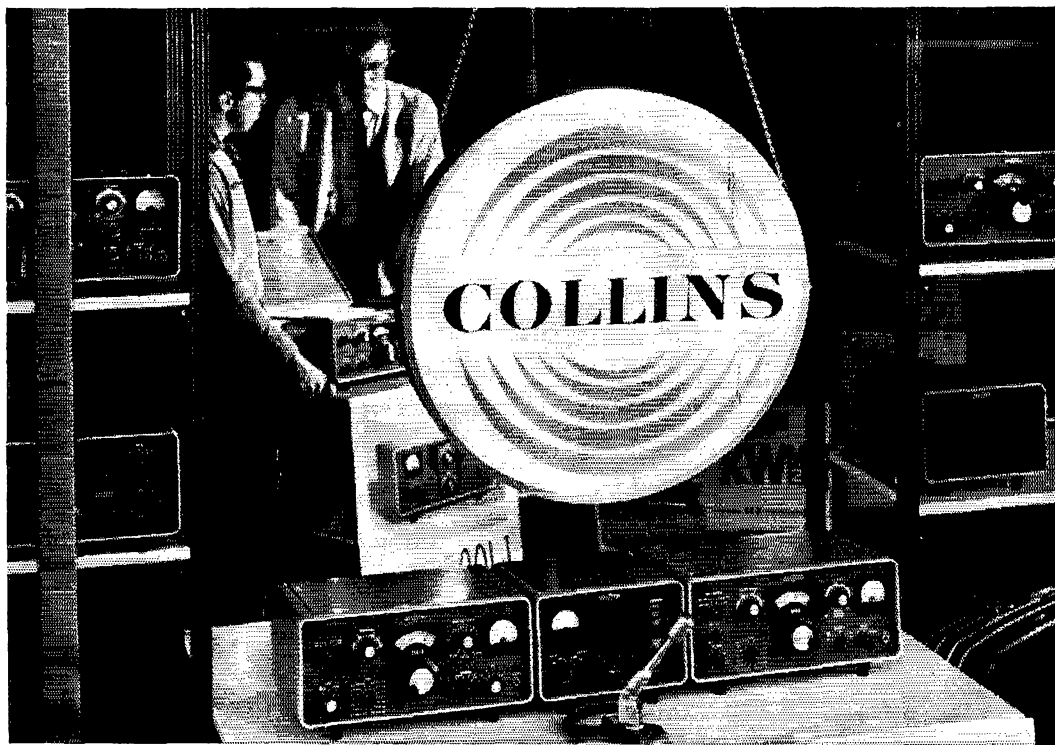
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PUBLISHED, MONTHLY, AS ITS OFFICIAL ORGAN, BY THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN., U. S. A.; OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

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Subscription rate in United States and Possessions, \$5.00 per year, postpaid; \$5.25 in Canada, \$6.00 in all other countries. Single copies, 50 cents. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U. S. and for an equivalent amount in U. S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices.

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INDEXED BY

Applied Science and Technology Index
Library of Congress Catalog
Card No.: 21-9421

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FIFTY YEARS OF A.R.R.L. —

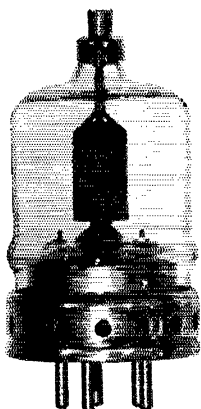
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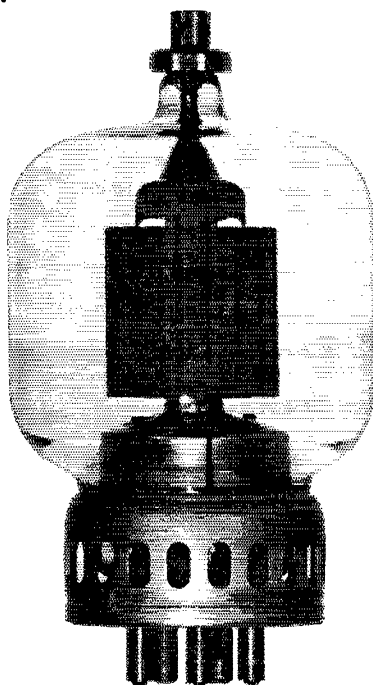
AMATEUR SERVICE NEWSLETTER

DX Champions!

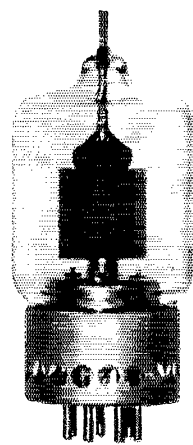
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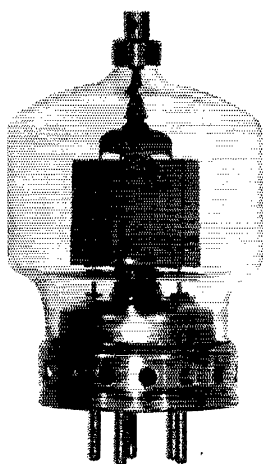
4-125A



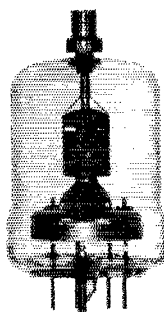
8166/4-1000A



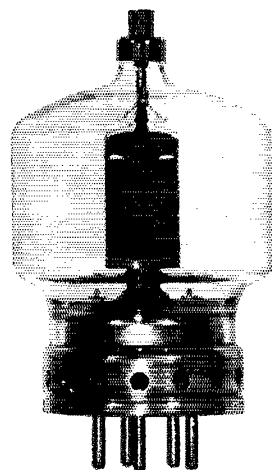
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but immunized

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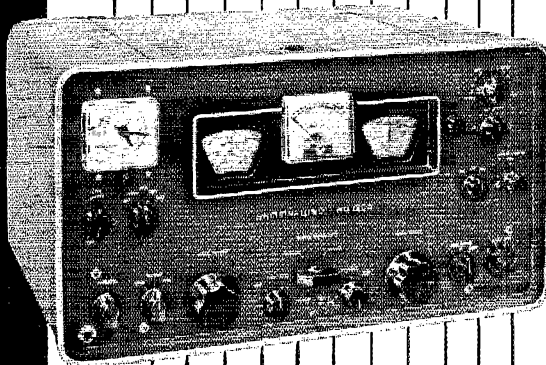
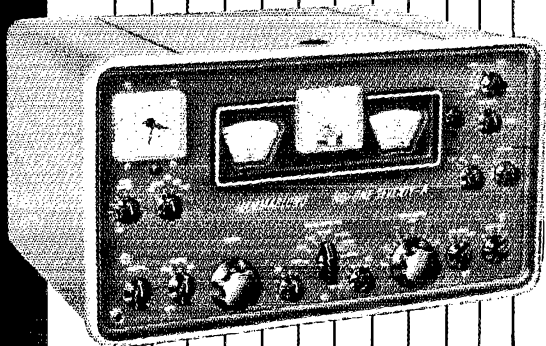
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EXPIRES JAN. 31, 1964

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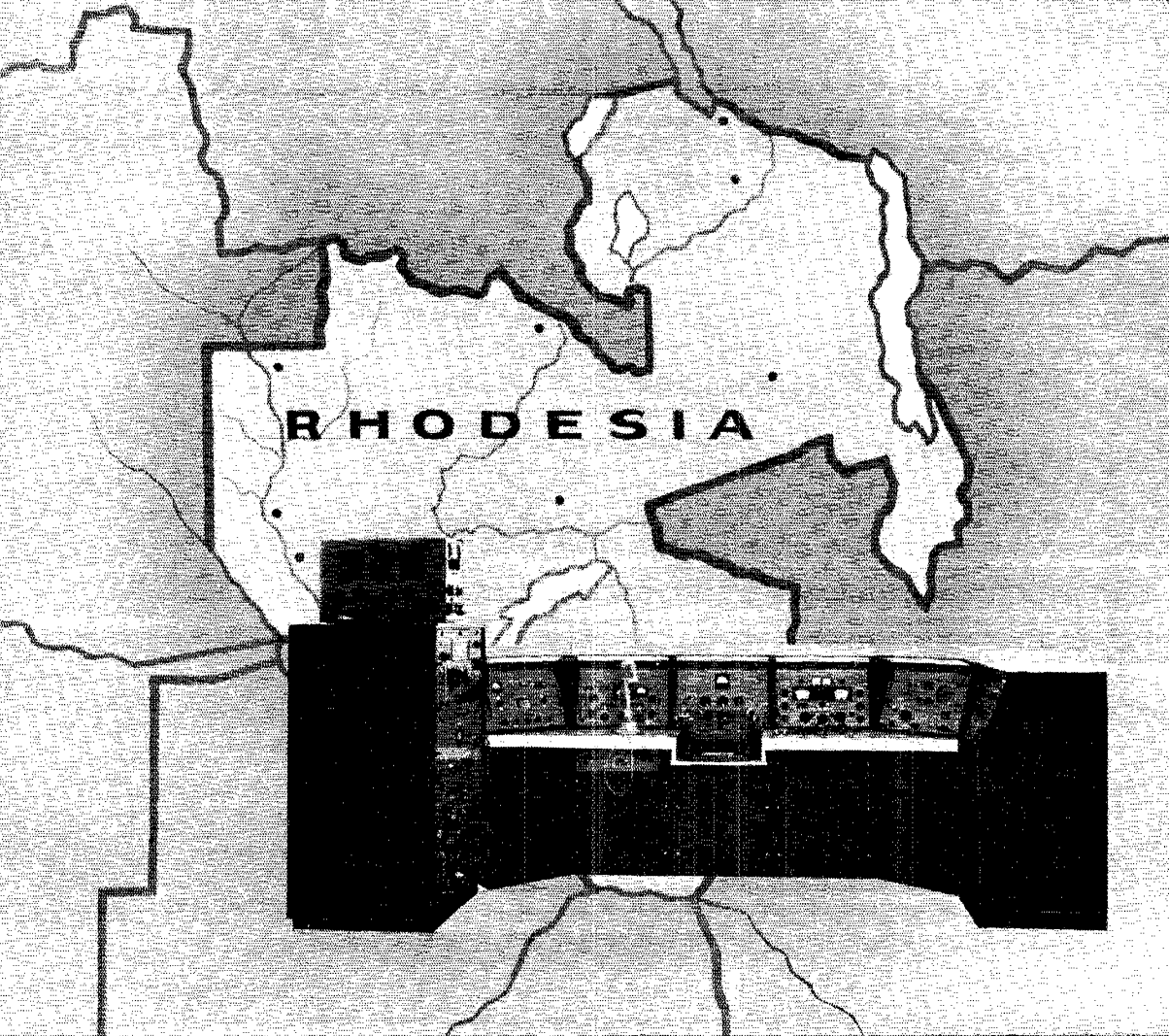
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is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the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

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

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

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

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"It Seems to Us..."

The Year in Review

NINETEEN SIXTY-THREE has come and gone; amateurs everywhere can now wipe the slate clean and prepare for the challenge of a new year. Before we grab the eraser, though, let's take a look at the events of the past twelve months.

It was a busy and exciting year!

The ever-increasing world population of amateurs reached 375,000 by the end of the year, more than 250,000 of which could be found in the U.S. alone.

With strong financial support from the membership, the League moved its administrative activities into a bright new building with some 24,000 square feet of floor space. On July 1, for the first time in 32 years, the premises at 38 LaSalle Road, West Hartford, stood dark and empty. And there was plenty to keep the crew busy at the new office. During the year, about a half-million books and booklets and nearly a million and a half *QST*'s were prepared, printed and dispatched. Fifty thousand pieces of literature for the general public were furnished to individual amateurs and clubs for local use at civic-club meetings, fairs, science exhibits and the like. There were a thousand affiliated-club showings of films and filmstrips from the ARRL Training Aids Library, reaching an audience of 25,000. The Communications Department mailed 175,000 copies of its various bulletins to promote improved operating and greater public service. The Technical Information Service answered more than 5000 inquiries on equipment problems. At least ten thousand letters to members on other subjects were dictated, typed and mailed. Some 5000 people earned membership in the Rag Chewers Club; 800 WAS and 1300 WAC applications were approved and certificates issued; 130,000 DXCC cards were processed, resulting in 750 new DXCC awards and 5000 endorsement stickers! Some 300 hours of code-practice copy were transmitted by WIAW, and 4000 people received code proficiency awards. Nearly 1400 local radio clubs cooperated with the League as affiliated societies. All this activity kept things jumping, as you can imagine.

The Federal Communications Commission was quite active in amateur matters during the year. Privileges in the 160-meter band were

expanded at League request, enabling amateurs in many parts of the U.S. to make use of the band for the first time since 1956. Again at League request, the power restriction on the 420-450 Mc. band was lifted by both the U.S. and Canada, permitting v.h.f.ers to use full power, a kw, in most of the U.S., and 750 watts in Canada. Mobile logging requirements in the U.S. were eased (also at ARRL request) in time for the summer mobilizing season. The FCC tightened procedures for Conditional, Technician and Novice exams. On another front, the Commission shattered 51 years of tradition — over the League's strenuous objections — by enacting rules requiring the payment of a fee with most applications filed by amateurs.

As part of a campaign to improve standards of technical and operating proficiency on the part of U.S. amateurs, the League petitioned FCC for reinstatement of the Advanced Class license, and gradual limitation of voice operating privileges in four h.f. bands to holders of this or the Amateur Extra Class license. The action caused a considerable furor in amateur ranks; much of it arose from misstatement of facts in on-the-air discussions, but often it was an honest difference of opinion expressed by those who think amateur radio is fine just as it is and does not need upgrading to meet the serious challenge of the future. The League also sought an upgrading of the written examinations for other classes of license as well, to reflect present amateur techniques. Recognizing that these steps alone would not solve all of our problems, the League began efforts to beef up the Official Observer system, expand the educational material in *QST* and other ARRL publications, and encourage more efficient and flexible use of the amateur bands.

Also along these lines, the National Traffic System and the Amateur Radio Emergency Corps were combined to form the Amateur Radio Public Service Corps, creating an emergency network capable of both local and long-distance message handling for maximum effectiveness in the public interest. Traffic handlers in nets which send the League monthly reports accounted for an estimated two million messages, demonstrating the willingness of radio

amateurs to serve the public in everyday fashion as well as in more spectacular circumstances.

Old Man Sunspot did his best to shake us off the higher amateur bands, but participants in the various operating activities found plenty of contacts anyway. Field Day yielded more than 1500 entries representing about 15,000 participants, and the 1963 DX Test brought in 1300 entries. There was activity aplenty in the '63 Sweepstakes, but it remains to be seen how conditions and new wrinkles in the rules affected the scores. Despite a scarcity of openings, v.h.f. SS scores remained high, with the 600-QSO mark being bested for the first time by single-operator stations.

The U.S. and the Dominican Republic signed a third-party traffic agreement during the year, and Canada added Bolivia and El Salvador to the list of countries with which VE/VOs may exchange such messages. A League request for a postage stamp commemorating 50 years of organized amateur radio is hopefully awaiting action by the Post Office Department. The Post Office examined the operation of ARRL QSL Bureaus and ruled that their basic operations do not violate the postal laws. The U.S. Senate approved and sent to the House the Goldwater Bill, S. 920, which would permit the government to make reciprocal amateur operator agreements with other nations like that now in effect between the U.S. and Canada. Manitoba began issuing amateur call-letter license plates, leaving Ontario as the lone Canadian holdout, while New York became the 47th state to provide the plates, with Kentucky, Massachusetts and New Jersey to go.

An Extraordinary Administrative Radio Conference on Space Communications was held in Geneva, Switzerland, during October and November. Amateurs present as members of official delegations worked with an IARU observer team to secure official international approval for amateur satellite activity on 144-146 Mc.

There were 15 Province, State and Division Conventions held during 1963, and several times that number of hamfests, banquets and similar affairs on a local basis. There was even an international hamfest in Geneva, Switzerland sponsored by the newly-formed International Amateur Radio Club, at the time of the space conference.

Was 1963 a good year for you? We hope so, and we hope also that '64 proves every bit as challenging and successful. During the coming year we shall have, through *QST*, a fifty-year look at our past history. During the year we shall also face serious problems, the solutions to which may affect the course of amateur radio for many years to come. From the current turmoil, we are confident that the amateur body, led by ARRL members, will make the decisions necessary to a bright and useful future.

QST

QST Article Contest

As a feature of the League's 50th Anniversary year, you are invited to submit entries in a monthly *QST* article contest covering the broad fields of more efficient use of amateur frequencies and more effective amateur performance in the public interest, convenience and necessity.

Observe procedures as you operate in the amateur bands, h.f. or v.h.f. Analyze your own operating techniques and those of others. Study the principles of good operating recommended by the Board and incorporated in Operating Aid No. 11 (see p. 64a, September 1963, *QST*). Then sit down to put your constructive thoughts on paper to submit for the contest. Or you may choose to discuss accounts of club and leadership experience, training programs, ARPSC-RACES plans and activities, public relations projects. We want to present ideas that have been or should be tried for fuller development of organization patterns and public service capabilities.

Some possible specific subjects: Getting the successful v.h.f. net underway, mending our operating defects, recommended s.s.b. techniques, hints on message handling and net operation, more effective self-policing, best contest and DX procedures, courtesy in operating, band-switching to v.h.f. for local contacts, teaching-group techniques, using low power in every shack, a public relations program that worked, efficient station layout.

The author of the article selected by *QST*'s staff as best of those on hand each month for the remainder of 1964 will receive a \$25 U.S. Bond. The first winning article will appear in the March issue, for which the deadline is January 25, but articles may be submitted at any time throughout the year up to October 25 (deadline for the December issue). Approximately 1,000 words is an ideal length, and copy submitted typewritten and double-spaced will be helpful. Articles will be selected on the basis of originality and general value to the amateur fraternity. Give this contest a try whether your ideas relate to emergency drills, club training programs, code proficiency, or getting the most out of your amateur operating. Be sure to mark your contribution "for the *QST* article contest."

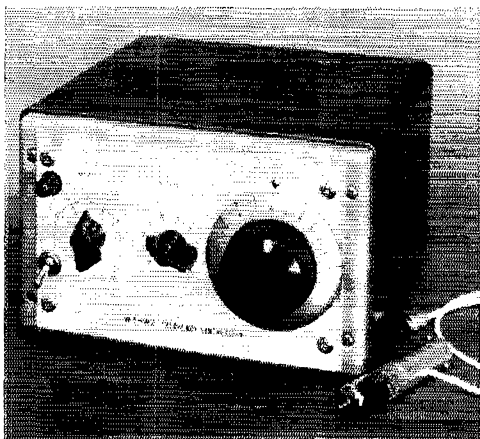
MEMBERSHIP CHANGES OF ADDRESS

Four week's notice is required to effect change of address. When notifying, please give old as well as new address. Advise promptly so that you will receive every issue of *QST* without interruption.

BY M. R. BRIGGS,* W3HWZ

AND H. J. MORRISON

Fig. 1—The finished synthesizer with HT-32 adapter. The 100-kc.-step switch (S_2) is to the left, and the 10-kc.-step switch (S_1) at the center. The dial at the right controls the tuning of the variable-frequency oscillator spanning the intervals between 10-kc. steps. The dial drive is a National type AM.



A Simplified Frequency Synthesizer

This frequency synthesizer (or crystal v.f.o.) requires only three tubes and uses inexpensive standard crystals requiring no grinding to frequency. The unit plugs into the v.f.o. tube socket of HT-32 series exciters and is adaptable to most other s.s.b. exciters having a 5-Mc. v.f.o. as the tuning element.

IN reviewing the previous literature on frequency synthesizers, several items were noted which made them less than desirable for construction by the average amateur. First, they were large in size and required a considerable number of components. Secondly, the crystals were not readily available or required grinding or etching to produce the desired results. In addition, placing the unit on frequency was a complex process, and generally required equipment not available to the average amateur. In the development of this synthesizer, the following requirements were set up:

Frequency range: 5 to 5.5 Mc. to allow its use with the HT-32 series equipment, Central Electronics equipment or other units using 9-Mc. filters.

Crystals: Minimum number, readily available, no grinding or etching, and low cost.

Tubes and components: Minimum number of tubes, all components readily available or easily constructed.

Output power: Sufficient to drive the HT-32-series equipment or the others listed above.

Spurious emission: At least 60 db. down.

Stability: Equal to good AT-cut crystal.

*34 Holmehurst Ave., Catonsville 28, Maryland.

Construction: Small size, easily constructed with tools usually available in the average workshop.

Crystals

The first problem tackled was that of obtaining crystals which were readily available in 10-kc. steps, and at low cost. The solution was found in the use of Citizens-Band and radio-control crystals which are obtainable in 10-kc. steps in the 27-Mc. frequency range. These crystals are, of course, readily available and are quite low in cost. They can be obtained with a frequency tolerance of 0.0025 per cent.

The next problem involved determining the combination of additional crystals that would give an output of 5 to 5.5 Mc., with spurious emission below 60 db. Considerable use was made of mixer frequency charts. For those of you who may be interested in this work, a very fine set of mixer frequency charts was furnished in *Electronics* for August 1946, by Mr. R. S. Badessa of the Naval Research Laboratory. From these charts it was determined that the use of a 4-Mc. mixer frequency added to the 27-Mc. frequency giving 31 Mc., with a subtraction frequency of 26 Mc., would give the desired output frequency, and no spurious frequencies would fall within the desired output frequency range. The final frequency therefore is equal to $F_1 + F_2 - F_3$. The F_2 , or 4-Mc. frequency, is adjusted in 100-kc. steps, and crystals in this frequency range are again readily available at low cost.

Variable-Frequency Oscillator

The F_3 , or 26-Mc. frequency, is made variable over a 10-kc. range so that the output frequency

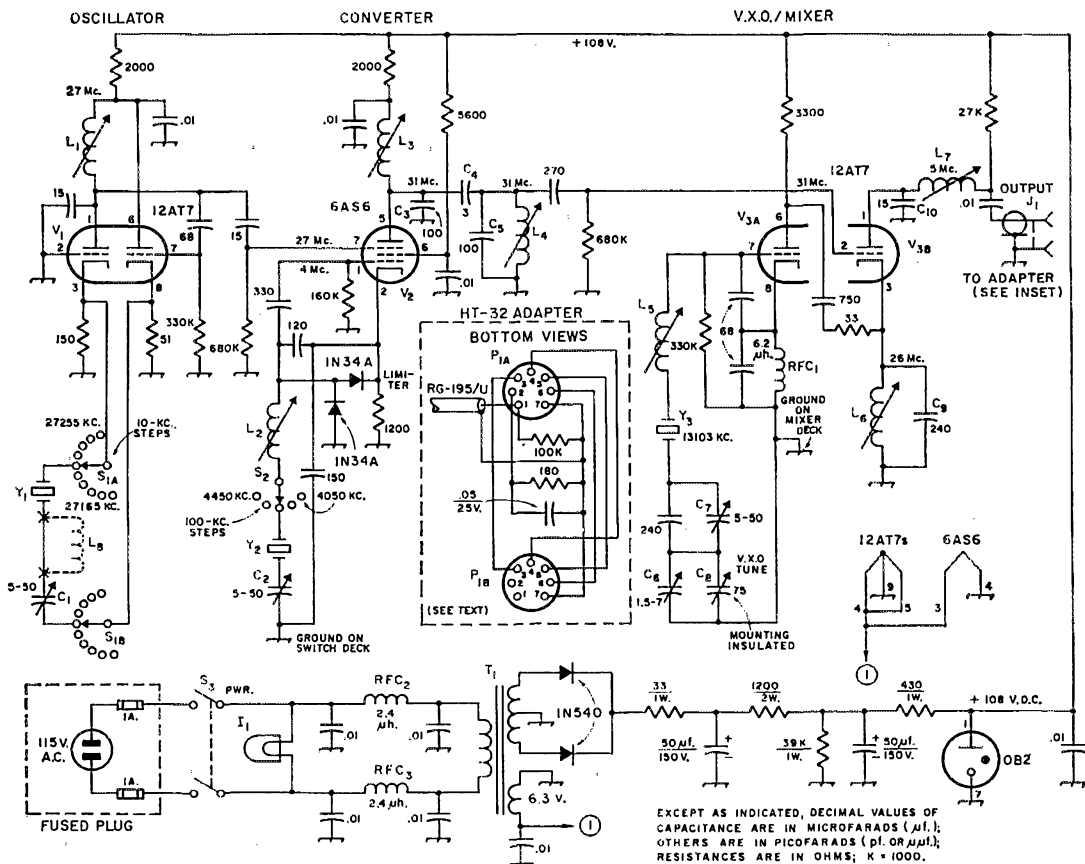


Fig. 2—Circuit of the frequency synthesizer. Fixed capacitors of decimal value are disk ceramic; others are silver mica or NPO ceramic, except where polarity indicates electrolytic. Unless indicated otherwise, resistors are 1/2-watt composition. Component labels not found below are for text-reference purposes.

- C₁, C₂—Ceramic trimmer, one for each switch position (Erie CV11D500).
- C₄—Ceramic trimmer (Erie CV11A070).
- C₇—Ceramic trimmer (Erie CV11D500).
- C₈—Air variable (Hammarlund MC-75-M).
- I₁—115-volt neon panel lamp.
- J₁—Chassis-mounting coaxial receptacle (BNC).
- L₁—1.0–1.6 μh., iron slug, ceramic (North Hills 1000A black dot, or equivalent).
- L₂—8.5–14.5 μh., iron slug, ceramic (North Hills 1000E yellow dot, or equivalent).
- L₃, L₄—0.2–0.35 μh., iron slug, ceramic (remove winding from North Hills 1000A; replace with 6 turns No. 28 enameled, evenly spaced between terminals).
- L₅—1.6–2.7 μh., iron slug, ceramic (North Hills 1000B brown dot, or equivalent).
- L₆—0.12–0.17 μh., same as L₃ and L₄ except 4 turns

- spaced approximately two wire diameters opposite mounting end of form.
- L₇—29–55 μh., iron slug, ceramic (North Hills 1000H violet dot, or equivalent).
- L₈—1.5 μh., see text (Miller 4604 r.f. choke).
- P₁—Miniature 7-pin to 7-pin extension adapter (Vector G2.2–8M).
- RFC₁—6.2 μh. (Miller 4610).
- RFC₂, RFC₃—2.4 μh. (Miller 4606).
- S₁—Ceramic rotary switch: two sections, two poles, 10 positions (Centralab P-270 index, two type YD sections, one position not used).
- S₂—Ceramic rotary switch: one section, one pole, five positions (Centralab P-270 index, one type YD section, six positions not used).
- S₃—D.p.s.t. toggle switch.
- T₁—Power transformer: 250 volts, c.t., 25 ma.; 6.3 volts, 1 amp. (Stancor PS-8416).
- Y₁—Third overtone crystal, type HC-6U, 0.005-per-cent tolerance (Citizens Band), one for each switch position in succession (clockwise), as follows:

27,165 kc.	27,195 kc.	27,235 kc.
27,175 kc.	27,205 kc.	27,245 kc.
27,185 kc.	27,215 kc.	27,255 kc.
	27,225 kc.	
- Y₂—Fundamental crystal, type HC-6U, 0.005-per-cent tolerance, anti-resonant with 32 pf., one for each switch position in succession (clockwise) as follows: 4050 kc., 4150 kc., 4250 kc., 4350 kc., 4450 kc.
- Y₃—Same type as Y₂, 13,103 kc.

without affecting the over-all stability of the crystal. Since we desired a frequency shift of 10 kc., this indicated a fundamental frequency crystal of approximately 20 Mc. While fundamental-frequency crystals in this frequency range can be obtained, they are relatively fragile and expensive. This problem was solved by using a crystal operating at 13 Mc. and using its doubled frequency. The 13-Mc. crystal, therefore, needs to be pulled only 5 kc., an amount which is easily obtainable.

Performance

A tabulation of the actual performance of the unit is given as follows:

Frequency range: 5 to 5.5 Mc. in 100-kc. steps, each step of which may be divided into 10-kc. segments, with a continuously-variable frequency to span the 10-kc. intervals.

Crystals: A total of 16, all readily available at low cost. No grinding or etching required. Only one variable crystal, and the variable-frequency control-dial readings are therefore the same for all settings of the 100-kc. and 10-kc. steps.

Tubes: 3 tubes required, plus one regulator.

Output: Over 2 volts peak-to-peak, which is sufficient to drive the IIT-32-series equipment.

Spurious emission: Measured 70 to 80 db. down.

Stability: Equal to that of AT-cut crystals.

Physical: 5 by 8 by 8 inches. Interior construc-

tion all of flat-plate type. All parts are readily available, or may be easily constructed.

Schematic Diagram

Fig. 2 shows the schematic diagram of the unit. Starting at the left, the 12AT7 tube, V_1 , operates in a Butler-type oscillator to give the 10-kc. steps. It will be noted that the crystals start at 27,165 kc., and are in steps of 10 kc. up to 27,255 kc. An individual trimming capacitor, C_1 , of 5 to 50 pf., is connected in series with each crystal to allow putting it exactly on correct frequency. In certain individual cases, it was found necessary to place a small inductance, indicated by L_3 , in series with the crystal to lower the frequency slightly to allow it to be correctly adjusted. L_1 , in the plate circuit of the first half of the 12AT7, is tuned to the 27-Mc. operating-frequency range of these crystals.

The second tube, a 6AS6, V_2 , operates as the 4-Mc. converter. The oscillator circuit is of the standard Colpitts type, and uses crystals, starting at 4050 kc., in 100-kc. steps up to 4450 kc. In this circuit, the series inductance, L_2 , lowers the group frequency of the crystals, and the individual crystals are placed on exact frequency by the 50-pf. capacitors, C_2 . The 1N34A diodes hold the voltage amplitude of this circuit relatively constant, regardless of the variation in output of the 4-Mc. crystals.

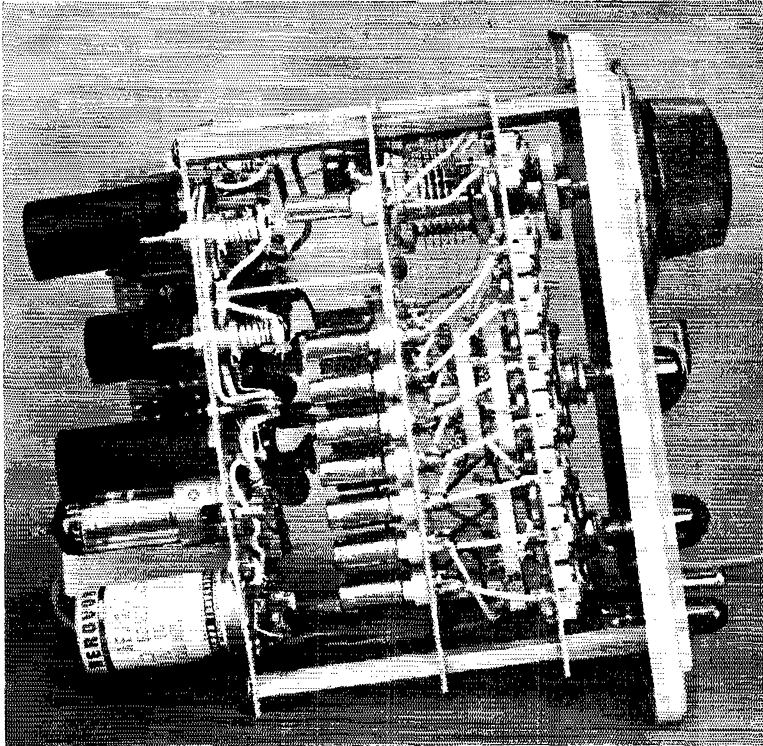


Fig. 3—The synthesizer is made up in three decks. The one closest to the panel carries the variable capacitors and switches, crystals are mounted on the next in National CS-7 sockets. Tubes, coils and power-supply components are mounted on the one at the rear. Note the shield running from the second to the third deck.

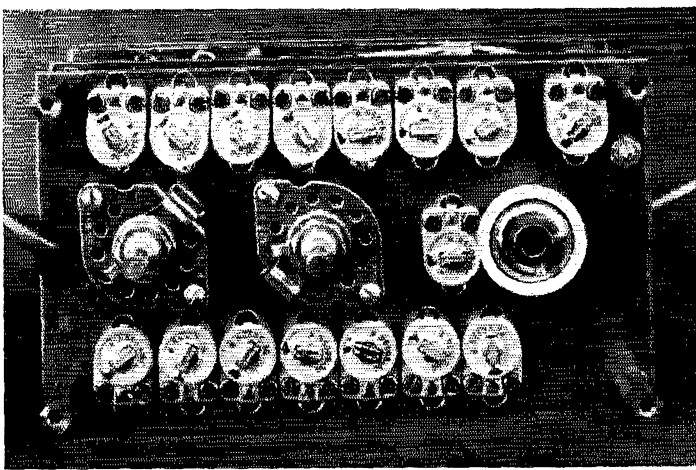


Fig. 4—Front view of the front deck showing the arrangement of crystal-trimmer capacitors and crystal switches. The shaft of the air variable tuning the variable-frequency oscillator is at right center. The slug-adjusting screw of L_5 may be seen in the upper right-hand corner.

Input from the 27-Mc. oscillator is fed to the injection grid of the 6AS6. The output circuit, consisting of L_3 and C_3 , is tuned to the sum frequency, or 31 Mc. The output from this stage is coupled through C_4 to an additional tuned circuit, L_4 and C_5 , also tuned to 31 Mc. By slightly stagger-tuning these two circuits, the mixed output from the first two crystal stages is held fairly constant over the total frequency range. The first half of the second 12AT7, V_3 , operates again as a Colpitts-type crystal oscillator. The frequency variation of 5 kc. around the operating frequency of 13,103 kc. is accomplished by variable capacitor C_8 . The exact range of 5 kc. is obtained by setting the minimum capacitance through adjustment of C_6 , and the maximum capacitance through adjustment of C_7 . Coil L_5 allows adjustment of the crystal frequency to the correct value.

The output of this circuit is coupled to the cathode of the second half of the 12AT7, V_{3B} , and the circuit consisting of L_6 and C_9 is tuned to 26 Mc., or the second harmonic of the variable crystal. The 31-Mc. output from the previous two stages is injected into the grid, and the desired output of 5 to 5.5 Mc. is obtained in the plate pi-section output circuit consisting of L_7 , C_{10} , and the capacitance of the output cable. Using a 95-ohm output cable having a low capacitance of approximately 36 pf. for 2 feet of length, and tuning L_7 for the mid-frequency of the desired band, it was found that the output stayed relatively constant over the total frequency range.

Power Supply

The power supply for the unit is quite conventional, consisting of a 250-volt center-tapped plate-supply transformer, a pair of 1N540 silicon rectifiers, and an RC filter. The voltage is stabilized through the use of an OB2 regulator tube. Primary line filtering is accomplished by RFC_2 and RFC_3 in combination with the 0.01- μ f. capacitors.

For those of you who have HT-32-series equipment, the connections to an adapter are

shown in the inset sketch in Fig. 1. The adapter is made up using a 7-pin to 7-pin vector adapter. This plugs into the 6CB6 5-Mc. v.f.o. tube socket. The 6CB6 is then plugged into the adapter.

Unit Construction

Fig. 1 is a front view of the unit. The left-hand knob is the 100-kc. step control. The center knob adjusts the frequency in 10-kc. steps, while the right-hand dial controls the variable-frequency oscillator, and is marked every kilocycle. There are two sets of dial markings on all controls. The outer ones read counterclockwise, while the inner ones read clockwise. This is to provide the correct reading on the dials when the output frequency of the equipment exceeds that of the 9-Mc. crossover point. The equipment is housed in a Bud utility cabinet, type 587, which measures 5 by 8 by 8 inches. The HT-32 adapter and its tube are also shown in this view.

Fig. 3 is a top view showing the interior construction of the unit. The unit is made up of three flat plates, $3\frac{7}{8}$ by $6\frac{7}{8}$ inches, of $\frac{1}{16}$ -inch aluminum, separated by metallic spacers. The panel spacers are $1\frac{1}{4}$ inches long, center spacers $1\frac{3}{8}$ inches, and rear spacers $2\frac{1}{8}$ inches. The plate adjacent to the front panel mounts all of the crystal-trimming capacitors as well as the range switches and the variable-frequency capacitor. The center plate mounts all of the crystals and their associated sockets, while the rear plate mounts the power supply, tubes and associated components. The use of this flat-plate type of construction greatly simplifies the layout, drilling and wiring of the unit. The only piece requiring bending is the small shield seen in this view, above the crystals, and between the center and rear plates.

Fig. 4 shows the front of the unit with the panel removed, exposing all of the crystal-adjustment trimmer capacitors. During the adjustment, the unit is operated in this condition. However, once the adjustments have been made, the front panel is secured, since no additional adjustments are expected to be required. There is one additional adjustable component which is not visible

in this view. This is the capacitor (C_6) for setting the minimum capacitance of the variable capacitor. This trimmer is mounted on a Micarta angle bracket attached directly to the capacitor, and is available from the right side of the unit.

Fig. 5 is a rear view of the unit showing the placement of the power transformer, filter capacitor, vacuum tubes, the rectifiers, line filter and resistor units. The rectifiers, line filter, and resistor units are mounted on a piece of Vector perforated board, $1\frac{3}{8}$ by $4\frac{1}{8}$ inches, which is mounted at right angles to the rear plate. This perforated board is extremely handy. Through the use of the push-through-type terminals, the components can be easily and quickly mounted.

Fig. 6 shows the various components mounted on the back side of the rear panel. Actual placement of the components is not critical, except to allow space for the shield mentioned previously which prevents coupling between the two 31-Mc. circuits, except through the proper coupling capacitor, and also shields the 4- and 27-Mc. circuits from the 5- and 26-Mc. circuits, respectively. The main difficulty encountered in keeping the spurious to the desired value was in respect to common ground currents. As an example, it was found necessary to insulate the variable capacitor from its mounting plate and to run a ground wire directly back to the mixer circuitry. Similarly, the ground return for the 4-Mc. crystals was carried directly back to its associated circuitry. (Both of these connections are indicated in Fig. 2.) These simple circuit changes reduced the spurious from approximately 50 db. to better than 70 db.

Fig. 7 shows the average frequency drift as measured at the output frequency of 5 to 5.5 Mc. vs. time from a cold start. This shows that the average drift is approximately 20 cycles. With certain combinations of 4-Mc. and 27-Mc. crystals, the drift may be less than this, and with other combinations it may be somewhat more, but the curve shows the average. Variation in line voltage of plus or minus 10 volts around the nominal value again showed a frequency shift of approximately 20 cycles. This shift occurs quite rapidly and is apparently caused by the change in cathode temperature of the tubes.

Alignment Procedure

Considerable thought has been given to the alignment procedure, with consideration being given to the type and amount of equipment that would be available to the average amateur. Fortunately, during the development of this unit, the authors had available to them very excellent laboratory equipment in the form of frequency standards, high-speed oscilloscopes and frequency counters. With this equipment, of course, the line-up procedure was relatively simple, but it was recognized that this would not be the case for most amateurs. The following equipment is required for alignment:

1) A general-coverage receiver capable of covering up to 28 Mc.

2) A crystal calibrator or signal generator incorporating 100-ke. and 10-ke. output frequencies. A Hallcrafters type HT-7 unit modified to remove the modulation is excellent for this purpose. These units are quite old, but generally available. (If neither item is available, an accurately calibrated BC-221 or equivalent may be used.)

3) An audio oscillator and loudspeaker.

Prior to starting line-up procedure, the calibration equipment and receiver should be thoroughly warmed up to minimize instability. The calibration equipment should be checked against WWV to make sure that the frequency is correct. Couple the output terminal of the synthesizer directly to the input of the receiver through a 25-pf. variable capacitor, so as to permit adjusting the input signal. Start with this capacitor at maximum. All crystal-trimming capacitors should be set to maximum capacitance, that is, with the solder dot on the variable portion adjacent to the terminal tab at the screw-mounting end of the capacitor. Place the 10-ke. range switch of the unit in the 5th clockwise position, and tune the receiver to approximately 27,210 kc. Slowly adjust the 27-Mc. tuning coil, L_1 , while rocking the receiver dial control back and forth between approximately 27,200 to 27,250 kc.

At some point in the adjustment of L_1 , the 27-Mc. crystal in position 5 will break into oscillation and the signal should be heard in the receiver. Set the receiver r.f. gain control for a convenient reading on the S meter, and adjust L_1 for maximum reading. If no S meter is avail-

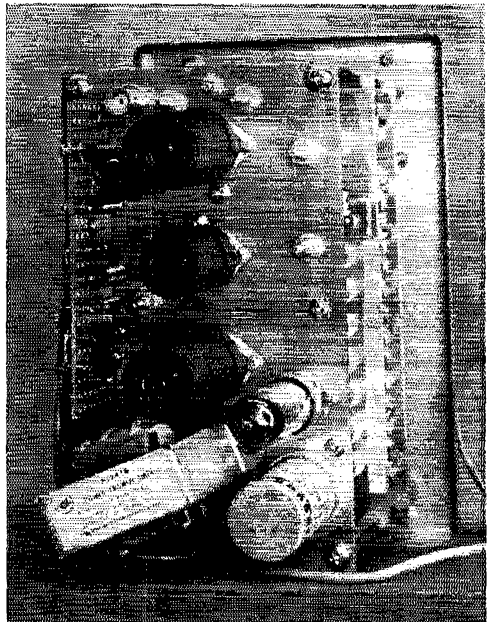


Fig. 5—Rear view of the frequency synthesizer. The power-supply rectifiers, resistors and r.f.-filter components are on the perforated board at the left. V_2 is at the top, next to the output connector, followed by V_1 , the VR tube (unshielded), power transformer and filter capacitor.

able, turn on the beat oscillator in the receiver and adjust L_1 for maximum audio output. Starting, then, with the first position of the 10-kc.-range switch, each crystal should be checked to see that it is properly oscillating and, most important, that the frequency advances in steps of approximately 10 kc. This will assure that the crystals are in their right positions, and correctly marked as to frequency. (We actually had a case of incorrect frequency marking that added an unexpected confusion factor!)

The next step is to get the 4-Mc. crystals into operation. Place the left-hand or 100-kc.-range switch at the most counterclockwise point, which should be the position for the 4050-kc. crystal. Tune the receiver to this frequency. With the crystal oscillating, a strong signal should be heard. Rotate the range switch clockwise to the second position and note that the frequency in the receiver is approximately 4150 kc. Continue with the next points on the switch. Note that the frequency progression is in 100-kc. steps.

Next, tune the receiver to approximately 13,103 kc., or until the variable-frequency crystal is heard. Operate the frequency-control dial and check to see that the crystal is oscillating satisfactorily over the complete range. We now have all crystal circuits operating properly.

Set both switches, and the control dial, to approximate mid positions, and tune the receiver down around 5 Mc. until the output signal from the unit is heard. Adjust the r.f. gain control of the receiver to an approximate mid-scale reading of the S meter, or to a comfortable audio level if no S meter is available. Adjust L_3 , L_4 , L_6 and L_7 for maximum output. Rotate the 100-kc.-range switch through each position, tune in the proper frequency, and note how the output varies over the band. By slightly varying the adjustments of L_3 , L_4 and L_7 , it should be found that the output can be held reasonably constant across the entire frequency band.

Having now established that the equipment is operating properly, and that the output is reasonably constant across the band, we are now ready

to proceed to tune the various crystals to the desired exact frequencies. The 4-Mc. crystals are adjusted first, according to the following procedure:

Move the slug of L_2 approximately one-quarter way into the coil. Using the 100-kc. crystal standard in the receiver, or an external 100-kc. standard coupled to the receiver, tune the receiver to 8100 kc. Place the 100-kc.-range switch of the synthesizer in the full counterclockwise position, which picks up the 4050-kc. crystal. A beat note should now be heard. Adjust the trimming capacitor associated with this crystal to obtain a zero beat with the standard. Next, tune the receiver to 8300 kc., place the 100-kc. range switch in the second position, and adjust the 4150-kc. crystal capacitor to zero beat with the standard. Similarly, tune the receiver successively to 8500, 8700 and 8900 kc., and adjust the 4250-, 4350- and 4450-kc. crystals to zero beat with the standard. In case the trimming capacitors run out of range, or are set to less than half their maximum capacitance value, L_2 should be adjusted in one direction or the other, which will then change the frequencies of all of the crystals. If this is necessary, the foregoing procedure must be repeated to retune all crystals to their correct frequencies. While the above may sound somewhat complicated, in actual practice it has been found relatively simple to put these crystals exactly on frequency.

The next step in the line-up of the unit is to place the variable-frequency crystal at one of its proper end frequencies. This requires the use of the audio oscillator. First, turn C_8 to maximum capacitance and set the shunt capacitor, C_6 , which is mounted on the variable capacitor, at approximately half capacitance. Set the series trimming capacitor, C_7 , also at about half capacitance. The audio oscillator should be set to 2500 cycles, and the audio output adjusted for a comfortable sound level. Tune the receiver to 13.1 Mc., as indicated by the 100-kc. marker from the calibrator. A beat note of approximately 2500 cycles should be heard. Carefully adjust L_5

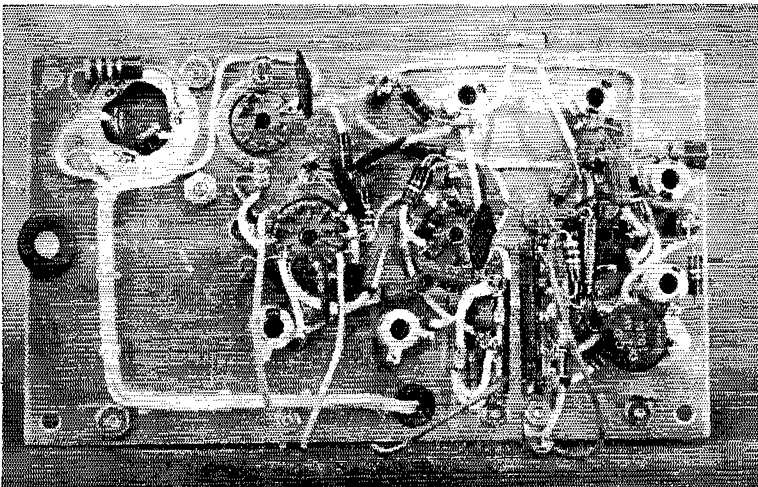
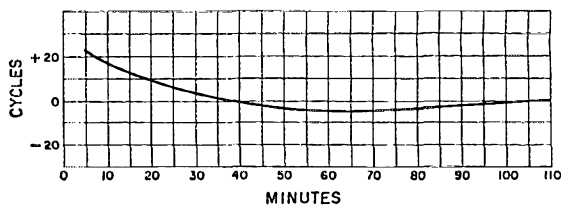


Fig. 6—Inside view of the rear deck showing the placement of coils and tube sockets. L_3 (left) and L_4 are at the top, L_1 (left) and L_2 at the bottom. L_6 (top) and L_7 are at the right.

Fig. 7—Graph showing the average drift in cycles from a cold start.



until this beat matches the 2500-cycle tone from the audio oscillator. This operation now places the variable crystal frequency at 13.1025 Mc. Leave this oscillator exactly as now tuned up, and proceed to start lining up the 10-kc. crystal positions. Set the 100-kc.-step switch on the first switch position. Set the 10-kc.-range switch full clockwise, which will pick up the 27.255-Mc. crystal. Tune the receiver to 5100 kc. as indicated by the calibrator. A beat note will probably be heard, and this note should be reduced to zero by adjusting the appropriate series capacitor for the 27.255-Mc. crystal. Next, turn on the 10-kc. marker of the crystal calibrator. Tune the receiver to 5090 kc. as indicated by the calibrator. Set the 10-kc. switch to pick up the 27.245-Mc. crystal. Again a beat note should be heard. Adjust the frequency to zero beat against the calibrator by means of the appropriate series tuning capacitor. Repeat the above step for the remaining positions of the 10-kc. switch, each time tuning the receiver to the next lower 10-kc. frequency and beating the appropriate crystal by means of its series trimmer capacitor. As previously mentioned, it may be found that zero beat will not be attained even with the series capacitor adjusted to maximum. In this case, it will be necessary to place a small inductance in series with the crystal to allow it to be adjusted to proper frequency. In certain other cases, it has also been found necessary to place a 15- or 20-pf. capacitor in parallel with the series tuning capacitor.

The frequency range of the variable-frequency crystal is set next. Tune the receiver to 5000 kc. Turn the variable capacitor to minimum capacitance and zero-beat the frequency by adjusting C_6 . Next, tune the receiver to 5010 kc., and set the variable capacitor to maximum. Zero-beat the frequency by adjusting C_7 . Since this last adjustment may also slightly affect the previous adjustment, repeat the latter two checks until the frequency of the variable oscillator just covers the desired 10-kc. range.

To calibrate the variable-frequency dial in 1-kc. steps, tune the receiver to 5 Mc., and place the unit on 5 Mc. (all switches and dials in the

full counterclockwise position). Have the crystal calibrator in the 100-kc.-only position. Set the audio oscillator at 1000 cycles, and slowly rotate the variable-frequency dial clockwise until the beat frequency produced by the unit against the 5-Mc. standard point is in synchronism with the 1000 cycles produced by the audio oscillator. Next, set the audio oscillator to 2000 cycles, and move the variable-frequency dial clockwise until the beat note from the receiver matches that of the 2000-cycle tone from the audio oscillator. In similar fashion set the audio oscillator to 3000, 4000 and 5000 cycles and obtain the calibration points on the variable-frequency dial. While at the 5000-cycle point, turn on the 10-kc. marker of the crystal calibrator and switch the 10-kc.-range switch to position 2, which should again give a 5000-cycle note. Set the audio oscillator at 4000 cycles, and continue to rotate the variable-frequency dial clockwise until the beat note being produced by the receiver is equal to the 4000 cycles from the audio oscillator. Repeat this process for 3000, 2000 and 1000 cycles to the full clockwise position of the variable-frequency dial. If points closer together than one kc. are desired, the above process can be followed using 500-cycle points from both the audio oscillator and receiver.

With the unit now set up on the proper frequencies, it should be possible to cover any of the 10-kc. positions by means of a single sweep of the variable-frequency dial, and to cover each 100-kc. point through the ten positions of the 10-kc. knob.

As a final adjustment, it might be well to recheck the output over the continuous frequency range by again rotating the 100-kc. switch control and readjusting coils L_3 , L_4 and L_7 as may be required.

On-the-air operation of the frequency synthesizer has been checked on all bands, 80 through 10 meters, with the HT-32 series transmitter working into a grounded-grid 4-1000A amplifier. Results have been excellent. Extensive tests have indicated no evidence of either in-band or out-of-band spurious emissions. The over-all operation has met all expectations. QST

Strays

The Voice of America continues to air W2SKE's Amateur radio program, in English, every week. W3BAK is producer, and W4ETT and W3ASK provide propagation information. Mail addresses are to Bill Leonard (W2SKE), P.O. Box 29, Geneva, Switzerland; or Amateur Radio, Box 922, Washington 4, D.C.

Thirteen-year-old WA9DUF, of Knightstown, Indiana, stood on a New York television stage recently and "talked" an Air Force pilot through the sound barrier while ABC-TV cameras and recorders whirred. It's part of the first half-hour program of a new Sunday afternoon series called "Science All Stars," slated to debut January 12.

Meet the Oscilloscope

What's in It;

What Makes It Work

BY GEORGE GRAMMER,* W1DF

IN ONE WAY the oscilloscope is unique among the measuring instruments to which amateurs are usually exposed. It has no printed scale and no pointer. There is no "absolute" value, clothed with the authority of the engraved scale and therefore beyond questioning, to be read from its face. The pictures painted in green lines on the cathode-ray tube may mean much or little, and the deciphering of them may be right or wrong, depending on the interpretive skill of the observer. (Parenthetically, there is hidden advantage in this; it induces a healthy skepticism that would make for more accurate results if it were applied to more obvious measurements.)

Interpretive ability has to be based on an understanding of the instrument. Therefore, before discussing the use of the scope for checking the operation of equipment, it seems desirable to review the instrument itself.

The C.R. Tube

The oscilloscope is built around the cathode-ray tube which, aside from having a cathode much like the one in an ordinary vacuum tube, has very little in common, structurally, with the more familiar triodes, tetrodes, and pentodes. However, details of tube structure are a matter mostly of interest to the tube designer; for our purposes, a broad outline of functions is sufficient. There are three fundamental sections to the cathode-ray tube: the "gun," which projects a beam of electrons down the cylindrical neck of

* Technical Director, ARRL.

In setting out to organize material on practical use of the oscilloscope in the station, it became obvious that the place to start was right at the beginning — the scope itself — in order to fill in the background that one must have in order to get the most out of the instrument. This article is the result. Test methods and setups will be covered subsequently.

the tube toward the flared-out end, focusing the beam to a fine point at the tube face; the "deflection plates," flat electrodes, arranged in two pairs at right angles, between which the beam passes; and finally, an end face, more or less flat, coated with a phosphor that glows (fluoresces) when and where the electron beam hits it. These three elements of the tube are shown in Fig. 1.

The usefulness of the tube lies in the fact that the electrons in the beam can, with incredible speed, perform tricks in changing their direction of motion — that is, they can when given the proper urging. Electrical charges on the deflection plates do this prodding. An electron is attracted by and — if free to do so — will move toward a positively-charged electrode, but is repelled by and will move away from one with a negative charge. In the top drawing of Fig. 1 the electron beam is shown passing between a pair of deflection plates, the upper of which has a positive charge and the lower a negative charge. The beam is therefore deflected upward, so that it strikes the fluorescent screen near the top. In the lower drawing the polarities of the deflection plates are reversed and the beam is deflected to the lower end of the screen. The beam is not attracted to the positive deflection plate in the way that electrons in the ordinary vacuum tube are attracted to the anode. The reasons are two: the electrons are given such high velocity by the gun that they get through before being deflected enough to strike the plate; and the voltages used to charge the deflection plates are intention-

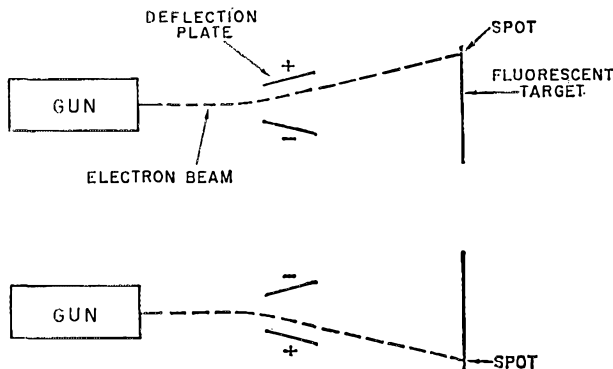


Fig. 1—The cathode-ray tube essentials include an electron gun for forming and projecting the beam, deflection plates for changing the beam's direction in accordance with signal voltage applied to the plates, and a target or screen that fluoresces where the beam strikes it.

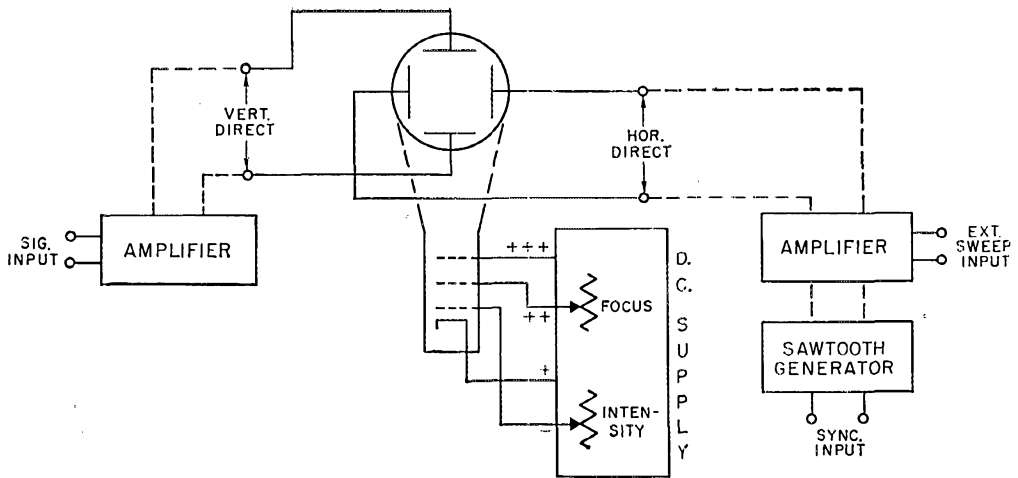


Fig. 2—Typical oscilloscope broken down into major sections. A very simple scope would need only the power supply and such controls as are essential for putting the spot on the desired part of the screen. The characteristics of the amplifiers, when included, will vary considerably, depending on the purpose for which the instrument is designed.

ally kept within bounds that keep the beam on the screen.

As the pinpoint of the beam moves over the screen under the influence of continuously-varying voltage on the deflection plates, it leaves a trail of light on the phosphor. This is because the phosphor continues to glow for a time after it has been struck. The screens used in scope tubes have what is known as "medium-persistence" phosphor, which keeps on glowing for an appreciable fraction of a second after the electron beam has passed. This, plus the normal persistence of human vision that makes the movies and television practicable, gives the illusion of a complete pattern of light lines on the screen, even though the spot may not be in any one place for as long as a millionth of a second.

Oscilloscope Necessities

So much for over-all cathode-ray tube operation. The complete scope may have several other main divisions. An indispensable one is the power supply and associated controls for the gun. There is the usual heater supply, practically always a.c., for the cathode. There is also a high-voltage, low-current d.c. supply for the gun electrodes. Conventionally, these electrodes are shown as grids in c.r. tube symbols, although they do not resemble ordinary grids in physical shape. Also, except for the one nearest the cathode, they are called anodes rather than grids. The second anode, the uppermost of the three grid-like symbols in Fig. 2, is operated at high positive voltage in order to give the electrons in the beam high velocity. The voltage on the next element, known as the "first" or "focusing" anode, controls the size of the spot on the screen. The electrode next to the cathode acts like a real grid in that it controls the beam current—the number of electrons in the beam—and thus exerts control over the excitation of fluorescence in the screen material; the greater

the beam current at the focused spot the brighter the glow. The cathode, as usual, is a little more positive than the grid electrode. The relative potentials are shown, qualitatively, by the number of plus signs.

Not shown in Fig. 2, but an important part of the supply essentials, are the "centering" circuits. These are simply voltage dividers that adjust small d.c. potentials on each pair of plates so that the pattern display can be placed properly on the screen. Although at this stage the actual circuitry begins to look a little complex, it is all auxiliary—just there to get the tube into operation so it can do its real job. The various voltages and the four controls—intensity, focus, horizontal centering and vertical centering—are in the same category as heater, grid bias, screen and plate supplies for an ordinary tube.

Beam Deflection

The display that appears on the face of the tube is created by the signal voltages on the deflection plates. One of these, the voltage applied between the horizontal plates, is used as a reference. For this purpose it must have known characteristics. The signal under examination is applied to the vertical plates. Either set of deflection plates could be used for either purpose, but this horizontal-vertical combination is customary.

An immediately practical question is how much deflection voltage is needed, because the voltage required for forming a pattern that fills the screen reasonably well may be quite different from the voltage actually available from the equipment being tested. As it happens, the c.r. tubes used by amateurs do not vary a great deal in their deflection-voltage requirements. The guns all operate with a second-anode voltage of 1000 to 2000 volts, which establishes the range of velocity of the electrons in the beam. Thus the

beam in a 5-inch tube, for example, is no harder to deflect than the beam in a 2-inch tube, when both operate at the same second-anode voltage. Also, the angle over which the beam is deflected is about the same in tubes of different face sizes. As an approximation, then, a given voltage on the deflection plates will cover about the same percentage of the screen regardless of tube size. The voltage needed for deflecting the spot entirely across the screen will be in the order of 400 or 500 volts peak to peak, or 150 to 200 volts r.m.s. The two pairs of plates do not have equal sensitivity, in most cases, so the lower voltages will be associated with one pair and the higher voltages with the other. As patterns covering more than two-thirds of the screen width and height are rarely useful, the figures above represent the upper limits of required voltage.

Accessory Circuits

If the signal voltage available from the equipment is of the right order it may be applied directly to the vertical plates, as suggested in Fig. 2, at the "direct" terminals. The r.f. voltage from a transmitter can always be made to have the right value for direct application to the deflection plates. Other signals may be too small, in which case an amplifier has to be used.

It is at this point that the scope circuit starts to get complicated. If the amplifier is to handle signals in anything more than the audio range, it has to have wide-band frequency response. The less-expensive instruments generally have amplifiers useful from a few cycles per second up to about 200 kc., or sometimes up to 500 kc. Only the high-priced ones would include a vertical amplifier that could handle an r.f. signal as high as 7 Mc.

It is fortunate that such an amplifier isn't necessary for transmitter checking. However, a vertical amplifier can be useful. One that will work well up to 500 kc. will be quite suitable for looking at *incoming* signals, since these can readily be taken from the receiver's intermediate-frequency amplifier. As the i.f. voltage is relatively low, the scope vertical amplifier is needed for bringing it up to deflection level. And, of course, low-level audio signals can't be displayed without a good vertical amplifier.

The requirements of low distortion, wide frequency response, relatively high voltage output, and high gain, together with provision for push-pull deflection,¹ add up to a fairly elaborate circuit and some expense. But don't forget that *a vertical amplifier is not needed for looking at transmitter output*, and in fact, the amplifiers

¹ Although single-ended deflection—i.e., one plate of each pair at ground potential for the signal and deflection voltages—can be used, balanced or push-pull deflection has the advantage of greatly reducing distortion both in the c.r. tube itself and in the deflection amplifier. The push-pull deflection amplifier also is capable of more than double the output voltage of a single-ended amplifier using the same tube type and plate voltage. Single-ended deflection generally is confined to very simple scope setups (such as the one shown in the measurements chapter in the *Handbook*) that do not incorporate amplifiers.

built into most general-purpose scopes are not usable. To attempt to use them is to ask for trouble in the form of pattern shapes practically beyond interpretation.

Horizontal Deflection

The horizontal deflection voltage is the reference with which the signal being examined is compared. In many cases, but not all, it is advantageous to make this reference take as simple a form as possible. The simplest in terms of interpreting the display, and the most popular for general scope measurements, is the "linear time base." Here the spot is made to move horizontally across the screen at constant speed for the full deflection width. It usually moves from left to right, and when the extreme right end of travel is reached the spot is snapped back to the left end as quickly as possible, then to begin another journey to the right at the original speed. The relationship between time and distance in the position of the spot can be represented graphically as shown in Fig. 3A. Since the distance also is a measure of the instantaneous deflection voltage, the result expressed in time vs. voltage rather than time vs. distance is a waveform having the shape of a sawtooth.

Another simple type of horizontal deflection is the sinusoidal time base. An ordinary sine wave—often the 60-cycle line voltage—is used in this case. The spot does not move at uniform speed across the screen. Study of Fig. 3B will show that, starting from the lower left corner, in the first unit of time (one block) the spot will move about $1\frac{1}{2}$ units of distance. In the second unit of time the spot moves three units of distance. In the third time unit the spot moves five units of distance; in the fourth time unit, three distance units; in the fifth time unit, $1\frac{1}{2}$ distance units. This completes one sweep from left to right. Thus the spot started moving slowly from the left end, gathered speed until it was moving most rapidly at the center, then gradually slowed down as it reached the right-hand end of the deflection.

Besides the speed variation during the spot travel from left to right, there is another major difference between the sinusoidal and linear time bases. The spot isn't rapidly snapped back to the left to start the next left-right trace. It simply reverses the original left-right process and goes from right to left with the same speed variation, taking the same total amount of time (one half cycle of the sweep frequency) to do it. Because of these two factors—variable speed, and equal "trace" and "retrace" times—the two types of horizontal sweep will develop quite different-looking patterns from the same signal on the vertical plates.

A third type of reference for the horizontal deflection is the signal being examined or, rather, its progenitor. This type of horizontal deflection is useful in checking amateur transmitter operation because the resulting pattern is well adapted to show linearity, or lack of it, in amplifiers.

Horizontal Accessories

The three elementary types of horizontal deflection have a good deal to do with the accessories needed for the scope. Some types of signal checking need no more than a 60-cycle sinusoidal sweep. The sine wave doesn't even have to be a very good one, since the principal necessity is a varying voltage that will move the spot back and forth horizontally. The 60-cycle line just happens to be a convenient source of such a voltage. Fortunately, the line frequency is neither too high nor too low to be generally useful for deflection, when speech signals are being examined. Monitoring of transmitted and received signals can be done quite satisfactorily with such a sweep. The voltage can be taken from the 60-cycle line through an ordinary audio transformer and applied to the horizontal plates through a potentiometer for adjusting the width of the pattern. No horizontal amplifier is needed.

A good linear sweep or time-base calls for fairly complicated circuits. First, the sawtooth voltage has to be generated somehow, since there isn't any handy natural source for it. This takes an oscillator capable of generating the desired waveform, at rates varying from a few per second to many thousands per second. Then, since the pattern won't stand still unless there is a fixed time relationship between the sweep rate and the frequency of the signal being examined, a means for locking or synchronizing the two has to be included. The output voltage from the oscillator isn't generally large enough to be used directly, so there also has to be a horizontal amplifier, again with push-pull output. This leads to the setup shown in Fig. 2.

By this time the complete oscilloscope circuit is spread out over a page or two, and it is no wonder that a good many prospective users throw up their figurative hands and complain that the scope is "too complicated." In truth, the circuit isn't simple; simplicity has been traded for versatility. We repeat once more, though, that you can get a good deal of information about transmitter operation—probably as much as you really need—without these complications. Even if they're built into the scope you may own, you can easily skip using them.

The horizontal amplifier, in general, does not have to have an excessively wide frequency range. It is sufficiently wide when the response is such that the sawtooth waveform of the linear time base is preserved at the highest sweep frequency generated. In the lower-cost scopes response up to 200 kc. is reasonably adequate. The vertical and horizontal amplifiers in such scopes often are practically identical. When the horizontal amplifier is included, it is always provided with a set of input terminals so that other sweep waveforms—audio, for example—can be used, with amplification, to replace the linear sweep.

The third type of horizontal sweep, mentioned earlier, does not usually require a horizontal amplifier in amateur checking, although the amplifier is sometimes useful. A principal example of this type of sweep, but not the only one, is

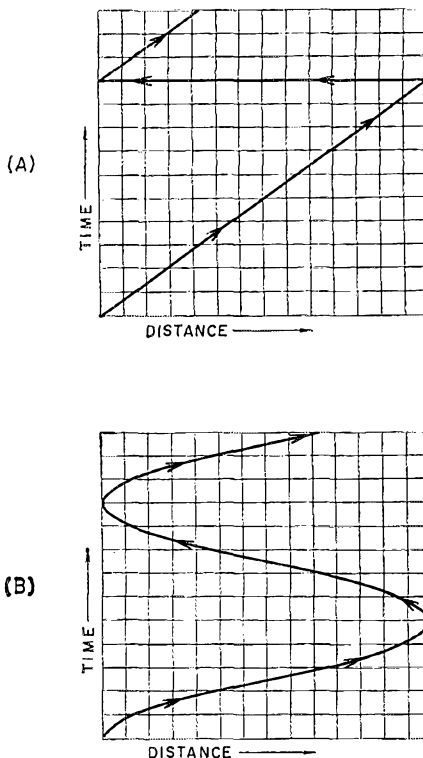


Fig. 3—Relationship between time and distance that the spot moves over the screen for two elementary types of sweep. Arrows show the progress of time and distance during each cycle of the sweep voltage. Note: These are not reproductions of what is seen on the c.r. tube screen. The "pattern" resulting from a single sweep (no deflection by the second pair of plates) is always a straight line. The only observable difference between the single lines produced by these two types of sweep is that with the linear sweep (A) the entire line will have the same brightness, while the line produced by the sinusoidal sweep (B) will be brightest at the ends, with decreasing brightness toward the center.

found in checking amplitude-modulated phone transmitters, where the audio signal from the modulator becomes the reference signal against which the resulting r.f. output signal is compared. As most modulators develop more than enough audio voltage to give an adequate horizontal sweep on the c.r. tube face, additional amplification is not needed. The voltage from the modulator, suitably adjusted in amplitude for the desired pattern width, can go directly to the horizontal plates.

(The second article of this series will appear in an early issue. — Editor.)

QST

Strays

The Nevada State Centennial Amateur Radio Committee is offering a handsome certificate for five confirmed contacts with Nevada hams during the 1964 centenary year. Send QSLs to the Nevada Centennial Radio Amateur Radio Award, P.O. Box 5234, Reno.

A Junk-Box Frequency Standard

Inexpensive Oscillator-Multivibrator Unit

BY ROY R. CAMPBELL, D.D.S.,* W4DFR

This unit provides spotting frequencies at 10-ke. intervals. With a little care, accuracy approaching that of much more expensive equipment can be realized. If you already have a 100-ke. crystal calibrator, the cost can be reduced still further.

Most amateurs these days provide themselves with a 100-ke. crystal "calibrator" — either built into the receiver, or external — which furnishes harmonic signals accurately marking the low-frequency limits of the various amateur bands. However, since the harmonic frequencies fall at intervals of 100 ke., it does not provide similar calibrating signals for the upper limits of some bands, nor for either upper or lower limits of some of the phone subbands. In addition, there are many other occasions calling for markers between 100-ke. points. Such markers are useful in the calibration of a v.f.o., in spot-frequency schedule operation, or in accurately calibrating a receiver dial.

For the most part, such a piece of gear has been a fairly costly item; even those that have been available on the surplus market have been by no means inexpensive. In the unit described here, I have attempted to hold the cost down to suit the average pocketbook while still maintaining an accuracy, if proper precautions are

* P.O. Box 168, 101 "A" Street & Broadway, Lenoir City, Tenn. 37771

used, closely approaching that of more expensive equipment. Most of the components for the original model were picked out of the junk box; with all new parts, the cost should not exceed \$15.00. Other than the crystal (which is not a strict requirement) no part is classified as "precision," although certain of the components add value if care is used in their selection. Power for the unit may be taken from most receivers, but a self-contained source can be very modest. Simple VR-tube regulation is desirable where line-voltage fluctuation may be a problem.

Oscillator

The circuit of Fig. 1 starts out with the 6BH6 oscillator. The Colpitts arrangement was chosen because it lends itself well to either crystal or self control. Crystal operation will provide a more stable signal, of course, but the stability with self control is surprisingly good and will serve for most calibrating purposes. When using a tuned circuit for self-excited operation, no coil tap is required. This is an advantage, especially when a multilayer coil is involved. The circuit will work over a wide range of frequencies, which makes it additionally useful for checking crystals, or for using higher-frequency crystals for spotting certain frequencies. The output is rich in harmonics.

The Multivibrator

The second stage in Fig. 1 is primarily a multi-

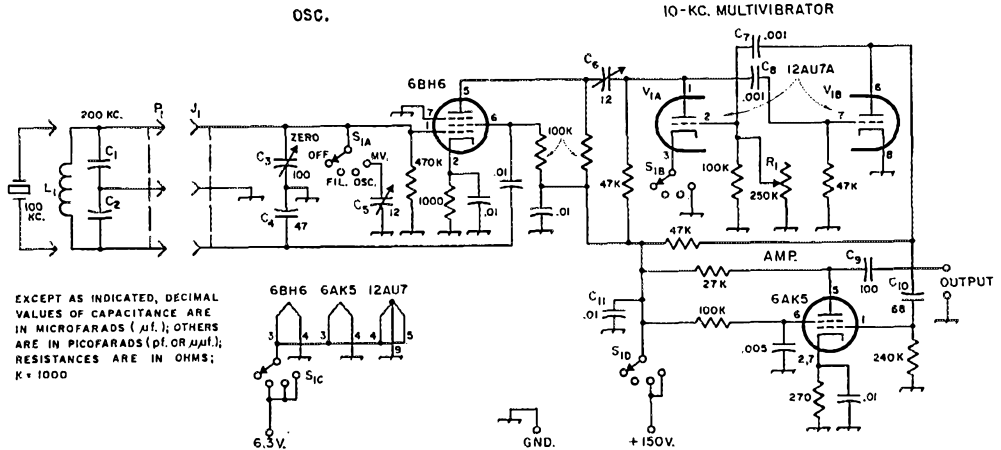


Fig. 1—Circuit of the frequency standard. Resistors are $\frac{1}{2}$ watt. Fixed capacitors not listed below are disk ceramic.
 C₁, C₂—See text.
 C₃—100-pf. midget variable.
 C₄, C₇, C₈, C₉, C₁₀—Mica, preferably silver mica.
 C₅, C₆—NPO ceramic trimmer (CRL 825-FZ).
 C₁₁—Paper.
 J₁—5-prong ceramic tube socket.
 L₁—See text.
 P₁—5-prong plug (Amphenol 86-CP5 or similar).
 R₁—Linear control.
 S₁—Ceramic rotary switch: 2 sections; 2 poles per section. 4 positions (CRL PA-2010, 2 positions not used).

vibrator using a 12AU7 dual triode. As most readers know, a multivibrator is a resistance-capacitance oscillator that is quite unstable by itself, but which can be stabilized by driving, or triggering it with a stable oscillator of higher frequency. Thus, it becomes a "frequency divider." In this instance, the multivibrator frequency is 10 kc. which provides harmonic spotting frequencies of usable strength at 10 kc. intervals up to at least 30 Mc. Although a multivibrator will "lock in" with a driver frequency as high as 100 times the multivibrator frequency, adjustment becomes quite difficult if the driver frequency is more than 10 or 20 times the desired multivibrator frequency. The multivibrator, being an unstable oscillator, has an increasing tendency to jump from one sub-multiple of the driving frequency to the next as the driving frequency is raised. That is, if the driving frequency is 1000 kc., the multivibrator frequency may jump from the desired frequency of $1000/100 = 10$ kc. to $1000/99 = 10.1$ kc., or to $1000/101 = 9.9$ kc. For this reason, the oscillator is designed to operate at 200 kc. self-excited, or 100 kc. crystal-controlled when driving the multivibrator.

The multivibrator may be switched off by means of S_1 ; S_{1B} opens the cathode of V_{1A} in all except the MV position. The oscillator signal is then simply coupled to the grid of V_{1B} which operates as a resistance-coupled amplifier. Since this switching results in a small change in oscillator frequency, C_5 is provided in the oscillator circuit to compensate. This capacitor is adjusted so that the oscillator frequency remains the same with the multivibrator in or out of the circuit.

Output Amplifier

The 6AK5 amplifier is included principally to isolate the multivibrator from output loading effects. It will, however, provide some amplification of oscillator harmonics when the multivibrator is switched out. A parallel-tuned tank connected across the output terminals of the amplifier may be used to accentuate certain harmonics if desired, although the simple resistance coupling shown provides good signal strength up to at least 30 Mc.

Construction

Components may be assembled on any chassis of convenient size. There is nothing particularly critical about the arrangement of parts on the chassis. If the crystal is not used, the capacitance of C_1 should be about 1.5 times that of C_2 . The exact values will depend upon the inductance of L_1 . I used an r.f. choke from an old diathermy oscillator. The inductance of this choke is about 1.6 mh., and it tunes to 200 kc. with a capacitance of 780 pf. at C_1 and 530 pf. at C_2 . The odd values were made up of standard values in parallel combination. These capacitors should be mica, preferably silver mica, and the coil should have a reasonably high Q . Critical adjustment of capacitances can be avoided by using a slug-

tuned coil, such as the Miller type 4414 which has an inductance range of 1.3 to 2.1 mh. This coil should be capable of tuning to 200 kc. with standard values of 7500 pf. at C_1 and 5100 pf. at C_2 . The five-prong socket J_1 will accept most crystals as well as a 5-prong plug-in coil form.

Adjustment

The oscillator should be adjusted first. The output terminal should be connected to the antenna terminal of a receiver. The circuit should function with most crystals, regardless of frequency. With higher-frequency crystals, feedback may be adjusted by means of C_3 . When a 100-kc. crystal is used, C_3 is used to "zero" the crystal against WWV. To adjust a 100-kc. crystal, turn on the receiver b.f.o. and listen to one of the harmonics. The beat note should vary as C_3 is adjusted. Now turn off the b.f.o. and tune in WWV. A beat should be heard between the 100-kc. oscillator and WWV's carrier. Adjust the beat to zero by adjustment of C_3 . Broadcast-band signals at exact multiples of 100 kc. also provide good reference signals. Although there is a small tolerance allowed, most broadcast stations hold within a few cycles of their assigned frequencies. If the receiver is equipped with an S meter, this may be used as an accurate indicator of the beat between the 100-kc. oscillator and the standard. As the beat approaches zero, the reading on the S meter will fluctuate, more rapidly at first, and then more slowly, until at exact zero beat the needle will remain motionless. If C_3 is adjusted further in the same direction, the fluctuations will resume. C_3 should then be returned to the point where the needle is stationary.

The adjustment with the tuned circuit instead of the crystal is similar except, of course, for the preliminary adjustment to approximately 200 kc. as described earlier. If the broadcast band is used as a reference, only those signals at exact multiples of 200 kc. will be useful. C_3 may be used as a final trimmer.

With the receiver b.f.o. turned on, you should now hear harmonic signals every 100 kc. (or every 200 kc. with self excitation) throughout the tuning range of the receiver, up to at least 30 Mc.

Adjusting the Multivibrator

Before attempting to adjust the multivibrator itself, zero-beat one of the 100-kc. (or 200-kc. with self excitation) harmonics on a receiver. When S_1 is turned to the MV position, the oscillator frequency may change slightly. Without touching the receiver tuning, adjust C_5 to bring the signal back to zero beat.

In adjusting the multivibrator, the broadcast band is a convenience. Since the American broadcast channels are assigned at exact multiples of 10 kc., the multivibrator signals should fall at zero beat on all broadcast carriers when the multivibrator is correctly adjusted. If the adjustment is not correct, a beat note will be heard on each broadcast carrier (with the receiver b.f.o.

turned off). In such a case, pick out a broadcast carrier in a clear channel and listen to the beat note as R_1 is slowly adjusted. As R_1 is adjusted the beat note should suddenly hop to a different frequency. At some point within the range of R_1 , the beat note should drop to zero. When this occurs, check one or two other channels to make sure that the multivibrator signal is at zero beat with these carriers also.

The multivibrator is rather touchy as to the strength of the driving signal. If the driving signal is too weak, the multivibrator will have a tendency to jump from one submultiple to another. If the driving signal is too strong, "squegging" may take place which will be evidenced by a myriad of unidentifiable beats as the receiver is tuned. Overdriving may also cause the multivibrator to produce signals at 20-ke. intervals, rather than 10-ke. intervals. In any case, it should be possible to make corrections by adjustment of C_6 . Under proper operating conditions, an oscilloscope or peak-reading v.t.v.m. should show a 10- to 20-per cent higher voltage at Pin 7 of the 12AU7 than at Pin 2. C_6 may have to be adjusted differently for the crystal than for the tuned circuit.

While the crystal harmonics will be reliable shortly after the power supply is first turned on, it is advisable to allow plenty of warm-up time

for the multivibrator and the self-excited oscillator, if the latter is used. The amount of power consumed by the unit is negligible, and the amateur who finds use for it two or three times a week will soon learn the value of leaving the heater power on all the time, even when not in use.

Accuracy

The principal difference between this unit and one costing many times as much is in the long-term stability. Changes in humidity as well as temperature will affect the accuracy. It is the compensation for such effects that runs up the price of more expensive equipment. However, the short-term stability is excellent and, in the hands of a careful operator, highly accurate measurements can be made. The only requirement is that the oscillator frequency be checked against WWV immediately before the measurement is made and again immediately after. The latter check is perhaps the more important, especially if the measurement has taken more than a moment or two, for it tells whether the oscillator frequency has changed during the measurement. If there has been a change, the amount can be estimated to determine if the accuracy is sufficient for the particular purpose. If not, the measurement can be repeated. QST

Strays

Feedback

The procedure for adjusting the 5-Mc. filter at the input of the TDCS transistor communications receiver (page 19 of November *QST*), is incorrect. Before wiring the coils into the circuit, each coil was shunted with a capacitance of known value. The resonant frequency of the known capacitance and the required inductance (specified under Fig. 1) was then calculated for each coil, and the coil adjusted to make the circuit resonate at this frequency.

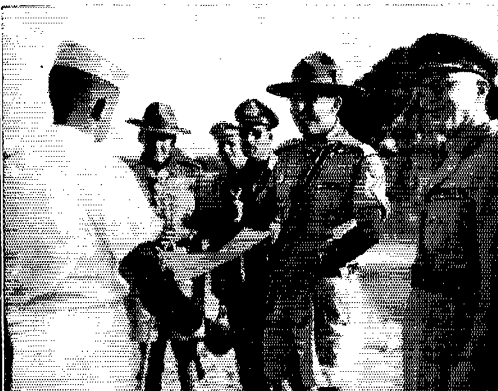
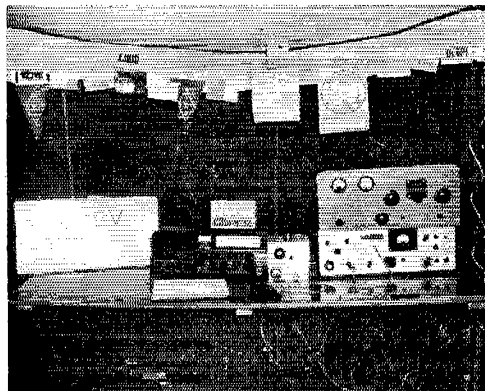
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In "The Single Sideband Sixer" (*QST*, Oct. 1963,

p. 11), when using the B.&W. 350-2Q4 audio phase-shift network, the 1500-ohm resistor across the secondary of T_1 (Fig. 1) should be changed to 390 ohms to provide balanced drive. The circuit is correct for use with the other networks mentioned.

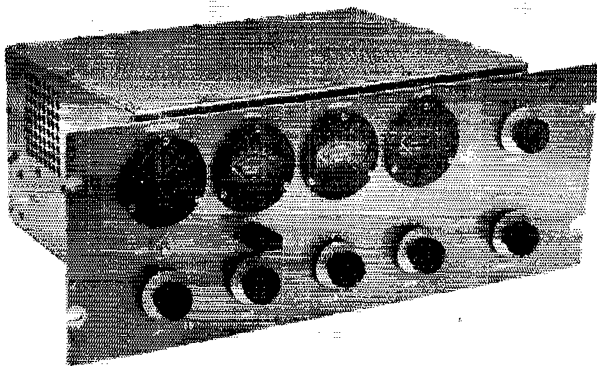
The heater wiring to V_6 and V_7 , the cascaded 12AT7 tubes, was omitted from Fig. 1. The heaters are supplied from a separate 6-3-volt transformer secondary which has its center tap connected to +300 volts. This avoids exceeding the heater-cathode voltage rating of these tubes.

In Fig. 3, pin 6 of the 6JH8 should be fed through the 500-pf. capacitor from the r.f. carrier source, with no connection to the lead from T_2 .



When the Radio Amateur Association of Greece set up SV1SV (left) at the International Boy Scout Jamboree in Athens last August, they got a surprise visit from His Royal Highness, Crown Prince Constantine. No less surprised was the Prince when "Yogi" Bauer, SV0WW/K3WPO, presented him with an "Honorary Seabee" certificate (right). Operators SV1AD, AM, AN, AP, AR, AS, AT, and AV each got the Seabee stamp of approval, too.

Fig. 1—This 500-watt transmitter packs a punch on 50 Mc.! It is completely enclosed in an aluminum box to reduce TVI problems. The top and bottom are made of perforated aluminum and the holes on the left side of the enclosure are for air intake to the blower. Lower controls are (l. to r.): drive (R_1), oscillator (C_1), doubler (C_2), amplifier grid (C_3), and loading (C_5). Plate tuning (C_4) is at the upper right.



A Compact 500-Watt Transmitter for 50 Mc.

BY WILLIAM I. ORR,* W6SAI AND RAYMOND F. RINAUDO,* W6KEV

Six meters is here to stay. Regardless of the ups and downs of the sunspot cycle, this band remains popular and has heavy usage in most parts of the United States. Many six-meter operators have expressed a desire to build a simple, foolproof, high-power transmitter exclusively for 50-Mc. operation. The design shown herewith has been in service for over two years, has proved to be a steady and dependable performer and is recommended to those six-meter operators who wish to "step up to the very best!"

It has been found from the writers' experience that power levels up to 500 watts or so are readily achieved at 50 Mc. with physically small equipment and reasonable power supplies. Above this power level, however, the cost and difficulty of assembling high-power gear seems to rise as the square of the power input! In particular, the amount of expensive "iron" required in power-supply and audio equipment seems to be entirely disproportionate to the 3-decibel power gain achieved when going from 500 watts to a kilowatt. The extra 3 decibels can more easily be achieved in the antenna.

Circuit Description

The transmitter is a three-stage crystal-controlled unit capable of running 625 watts input c.w. or 300 watts a.m. phone on the 50-Mc. band. Provision is made for v.f.o. control. Only three transmitter stages are required and precautions have been taken to prevent radiation of undesired harmonics or spurious emissions that might cause TVI or BCI.

* Eitel-McCullough, Inc., San Carlos, Calif.

The tube line-up, Fig. 2, is: 6AG7 oscillator multiplier, 6V6GT frequency doubler, and 4CX300A power amplifier. The crystal oscillator is a modified Pierce circuit, with a crystal connected between the grid and screen of the pentode tube, and the plate circuit tuned to the third harmonic of the 8-Mc. crystal. If desired, 6-Mc. crystals may be substituted without circuit changes, the plate circuit then being tuned to the fourth harmonic of the fundamental frequency. Maximum frequency stability is achieved by a combination of low crystal current and oscillator screen voltage regulation. A 0A2 regulator tube holds screen voltage at 150 on the oscillator stage. The 25-Mc. harmonic output is capacity-coupled to the following doubler stage.

The doubler uses a 6V6GT in a conventional circuit. Its screen voltage is adjustable at the front panel by R_1 . This control determines the drive level to the final amplifier. The 50-Mc. output of the doubler stage is applied to the grid circuit of the 4CX300A amplifier stage by link coupling through a short length of coaxial line. Inductive coupling through two tuned circuits helps to minimize the coupling of 25- and 75-Mc. energy and higher harmonics to the final-amplifier grid.

The 4CX300A final-amplifier stage uses a simple pi-network plate circuit. The tube is neutralized by a capacitive bridge circuit composed of the various internal capacitances of the 4CX300A, the neutralizing capacitor, C_7 , and the 300-pf. silver mica bypass capacitor in the ground leg of the tuned grid circuit. The 4CX300A is mounted in an Eimac SK-710 socket containing a low-inductance screen bypass capacitor, C_8 , especially

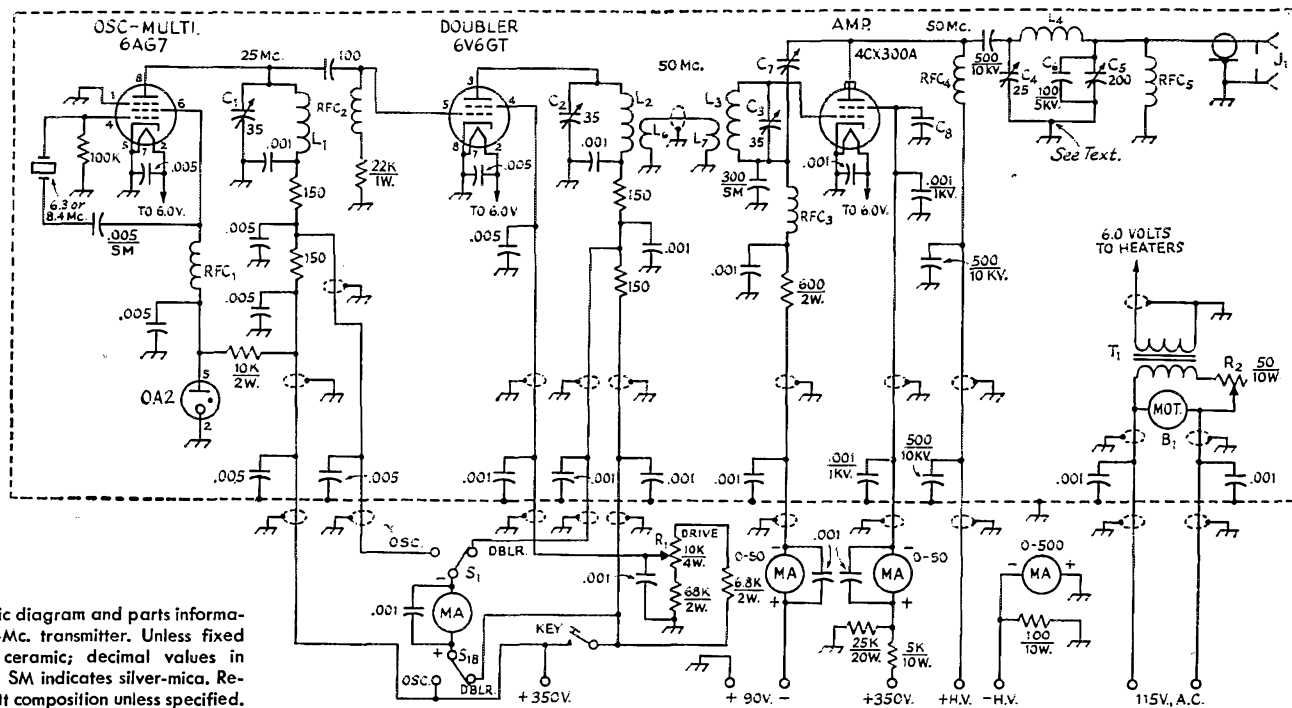


Fig. 2—Schematic diagram and parts information for the 50-Mc. transmitter. Unless fixed capacitors are ceramic; decimal values in $\mu\text{f.}$, others in pf. SM indicates silver-mica. Resistors are $\frac{1}{2}$ -watt composition unless specified.

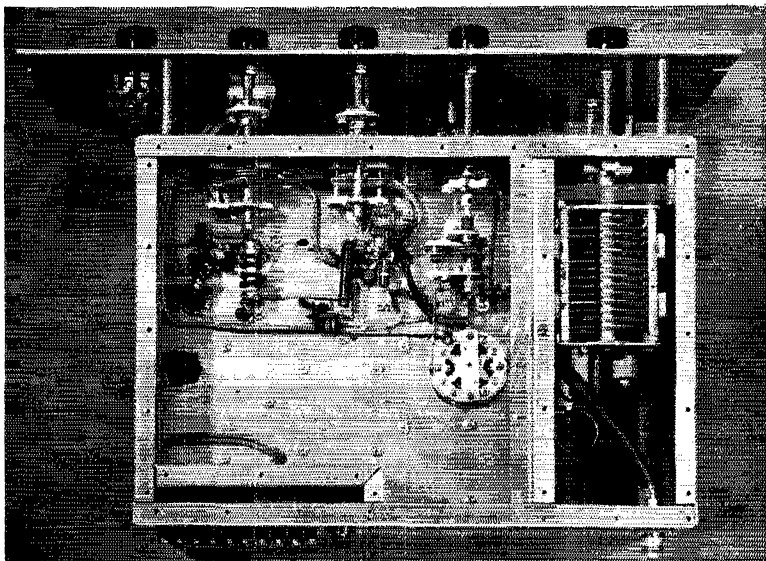
B₁—Phonograph motor to drive blower; see text. Blower should deliver 10 c.f.m. or more.
 C₁, C₂, C₃—35-pf. variable (Johnson 149-2 or 35R12).
 C₄—25-pf. variable, 0.075-inch spacing (part used was surplus; suggested replacement Johnson 154-11).
 C₅—200-pf. variable, .02-inch spacing (surplus, from BC-375 tuner, Johnson 155-6 suitable).
 C₆—100-pf. 5000-v. (Centralab 850S-100N).
 C₇—Neutralizing capacitor; see text and Fig. 4.
 C₈—Screen bypass, built into socket.
 J₁—Coaxial receptacle.

L₁—12 turns No. 16 tinned, $\frac{1}{2}$ -inch diam., 16 t.p.i. (Air-Dux 416T).
 L₂—7 turns No. 16 tinned, $\frac{1}{2}$ -inch diam., 8 t.p.i. (Air-Dux 408T).
 L₃—4 turns like L₂.
 L₄—4 turns $\frac{1}{8}$ -inch copper tubing, 1-inch diam., $\frac{3}{4}$ inch long.
 L₅—3 turns No. 16 tinned, wound on 50-ohm 1-watt resistor.
 L₆, L₇—Links of insulated wire around cold ends of L₂ and L₃, 1 turn each. Can be made from ends of con-

necting 50-ohm coax, with outer conductor removed.

R₁—10,000-ohm 4-watt control.
 R₂—50-ohm 10-watt slide type.
 RFC₁—2.5-mh. r.f. choke (National R-100).
 RFC₂—44- $\mu\text{h.}$ r.f. choke (Ohmite Z-14).
 RFC₃—7- $\mu\text{h.}$ r.f. choke (Ohmite Z-50).
 RFC₄—3- $\mu\text{h.}$ r.f. choke. 48 turns like L₁.
 S₁—D.p.d.t. toggle.
 T₁—6.3 volts, 4 amp. Adjust R₁ for 6.0 volts at heater terminals.

Fig. 3—Under-chassis view of the transmitter. The blower exhaust port is at the lower left, just above the terminal strip shield. All power leads are run in shield braid, with the center conductor bypassed to the braid at each end. The right-hand compartment houses the final-amplifier tank circuit. The 4CX300A socket is at the center of the chassis, behind the grid-tuning capacitor, C_6 . Under-chassis area is pressurized by a solid plate, removed for photography.



designed for v.h.f. operation. In addition, the socket screen terminal is bypassed with a 0.001- μ f. disk ceramic capacitor.

Four panel-mounted meters are used to indicate the currents drawn by the various stages. The left meter measures the plate current of either the oscillator or doubler. A double-pole double-throw switch, S_1 , connects the meter across the appropriate 150-ohm shunt. Individual meters are used in the grid, screen and plate circuits of the final amplifier. The plate-current meter, right, is placed in the negative lead from the high-voltage supply, requiring that the negative lead not be connected to ground at any point in the supply.

The oscillator and doubler stages are operated from a 350-volt 150-ma. power supply which also provides the screen voltage for the amplifier stage. C.w. keying is best accomplished by breaking the plate and screen voltage of the doubler stage at the keying point indicated in the schematic, allowing the oscillator to run continuously. A suitable LC filter must be used at this point to suppress key clicks, and the use of a keying relay is recommended to remove high voltage from the key. This is preferred to keying the cathode of the 6V6GT.

Transmitter Construction

Reliability is the watchword in the design of this transmitter, and the construction technique used is the tried-and-true relay-rack style, designed to remove as much thermal heat from the equipment as possible. Nearly 200 watts is dissipated by the transmitter when running "wide open," so special pains are taken to insure that all components run cool, and well within their ratings. As the complete transmitter has to be shielded to reduce unwanted radiation, the problem of heat radiation is an important one.

The transmitter is enclosed in a home-made aluminum box 14 inches wide, 10 inches deep,

and 6½ inches high. The enclosure is supported behind a standard 7 by 19-inch rack panel by means of four 2-inch metal pillars, thus providing space for the various switches and meters to be mounted behind the panel and out of the strong r.f. field. The top of the enclosure and the small portion of the bottom directly below the final tuning capacitors are covered by perforated aluminum sheet. The chassis portion of the enclosure has a solid aluminum sheet bottom plate, making possible chassis pressurization by the blower, the air escaping through the SK-710 socket and the SK-606 chimney and cooling the 4CX300A anode. A small aluminum shield (lower left corner, Fig. 3) was placed in one corner of the underchassis area to prevent the radiation of harmonics via the terminal-strip connections. Shielded wire is used for all power leads, and each terminal of the barrier strip is bypassed.

The blower used to cool the 4CX300A is a "home-brew" device. A squirrel-cage blower is driven by a phonograph motor which turns at about 3300 r.p.m. The unit moves enough air to cool the tube adequately up to about 150 watts plate dissipation, but would be insufficient for the full 300-watt dissipation rating. However, in neither the keyed c.w. mode (625 watts input) or the a.m. mode (300 watts input) does the average plate dissipation exceed 125 watts, so full dissipation is not required. Although the blower is rated at 10 cubic feet per minute, chassis back-pressure reduces the air flow to less than 4 c.f.m.

The neutralizing capacitor, C_7 , is formed by placing a ½-inch square aluminum plate adjacent to the anode of the tube, the separation being about ⅜ inch. This capacitor may be seen in the top-view photograph, Fig. 4, appearing as a small bracket between the 4CX300A and the front panel. The plate is mounted on the top of a ceramic feed-through insulator, which brings the neutralization lead from beneath the chassis.

Component Layout and Wiring

Parts layout is not especially critical. The stages are placed so that the tuning controls are evenly spaced across the front panel, even though the chassis is offset slightly from the center line of the panel (see under-chassis photograph). The blower and motor are placed in a corner of the chassis, with the blower exhaust duct passing through the deck of the chassis. All under-chassis power and filament wiring is done with shielded wire, and r.f. leads are made short and direct. The interstage link circuit is made of a short length of RC-58/U, 52-ohm coaxial line, with the outer shield of the line grounded at both ends. Flexible couplings and panel bushings are used on the tuning-capacitor shafts to insure that the controls turn evenly and smoothly. Capacitors C_1 and C_2 are grounded to the chassis, but capacitor C_3 is mounted on an insulating block, as its rotor is above ground.

The plate circuit of the 4CX300A employed a home-made choke, RFC_4 , air-wound over a $\frac{1}{2}$ -inch-diameter form. After a period of time, it was found that the choke had a tendency to sag a bit, so a section of Air-Dux coil was substituted for the home-brew choke (see parts list).

The pi-network capacitors, C_4 and C_5 , are mounted by their front frames to a $\frac{1}{4}$ -inch Plexiglas or phenolic sheet measuring $3\frac{1}{2}$ by $4\frac{1}{2}$ inches which, in turn, is supported from the front wall of the enclosure by one-inch metal bolts and pillars. The capacitors are driven by insulated couplings and thus the rotor shafts are floating above ground. The rear frame of each capacitor is then grounded to the chassis by means of a $\frac{1}{2}$ -inch wide copper strap running from the frame to the side of the chassis box via the shortest possible route. Ground loops are thus avoided, and the 6-meter pi-circuit tunes in a normal manner, "just like on the d.c. bands!"

The amplifier plate coil, L_4 , is supported on two one-inch ceramic insulators bolted to the rear frame of the tuning capacitors, and connections to the coil, capacitors, and plate blocking capacitor are made with $\frac{1}{2}$ -inch copper strap. The auxiliary loading capacitor, C_6 , and grounding choke, RFC_5 , are mounted on the rear of the variable loading capacitor, C_5 . A short length of RC-58/U 52-ohm coaxial line connects the loading capacitor to the coaxial receptacle mounted

on the rear wall of the enclosure. The outer braid of the line is grounded at the receptacle and also at the common point on the chassis wall to which the tuning capacitors are grounded.

Transmitter Operation

Once the transmitter has been completed, the wiring should be checked for possible errors before the equipment is given the "smoke test." A filament supply of 6.0 volts at about 4 amperes is required. It is important to note that the filament voltage of the 4CX300A is 6.0 volts, not 6.3 volts, and the voltage should be held within plus or minus 5 per cent of the design voltage if best tube life is to be obtained. Borrow a good, one-per-cent laboratory-type voltmeter to check your filament voltage and adjust it to 6.0 volts, or a little under. The 6AG7 and 6V6GT will work well at this slightly-lower-than-normal filament voltage. The blower should be turned on with the filament voltage to make sure that the stem of the 4CX300A remains cool, and the bottom plate should be in position to pressurize the chassis.

For initial tune up, the screen and plate voltages are removed from the 4CX300A. Remember that screen voltage should not be applied to the amplifier stage unless plate and bias voltages are also on the tube. It is permissible to apply or remove all voltages simultaneously, but screen voltage should never be applied *before* grid bias voltage and plate voltage are on, or screen current and dissipation will be excessive. This sequence of operation applies to all tetrode tubes, including small receiving tubes.

The 90-volt bias supply for the 4CX300A must be capable of withstanding about 30 ma. of grid current without serious loss of voltage regulation. A simple 50-ma. supply with a VR90 regulator tube will do the job. Adjust the series resistor to pass maximum current (40 ma.) when the supply is disconnected from the transmitter.

After the tuned circuits have been set to their approximate resonant frequencies with the aid of a grid-dip oscillator, an appropriate crystal is placed in the panel socket and high voltage applied to the oscillator and doubler stages, and bias to the 4CX300A. The drive potentiometer, R_1 , is set for minimum screen voltage on the 6V6GT and the tuned circuits are resonated for an indication of grid current on the 4CX300A grid meter. The drive control is adjusted for about 5 ma. amplifier grid current.

The 4CX300A stage is next neutralized in the normal manner, the neutralizing capacitor being adjusted so

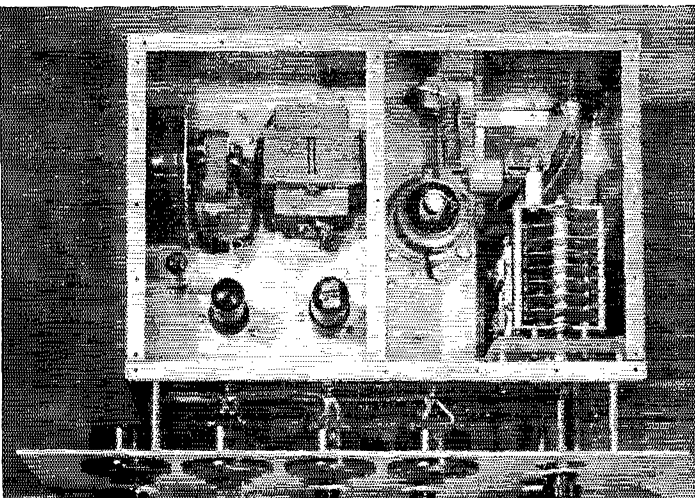


Fig. 4—In this view the blower and filament transformer are seen in the left-hand compartment near the rear of the chassis. Chassis plate, side pieces and shields are made from flat aluminum with flanges folded in a metal brake. In the left compartment are 0A2 regulator, 6AG7 oscillator, and 6V6GT doubler. The 4CX300A amplifier is on the edge of the chassis in the right-hand compartment, along with the plate-circuit components.

880V. C.T. at 150 MA.

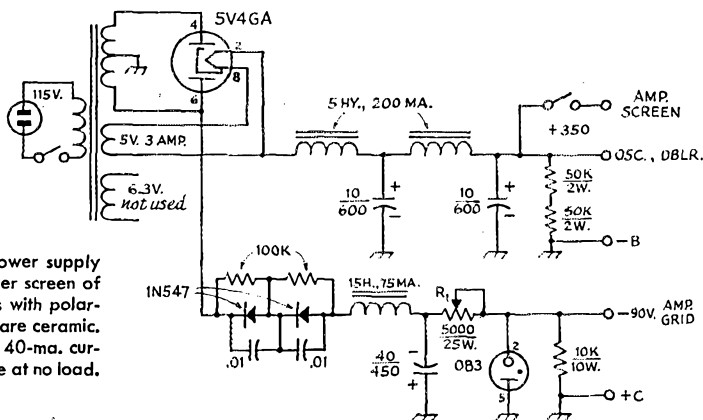


Fig. 5—Circuit diagram of the power supply for the exciter stages and amplifier screen of the 50-Mc. transmitter. Capacitors with polarity marked are electrolytic, others are ceramic. The slider on R_1 should be set for 40-ma. current flow through the regulator tube at no load.

that a minimum of grid current variation is noted when the plate tuning capacitor, C_4 , is tuned through resonance (loading capacitor C_5 is set at maximum for this adjustment). Alternatively, a small pilot lamp or other r.f. indicator may be coupled to the coaxial antenna jack and the neutralizing capacitor adjusted for minimum feed-through power. Once the stage is properly neutralized, little or no change on the grid meter will be noted as the amplifier plate circuit is tuned through resonance.

When all is working properly, the transmitter may be connected to the antenna feed line or to a dummy load, and grid drive, screen and plate voltage applied to the amplifier stage. Start with the drive control set near minimum. Increase the drive slightly and establish resonance in the plate tank circuit. Drive and loading are now increased until the typical operating conditions indicated in the table are achieved. The amplifier stage should never be operated in a lightly-loaded condition unless the drive level is reduced. With a little practice, you'll soon observe that grid, screen and plate currents are a function of both grid drive and antenna loading. If loading is too light, grid and screen current will be high. If the loading is too heavy, grid and screen current will tend to be low. Screen current, it should be noted, is an extremely sensitive indication of proper balance between drive and loading. In

fact, under conditions of heavy loading, the screen current of a tetrode may reverse. This phenomenon, common to tetrode tubes, makes it dangerous to rely upon a screen-dropping resistor or a series regulator to supply the screen voltage unless a bleeder is connected from screen to cathode. The bleeder should draw at least 15 milliamperes. Resistor R_2 in the screen circuit of the 4CX300A fulfills this requirement. Since it is placed before the screen meter, the bleeder current does not register.

Modulating the Transmitter

For a.m. phone, the final amplifier may be plate modulated. Plate potential is reduced to 1500 or 1000 volts. A pair of 811As, operating at the same voltage, will make a satisfactory modulator. As with other tetrodes, it is necessary to provide some modulating voltage to the screen element of the 4CX300A. A choke of 10 henrys (50-ma. rating) in series with the screen supply circuit, between R_2 and the meter, will provide adequate screen modulation so that 100-per-cent plate modulation may be achieved.

Using an External V.F.O.

An external v.f.o. may be used with this transmitter by changing the 6AG7 oscillator stage to a frequency multiplier and injecting a 6- or 8-Mc. frequency into the panel crystal socket. To do this, it is only necessary to ground the crystal socket pin connected to the 0.005- μ f. screen-blocking capacitor. The output of the v.f.o. may now be injected into the crystal socket via a short length of coaxial cable. The inner conductor of the cable is terminated to the socket pin attached to the 6AG7 grid terminal, and the shield of the cable is attached to the grounded socket pin. An old FT-243 crystal holder may be used for the plug on the end of the cable. If one of the 4-40 bolts holding the crystal socket to the panel is reversed and allowed to project beyond the panel, a small clip on the shield of the cable may be used to ground both the shield and the proper socket pin by clipping it to the projecting bolt. Other methods of connecting a v.f.o. are shown in July 1963 QST, page 16.

TABLE I

Typical Operating Conditions for the 4CX300A

Circuit	Class C Tele- graphy	Class C Tele- phony	Class AB ₁ Linear, S.S.B.
Plate Voltage	2500	1500	2500
Screen Voltage	250	250	350
Grid Voltage	-90	-100*	-55
Plate Current, ma.	250	200	100-250
Screen Current, ma.	16	20	4
Grid Current, ma.	25	14	—
Driving Power, watts	2.8	1.7	—
Plate Input, watts	625	300	625
Power Output, watts	500	235	400

* -90 volts fixed, plus 10 volts rectified bias.

For complete operating data, see information accompanying the tube, or write the authors.

Receiver Front-End Attenuator

Overcoming Receiver Blocking and Cross-Modulation

BY DAVID TALLEY,* W2PF

WITH the continued growth of ham radio it is no longer unusual for two or more amateur radio stations to be located within a few hundred feet of each other, or even in the same apartment building. The author recently visited a ham in a Long Island suburban community where several stations were using 3-element beams and kilowatt s.s.b. transmitters, and were all next door to each other!

The obvious problem was what could be done to permit adjacent stations to operate with the minimum mutual interference, even when operating on the same band. It is known that strong local signals can cause severe cross-modulation effects even in the best-designed communications receivers.¹ The presence of high signal levels outside of the receiver's pass band may often desensitize or block the receiver. High signal intensities in the receiver's front end may often

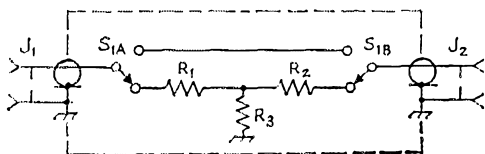


Fig. 1—Circuit for the r.f. T-Pad.

R_1, R_2, R_3 —See Fig. 2.

S_1 —D.p.d.t. switch.

J_1, J_2 —Coaxial connectors.

cause the r.f. amplifier or mixer tube to be driven into grid current. The solution is to reduce the unwanted or spurious signal level to the point where the cross-modulation disappears, or is substantially reduced, but with the desired signal still being heard. One solution to the problem is the use of a suitable r.f. attenuator or T pad inserted between the antenna and the receiver.

It was observed in the aforementioned cases that the strong signals encountered often moved the S-meter needle off scale. It was not unusual for the meter to read 50 or 60 db. over S9 throughout a 100-ke. segment of the 20-meter band. For example, with one station on 14.3 Mc., the 14.25- to 14.35-Mc. range in the second station's receiver was effectively blocked. This condition indicated that approximately 30 to 40 db. attenuation would be needed between the receiver's front end and the antenna to prevent the overload effects.

A 35-db.-attenuation T pad was constructed, similar to the one described by W0DAN.¹ Fig. 1 is the circuit of the pad, which should be constructed in a metal enclosure to prevent stray pickup. The input and output connectors should

* East 9th St., New York 3, New York.

¹ Andrade, "Recent Trends in Receiver Front-End Design," *QST*, June 1962.

TABLE I

50-ohm T-Pad Design

Db. Attenuation	R_1, R_2 (ohms)	R_3 (ohms)
20	41	10
23	43	7
25	44	6
28	46	4
30	47	3
33	47.5	2.5
35	48	2
38	48.5	1.5
40	49	1

Resistors should be $\frac{1}{2}$ -watt composition. Nonstandard values may be selected from nearest standard value by measurement.

be placed at opposite ends of the enclosure to minimize capacitive coupling. The switch, S_1 , permits the pad to be rapidly inserted in, or removed from, the circuit as required.

For those desiring different attenuation levels, Table I² shows values for use with 50-ohm unbalanced lines. The tabulation shows values for the $\frac{1}{2}$ -watt composition resistors required to give attenuation in the range of 20 to 40 db.

The insertion of the 35-db. pad materially reduced the overload effects in the receiver. It was now possible to receive other signals of moderate strength within about 15 kc. of the interfering station's frequency. The use of the attenuator made it possible for close-by stations to operate in adjacent segments of the band. Of course, the insertion of the pad also reduced desired signals by the same amount. Signals in the S9 range are now S3 or so, and 20-db.-over-S9 signals are reduced to S6 or S7. However, noise and other spurious products are also attenuated by 35 db. and, what is most important, cross-modulation products are substantially eliminated. The result is that ham neighbors are now able to operate without harmful interference. QST

² D. Talley, *Basic Carrier Telephony*, page 117, John F. Rider Publishers, New York.

Strays

An old friend has a new face. The *Radio Amateur Callbook Magazine* has a brand-new cover in a striking modern design. It will still be published quarterly, but the cover colors will change with the season. Inside, the magazine will be the same — an up-to-date listing of the call letters and addresses of radio amateurs. And the address of the publisher is still the same — Radio Amateur Callbook, Inc., 4844 Fullerton Ave., Chicago 39, Ill.

The League Program

ARRL President Addresses Midwest Convention

BY HERBERT HOOVER, JR.,* W6ZH

My Fellow Amateurs and our Distinguished Guests.

It is indeed a great honor and a pleasure to be here at the Midwest Division Convention in Wichita. In the pioneering days of aviation radio, in the early 1930's, I spent many pleasant days in Wichita setting up the communications network of one of the early airlines. I am delighted to be back once more — and even though the city has grown so much that I can scarcely recognize it, I find that the hospitality and friendliness are as generous as ever.

One of the cherished traditions of Amateur Radio is the ARRL Open Forum which takes place at our Division Conventions. Here we discuss our problems in open session, and the membership and their elected representatives have a chance to thrash out the policies and programs of the League.

This morning, I would like to make some observations as a result of my experiences as President of the League during the past year, and then join in whatever open discussion may follow.

* * *

At its annual meeting on May 3, 1963, the ARRL Board, by unanimous vote, adopted a resolution of basic policy which has come in for wide discussion among radio amateurs everywhere — both inside and outside the League. In taking this action, in my opinion, the Board courageously faced up to a situation that has been growing in seriousness for some time. I would be less than candid if I did not tell you how really serious I believe this situation to be. While the reasons to a considerable extent are due to international developments, domestic considerations are also involved. If you will stick with me for a few minutes, I will briefly outline the background of both.

Amateur Radio, organized as we know it, is soon to celebrate its fiftieth birthday. In this 50-year period, it has grown from a few hundred licensees to more than 250,000. The equipment has changed from relatively simple home-made gear to complex receivers and transmitters of sophisticated design and, often, of commercial manufacture. The frequencies available for amateur use have expanded from a small band near 200 meters, ordinarily useful for a few hundred miles, to the present harmonically related bands located throughout the spectrum. Under normal conditions, amateurs can now work each other anywhere in the world, at any time of night or

* President, ARRL.

“At the recent Midwest Division ARRL convention in Wichita, Kansas, on October 26 and 27, 1963, we were privileged to have as one of the speakers at the forum our president, Herbert Hoover, Jr.

“There were 410 ARRL members attending this particular forum and, as anticipated, the main subject of discussion was the ARRL's proposal concerning ‘Incentive Licensing.’

“A resolution was presented to those attending the forum that the Midwest Division as represented by those in attendance at the meeting go on record as supporting the ARRL's proposal to FCC to reinstate the advance class license and the segregation of bands accordingly. This resolution was presented to the floor and the resolution passed favorably with 400 members voting Aye, 3 members voting No and the balance abstaining.

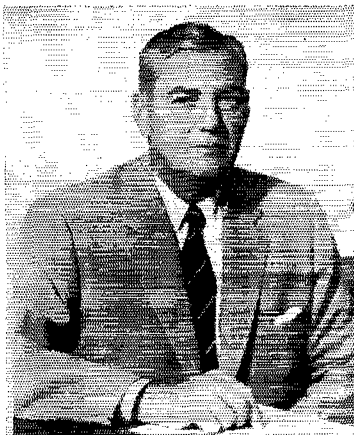
“In talking to many people attending the convention, I know that the incentive licensing proposal was considered to be of particular importance to amateur radio and I must say that I was pleasantly surprised at the support given this proposal by those attending the meeting.”

*Bernard V. Borst, WØLNZ
Convention Chairman*

day. As we look back, it has been a most extraordinary development.

Yet, in the process of this growth and progress, there is danger we may have taken some things for granted, without analyzing them very carefully, simply because they have become an accustomed habit. One of these is the continued availability of our high-frequency bands from 1.8 to 30 megacycles, without which amateur radio would soon wither away to almost nothing.

We have had our high frequency bands for such a long time many of us have assumed they were ours on a permanent basis. Perhaps we slipped into this attitude because of our having discovered the “short waves” years ago, and therefore assumed at least a goodly portion of them would remain ours for keeps. The bands were ours to enjoy and do with as we pleased — so long as we stayed within bounds and did not use them for commercial purposes. From the standpoint of self-preservation, it seemed as though our only



Herbert Hoover, Jr., W6ZH.

problem was to chase away occasional trespassers — and that, we assumed, was a job the FCC or some similar authority would do for us.

We would have little to worry about if all this were actually true; but unfortunately, as a matter of hard fact, such is not the case.

In practice, there is no such thing as a permanent frequency allocation. By International Treaties going back as far as the Berlin Conference of 1906, the nations of the world decided to avoid chaos in the radio spectrum by a self-imposed system of regulation. Each of them gave up their freedom to carve up the spectrum individually, and essentially agreed to abide by the decision of the majority. Whether we as 250,000 licensed amateurs in the United States like it or not, our country has just one vote in an International Radio Conference, and it is no bigger than the vote of any other country, large or small, in the final countdown.

The first International Conference which made allocations of "short waves" was held in Washington in 1927. At the urgent insistence of our amateur representatives, led by Hiram Percy Maxim, Amateur Radio was recognized for the first time as a full-fledged Telecommunications Service. This was despite vigorous opposition by many other countries who wished to give Amateur Radio no recognition whatever, or at best, to class it as an experimental hobby. The view of the United States was that amateurs had performed in the "public interest, convenience and necessity"; they were competent in their operations; and their technical contributions were of such far-reaching significance that they were justified in being formally designated as a "Service".

This does not in itself guarantee us any frequency allocations. We will have to fight for them in the future just as hard as we have in the past — and probably a lot harder. But it does make the job easier because we have a recognized status.

In subsequent conferences, the United States continued to maintain its support of the Amateur Service, and, in each instance, it has been joined

by enough other countries — Canada in particular — to constitute a majority. However, there have been repeated proposals which, if they had prevailed, would have severely reduced or eliminated our amateur bands. As we shall see, the latter attitude will probably be much stronger in the future than heretofore.

At the next Conference, which may well take place within three to five years, there are expected to be more than 100 nations participating, and each will have an equal vote. Approximately thirty countries have come into being as brand-new nations since the last Conference in 1959, and this will be the first such affair they have attended. Most of them are among the rapidly developing countries of Africa.

There are thirty or forty additional nations which, although older, also have little or no amateur activity. It is significant that many of the proposals to curtail amateur activities in past conferences have been originated by this group. All of the nations, in both of these groups, have radio and communications problems which they feel are far more pressing than providing for an amateur service. It requires only simple arithmetic to realize that the sum of these two groups add up to substantially more than a majority of the whole.

The next Conference, when it occurs, will again be concerned primarily with the high-frequency portion of the spectrum — from 3 to 30 Mc. This is the area where the most difficult interference problems must be resolved, and it is here, too, where our most valuable amateur bands are located.

The pressure for more high-frequency channels is far greater than ever before. Almost all of the newer nations — and many of the older ones, too — feel they have a vital need for more short-wave broadcasting. They have great pride in their sovereignty — which many of them have achieved only recently — and they want to broadcast their virtues, philosophies and aspirations to the rest of the world. Whether they are right or not, they feel a myriad of listeners are eager to hear their story if only a clear channel could be obtained. Unfortunately, all the channels assigned to broadcasting at the 1959 Conference are already overcrowded, and they must squeeze themselves into some other part of the spectrum — at least, they hope, until the next Conference rearranges the allocations to their satisfaction.

The desire for more broadcast channels falls primarily in the band from 7 to 22 Mc. In this band, these countries also want more commercial frequencies to keep in touch with the world centers of diplomacy and commerce.

They also have an internal communications problem. Being sparsely settled, telephone and telegraph by land wire seems inordinately expensive, and radio links in the 3 to 7 Mc. part of the spectrum appear most inviting. Again, if these channels are occupied — as they usually are — then they move into the first vacant spot to be found.

A number of such stations have moved in on

us already. *What is not fully realized, at least by most amateurs, is that there will again be a concerted move to take over most — if not all — of our amateur bands. And let us not delude ourselves, there are the votes available this time to make it extremely difficult.*

When the next Conference takes place, there is little we can do directly, as amateurs. These conferences are between governments, and, while the League and the IARU will have representatives present, we are only a small part of the over-all picture.

The final outcome will be determined by two things, namely (1) the attitude of the smaller countries, whose votes will be decisive, and who feel they are in desperate need of more space in the spectrum; and (2) how vigorously our own government — and those of other countries where substantial amateur activity has been supported — will defend our frequency allocations.

The attitude of the newer and smaller countries will be largely determined by their own self-interest. They will not be impressed so much by the historic achievements of amateur radio in the past as by what it can do for them in the future.

It will help us in anticipating their reaction if we ask ourselves some straightforward questions. Are we, for instance, in the daily use of our frequencies, creating the kind of image we would like these governments to have about amateur radio? Are we demonstrating our full capability to serve the public interest? Are we trying to improve our technical competence and keep pace with the progress in communications generally? Does amateur radio have a serious side to it, or is

it primarily a hobby for entertainment? The answers to these questions and to many more like them will largely determine what happens to amateur radio in the immediate years ahead.

There are serious and well-qualified amateurs in our government, and in vantage points outside, who are pessimistic about the outcome if the present amateur trends continue. They believe there is a good possibility we will lose all or a good part of our most useful bands; and further sharing with the high-power broadcasting and commercial services, of those parts which might remain, will severely reduce their effectiveness.

The full impact of this situation has become increasingly apparent within the last year. *The outcome will depend largely upon what we, as amateurs, can accomplish in getting our own house in order before the next conference begins to shape up.*

Whether we like it or not, the rest of the world looks to us to set the standards for amateur operation everywhere. This would be true by sheer weight of numbers, if for no other reason, for we have 250,000 licensees out of the 350,000 worldwide. But in addition, as a result of our high power and big antennas, we put proportionately more loud signals into the ether than even these numbers might indicate. It places upon us a responsibility for performance we cannot escape; and whether it be a foreign amateur who is looking toward us for guidance, or a foreign government looking at our frequencies with envy, it is the *United States Amateurs* who must set the example and provide the leadership. This is a sobering reflection, *and the only conclusion is that in the years immediately ahead we must do our*

The ARRL Program

- for more efficient use of amateur frequencies
- for increased amateur technical proficiency
- for more effective performance in the public interest, convenience and necessity

1. A complete review and revision of the present written examinations for various classes of amateur license to conform more closely with modern techniques.
2. Reinstatement of an advanced grade of license, with appropriate frequency privileges, to provide an incentive for improved technical knowledge.
3. An expanded educational program in operating and technical fields through:
 - a. *QST* and other League publications.
 - b. Encouragement to affiliated clubs in planning worthwhile programs for regular meetings.
 - c. Enlargement of the club Training Aids project administered by Hq.
4. A more effective Official Observer system.
5. Combining the Amateur Radio Emergency Corps and the National Traffic System to constitute an Amateur Radio Public Service Corps for maximum effectiveness in the public interest.
6. Limiting the term of Conditional Class licenses and making them non-renewable except in cases of genuine hardship (*i.e.*, the handicapped).
7. An educational program in *QST* to better acquaint members with the League's history, accomplishments and goals.
8. Strict observance of the following operating principles:
 - a. To make proper choice of bands below 30 Mc. appropriate to the distance to be covered.
 - b. To achieve equipment flexibility so that an adequate choice of frequency bands and powers may be available.
 - c. To use minimum bandwidth, consistent with good engineering practice and compatible with the mode of transmission being employed.
 - d. To expand the use of v.h.f. for local contacts wherever possible, with the ultimate aim of conducting all short-distance communication in this portion of the spectrum.
 - e. To use the minimum power necessary for each communication.

utmost to genuinely up-grade the Amateur Service.

This conclusion is also re-inforced if we look at the domestic side of the picture, for if we are to be successful at the next Conference we must have the active and wholehearted support of our own governmental agencies.

Amateurs have a proud record of making far-reaching and substantial contributions to the technical progress of radio. We have provided an indispensable source of skilled personnel in times of national emergency, and our activities in local disasters have been an invaluable public service. There are many additional amateur activities — more than it is possible to mention here — that have also made very real contributions to the public welfare.

There is still another aspect of amateur radio — the hobby side — that gives a tremendous amount of pleasure, enjoyment and thrill to those who actively engage in it. There is the opportunity to talk with old friends, as well as to make new ones. The challenge of working DX or of participating in a contest appeals to many in our ranks. Then, too — and perhaps above all the other aspects of ham radio — is the common bond of interest that lends substance to the friendships that are formed within the fraternity.

All of us treasure the pleasurable side of amateur radio. *But we must never forget that pleasure and entertainment are not the reason we have our amateur bands today. There are other important services that have a very real need for more channels. In our absorption with the many interesting aspects of amateur radio, this is all too easy to forget.*

As a practical matter, the purely "fun" side of amateur radio — the so-called hobby side — is one of the *extra* dividends that comes along from having done a creditable job on the more serious side. There are such a wide variety of constructive activities available that it is often hard to tell where the serious stuff leaves off and the fun begins. This is something each individual has to decide in his own conscience. But the serious side cannot be left for somebody else to do if we expect to keep our ham bands indefinitely.

A good example is the Citizens Band, which has been giving our regulatory authorities so much concern of late. It was originally intended for a multiplicity of business and personal communications, but it has been gradually taken over by literally thousands of individuals who found that chatting over the air could become a most engrossing hobby. Interference from this source has become so great that the original purposes were lost, and the FCC is now considering a drastic revision of the assignments. There is an undeniable moral in this for Amateur Radio.

A high FCC official, once an active amateur himself, said in a public speech recently that the Citizens Band "had all the bad features of amateur radio and none of the good ones." This is worth serious reflection, especially considering the source from which it comes.

In view of all these circumstances, it is useful to consider again just why we have our present frequencies. *The amateur bands were made avail-*

able to us instead of to other essential services because it was believed to be in the over-all national interest. The purpose was to create a body of technically competent and experienced operators; who would advance with the radio art and, wherever possible, make substantial contributions to its continued progress; and who would be active in promoting the public welfare. These definitions occur all through the legal justification for our domestic existence. In turn, it is basically on these grounds that our governmental agencies are able to support us at the international level.

During the annual meeting, the directors considered both the international and the domestic situations at length. It was recognized that unless vigorous measures were taken there was a grave possibility we might lose a substantial part of our high frequency bands at the next international conference. Furthermore, *the Board concluded this was not a matter that could be counteracted by strenuous arguments alone. Such arguments would have to be accompanied by a genuine upgrading of the amateur service itself if the future could be faced with any degree of confidence.*

Amateur Radio is a unique activity because all of us take part in it on an individual basis — and its future depends on each of us personally. It is not something where the Board of Directors, or the Headquarters Staff, or the Officers can perform feats of legerdemain — or pull white rabbits out of a hat — and everybody can then sit back and reap the benefits. On the contrary, this is the sort of thing where *everybody* has to do his share.

The Directors and the officers, in their contact with individual amateurs, at Club meetings and Conventions had found in recent years an increasing and overwhelming sentiment among members everywhere that *something* should be done to solve some of the pressing problems facing ham radio.

It was recognized that there was no single solution to the problem, and that any changes which might be recommended in licensing procedures would be only one aspect of a broad program.

It was emphasized that such things as crowded band conditions, poor operating and technical procedures, and lack of courtesy could not be cured by stiffer licensing requirements or, in most instances, by governmental monitoring. The only recourse for these ills would have to come through the voluntary action of amateurs themselves. The headquarters staff, including the communications, technical and editorial departments, were instructed to do everything possible to publicize and implement the program. Its success would depend upon education through *QST* and other publications — both inside and outside the League — by the cooperation of councils and clubs, and by the on-the-air conduct and diplomacy of conscientious and responsible amateurs everywhere. It was fully recognized that the voluntary aspect of the program was at once the most important and yet perhaps the most difficult to implement.

In arriving at its recommendations for changes in licensing procedures, it was believed a moderate increase in licensing requirements would achieve a necessary upgrading of our level of technical competence. To this end it was proposed that a more advanced type of examination, primarily covering the radio telephone techniques now in general use, should be required of those who wished to operate this type of equipment on certain of the high frequency bands. This has been called "Incentive Licensing" because it is an extension of the principle already adopted in our Novice and Technician classifications, and which was applied even more widely to our licensing structure prior to 1952. Personally, I think that "Competence" might be a better word than "Incentive" to describe the proposal, but that is beside the point.

In any event, there is no intention or desire to take anything away from anybody, nor is there any idea that only advanced electronics specialists should be able to qualify. On the contrary, an examination is envisioned which could be passed by almost any amateur who has had a year or more active experience as a General or Conditional licensee and who is willing to apply himself to a reasonable amount of study of the material that is readily available in the amateur handbooks. The proposal specifically recommends that no additional code test over and above that already included in the General Class license should be required, and there should be ample time to take an examination after it becomes available and before its use would be necessary.

It is not the purpose to correct overcrowded band conditions by restricting operation to a selected group. On the contrary, it is believed the maximum useful occupancy of our bands is desirable in order to demonstrate the necessity of our present allocations.

The Executive Committee and the officers were directed by the Board to work out the details of the licensing recommendations within the framework of the broad policies which had been laid down. This has now been done, and after a final consultation with all the directors, a specific proposal was filed with the FCC last week. Full details were published in the November issue of *QST*.

A large number of possible alternatives had come to the Executive Committee from members of the League. By unanimous agreement the Committee finally chose the plan outlined below.

Briefly, the proposal recommends that the Advanced Class license should be re-activated, and that it or an Extra Class license should be required for the use of radiotelephone on certain of the High Frequency bands in accordance with a proposed time schedule. This schedule suggests that the requirement become effective on the 20-meter band on July 1, 1965, the 15- and 40-meter bands on July 1, 1966, and the 80-meter band on July 1, 1967. It is recommended that in no event, however, should the proposal go into effect until at least one full year has elapsed after action may have been taken by the Com-

mission.

The proposed schedule recognizes that a majority of our emergency and traffic nets operate on the 80-meter band, and it allows almost four years until that band would be affected. This should give ample time for those who want to take the test to do so.

It is only natural that the League's proposal for a change in licensing procedures should come in for the most discussion. But the other aspects of the broad program should not be lost sight of — for they are also of major importance. It was realized that an over-all program with the ramifications outlined here could not be put into effect over night. Its success could only be measured in terms of years. Nevertheless, it was felt time was running out and a start should be made immediately.

It was also realized there would be opposition to parts of the program by some elements and individuals within the amateur ranks. In view of all the surrounding circumstances, however, the Board believed it had no alternative except to adopt a broad policy of genuinely trying to upgrade the Amateur Service.

In this connection, I would like to add one further point. The directors of the ARRL are elected individually for a two-year term by the League members in each of the 16 Divisions. They in turn elect annually four of their own fellow Directors to the Executive Committee, where they constitute a working majority. This is a thoroughly democratic procedure.

Grass roots control of League affairs by the membership is demonstrated by the fact that half of the present Directors of the Board, as well as all of the Director-members of the Executive Committee, the General Manager, the General Counsel and the President have been newly chosen within the last five years.

In the past year that I have been associated with them, I have found the Directors to be without exception a sincere and conscientious group of men, dedicated to the best interests of Amateur Radio. I am proud to serve with them, and I am in full accord with the policies they have adopted to strengthen Amateur Radio.

In conclusion, it is my opinion there are two general courses of action that are open to us.

The first is to drift along, do nothing, and hope for the best. This is the easy way, and the chances are that if we choose it we will get thoroughly elbowed, one of these days, at home as well as abroad.

The second alternative is to face up to the facts and start to do something constructive to preserve Amateur Radio for the future. That is the sole reason behind the Board's recent action, and I think the Directors are to be congratulated for their courage in taking the initiative.

The members of the Board are coming to you at this time, as fellow amateurs, to ask your help and support in preserving the future of Amateur Radio. I believe they deserve your full confidence.

Thank you.

The Bottle

BY JOHN G. TROSTER,* W6ISQ

LET'S see what's on the low end here . . .
hmmmmm . . . Europe-Africa . . . not
bad . . . whoa, what's this?"

"SOS SOS SOS de KK8QQ/mm. SOS."

"QQ?? Gosh, this is awful. I worked his
DXpedition yesterday on Emirau Island. Prob-
ably a new country, that is if we can educate
them DXCC fellas at Headquarters. Wonder
what's wrong with him?"

"SOS SOS QRRR de KK8QQ/mm. Ship sink-
ing . . . heavy seas 100 miles north Emirau
. . . SOS . . ."

"Oh my gosh, this is horrible. KK8QQ
KK8QQ/mm de W6ISQ. K."

"W6ISQ de KK8QQ/mm . . . battered by
heavy seas . . . hold filling fast . . . mast broken
. . . sinking condition . . . notify USN
. . ."

"KK8QQ de W6ISQ. Sa OM, u got logs from
Emirau?"

"ISQ-QQ. Logs safe in pocket. Call USN . . .
SOS . . ."

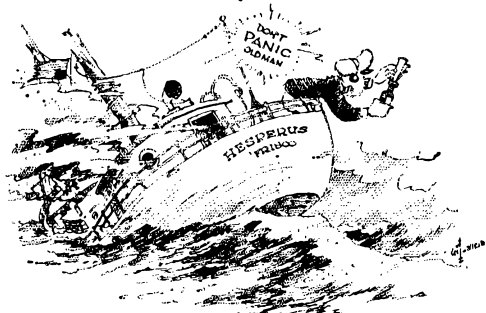
"In his pocket! — They'll be a pulpy mess,
that's what! 'QQ-ISQ . . . pocket NG NG
. . . wrap in oilskin or waterproof bag. QRX hr
while u save valuable documents . . . hurry!"

"ISQ-QQ . . . sinking fast . . . pse el . . .
have waterproof bag . . . will wrap logs ok
. . . nw USN pse . . ."

"QQ . . . ISQ . . . you got logs wrapped
safely now?"

"ISQ-QQ/mm . . . QRX . . . ok, logs wrapped
safely nw. Pse hurry . . . sinking lower . . .
fire spreading . . ."

"FIRE?? . . . he didn't mention fire! That's
different. My gosh, those leak-proof bags will
go up in flames if they even get warm. QQ/mm-
ISQ . . . quickly . . . leakproof bag NG NG in



fire . . . roll up log and stick in bottle . . .
quickly . . ."

"ISQ-QQ . . . decks awash . . . fire spread-
ing . . . USN . . ."

"QQ-ISQ . . . don't waste time . . . log into
bottle-quick . . . bottle . . ."

"ISQ-QQ . . . QRX . . . QRX . . . no cork . . ."

"Find one. No time to lose. Make sure bottle
light-colored so people can see valuable document
inside . . ."

"ISQ-QQ/mm OK . . . log wrapped in oil-
skins . . . stuffed in pale blue bottle . . .
corked . . . sealing wax . . . fire outside hatch
. . . water rising in cabin . . . SOS USN . . ."

"KK8QQ/mm de W6ISQ. Righto. Keep
your head, old man, don't panic. I'll handle this
personally and immediately. We'll get you out
of this ok, OM — citizens and USN working
together, ya know."

"Hello operator, get me Chief of Naval Opera-
tions, Pentagon, Washington . . . hurry, Miss.
This is a life-and-death situation . . . of course,
you can . . . don't quibble at a time like this
. . . never mind your Supervisor . . . get me
the Pentagon . . . IMMEDIATELY . . ."

"Yes, that's right, I did say the Chief of Naval
Operations . . . I said NOW, Captain . . .
NOW . . . life-and-death struggle in the Pacific
. . . public-spirited ham in conversation with
the derelict . . . I mean the ship is the derelict
. . . ha . . . don't waste time, Captain . . .
the CNO . . . here . . . immedjetly . . .
NOW . . . never mind the Joint Chiefs . . . now
. . ."

"Hello CNO? Where ya been? In the old days
. . . get to that later. Listen Admiral, there is a
U.S. citizen in a sinking condition . . . err
. . . his ship is in a sinking condition and on
fire about 100 miles north of Emirau . . . where's
Emirau? . . . You an Admiral and don't know
where Emirau is? Well anybody on the low end of
20 for the last week can give ya complete sailing
directions — let me tell y'about this idyllic little
isle . . . jewel of the Pacific . . . o.k. later . . ."

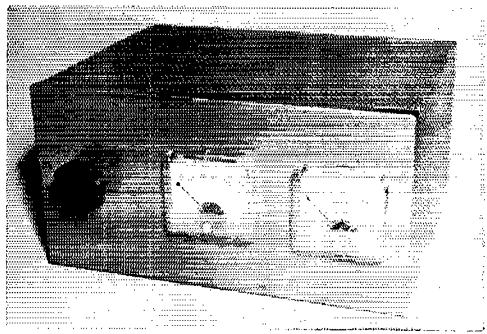
"Now this U.S. citizen has valuable documents
which would be a tremendous loss to millions . . .
. . . thousands . . . err . . . many people if
they got lost. I want you to get a ship . . .
planes . . . marines . . . whatever ya got around
there . . . save that man! One other thing
. . . may find a bottle floating around in the
wreckage . . . save the bottle . . . extremely
valuable — right, a bottle . . . sealed . . . val-
uable documents — right . . . bottle."

"No, really Admiral, you embarrass me. No
citation necessary . . . we public spirited . . .
really Admiral . . . when emergencies arise we
spring to action . . . coiled steel spring . . .
no thought of reward . . . doing my duty as a
citizen — 'Tis a far, far better thing I do —
no really, Admiral . . . the President wouldn't
have time for little old . . . well, maybe the
Commandant of the Marine Corps would be o.k.
. . . first instant of danger . . . like lightning
. . . well, if you insist . . . that's right. W6ISQ
. . . W6ISQ . . . right. And don't forget to

(Continued on page 164)

* 45 Laurel Street, Atherton, California.

BY JO EMMETT JENNINGS,* W6EI



Broad-Band Amplifiers

THROUGH the years frequent attempts have been made to build an ideal amplifier. There have been many fine designs, but all have had one common problem—maintaining constant output over a wide range of frequencies. As technology has advanced, various approaches have been used to solve the problem of broad-band frequency characteristics, but they have all resulted in complicated and expensive equipment.

The broad-band amplifier I am about to describe does not solve all problems either. However, it does make possible an inexpensive high-quality amplifier which is reasonably flat over the range 3.5 to 14 Mc., and is usable, but with decreasing output, up to 30 Mc. Originally this amplifier had no impedance-matching controls whatever, but later that feature was added to further improve its efficiency. Since beginning operation in January 1963, the ability to change bands without tuning or switching has been most gratifying. This forward step is now available to all in the amateur-power range.¹

Operating Principles

The vacuum-tube as an amplifier works most efficiently when delivering its power output at relatively high voltage and low current. With modern tetrodes the r.m.s. output voltage, at full drive, is of the order of 50 per cent to 65 per cent of the d.c. plate voltage, depending on the tube and class of operation (AB_1 , AB_2 , C, etc.). Thus an r.f. amplifier tube operating with a plate voltage of 600 will have an r.f. output voltage of 300 to 400 volts, provided the load resistance is optimum.

If this voltage could be developed in a 50-ohm resistive load, no impedance-matching circuits would be necessary. But 300 volts in a 50-ohm load represents 1800 watts, and there is no tube presently made that is capable of such output

with 600 volts on the plate. However, a practical substitute is a number of smaller tubes in parallel—enough of them to work efficiently into a load resistance of the same order as the line impedance.

As an example, the characteristic curves for the 12GJ5 tube, taken from the *RCA Receiving Tube Manual*, show that with 0 grid volts, 150 volts on the screen, and 50 volts on the plate (approximately at the “knee” of the curve), the plate current is 370 ma. With 12 tubes in parallel, the “knee” current, representing the instantaneous plate current at the peak of Class AB_1 operation, is therefore over 4.4 amperes. The corresponding d.c. plate current as read by the plate meter would be approximately 1.4 amperes, and the load resistance for optimum power output would be in the vicinity of 125 ohms, using a 600-volt plate supply.

In the writer's experience, safe operating conditions for these tubes as Class AB_1 linear amplifiers include 600 volts on the plate, 300 volts on the screen, and -67 volts on the grid. With 12 tubes, these conditions produce a static plate current of approximately 400 ma. Doubling the screen voltage over that used in obtaining the characteristics given in the tube data will more than double the peak plate current, and the optimum load resistance is correspondingly reduced. It is readily possible to drive the tubes to a d.c. plate current of 2.4 amperes without going into grid current. This eliminates one cause of TVI, and driver regulation is no problem. However, a plate current of more than 2.4 amperes

This is a step toward the ultimate amplifier—one that will work into the actual load without intermediary circuits. As the author says, not all the problems have been solved—but enough of the road has been traveled to result in a practicable amplifier that operates over three or more bands without tuning.

* Power Switch Division, Jennings Radio Manufacturing Corp., 275 Meridian Road, Salinas, Calif.

¹ To protect the design, a patent disclosure has been filed. One tube manufacturer is developing tubes to permit operation in the higher-power industrial applications as well as at higher frequencies.

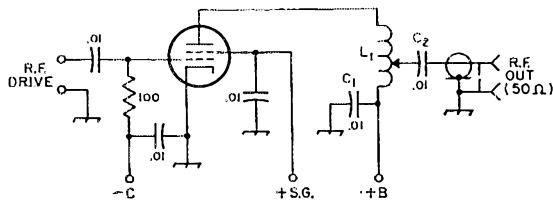


Fig. 1—Basic circuit of the broad-band amplifier, an essential feature of which is the use of tubes in parallel operating at relatively low plate voltage. L_1 is a tapped coil having an inductance of the order of 10 μ h. C_1 and C_2 must have low reactance compared with the load (coax) impedance; values shown are the minimum that should be used.

usually results in flat-topping, overheating, and TVI, as well as representing an illegally-high d.c. input at plate voltages over 400 volts. With 600 volts the plate current should not be allowed to swing up to more than 1.6 amperes on the plate meter.

Fig. 1 shows the elementary circuit of a single tube connected as a broad-band amplifier. The basic circuitry of one tube embodies all of the characteristics of the multiple tubes except that the power output is low and the optimum load impedance is high. L_1 was not used in the original 12-tube model, which was operated directly into the 50-ohm line to the antenna. However, higher output was obtained when a 10- μ h. roller coil was installed to serve as an r.f. choke as well as an impedance-matching circuit.

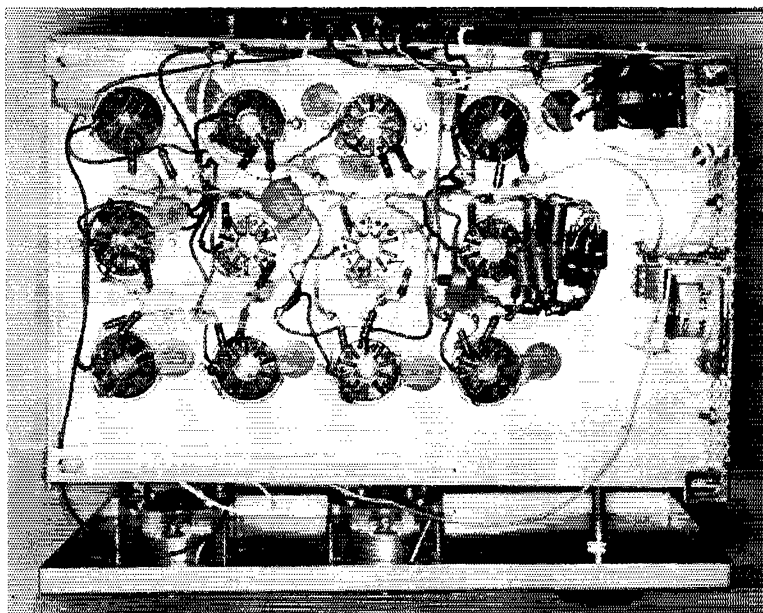
A few remarks regarding r.f. chokes are in order here. Commercial r.f. chokes are extremely large, especially 2.5-mh. chokes capable of handling 2 amperes. These large chokes were made for high r.f. voltages, and the inductance can be drastically reduced for low-r.f.-voltage applications. The broad-band plate circuit operates well with a 10- μ h. roller coil, which has a low d.c. drop. A tapped inductor may be used if it is wound with large copper wire — perhaps No. 16 to No. 12, depending upon the output circuit, as it will need

to handle 3 to 4 r.f. amperes as well as the 2 amperes d.c. to the final.

Practical Notes

The first amplifier built had 12 tubes in parallel, and was driven from a conventional exciter by means of capacitive coupling from the coax line to the grid. This amplifier did not have the 100-ohm grid resistor shown in Fig. 1, but instead used an r.f. choke at this point. As soon as plate voltage was applied the amplifier began to oscillate. This was rectified by the addition of a 50- to 100-ohm noninductive resistor in parallel with the grid choke. Employing this resistor not only stabilized the final amplifier and eliminated the need for neutralization, but the driver saw a more resistive load and was able to function under better conditions.

The method of isolating the tubes from each other at v.h.f. parasitic frequencies is not new, as anyone who has used multiple tubes has found it necessary to electrically isolate each tube from every other tube. This has presented a problem when attempting to operate the amplifier at the higher frequencies. Although stability is maintained in the 3- to 30-Mc. range, there is a decrease in output if the frequency is increased



Beneath the chassis of the 12-tube amplifier. The cluster of resistors at the left is the grid loading resistor for terminating the driver input. The antenna changeover relay is on the left wall.

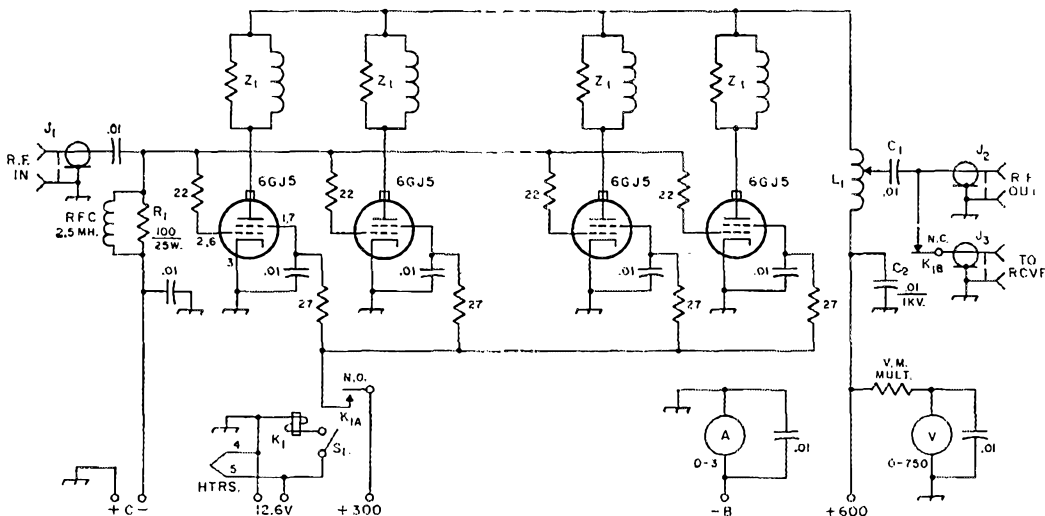


Fig. 2—The practical amplifier circuit. Broken line indicates that more tubes may be added in parallel by duplicating the individual tube circuits shown. Resistances are in ohms; resistors are 1/2 watt except as indicated below. Capacitors are ceramic; capacitances are in μf .

C_1, C_2 —Ceramic or mica, 600-volt or higher rating, to carry 4 amperes r.f. Capacitance shown is minimum that should be used; higher values are desirable. Adequate current-carrying capacity can be obtained by paralleling 6 or 8 capacitors (such as 0.005 μf , each) to result in a total capacitance of 0.01 μf or more.

J_1, J_2, J_3 —Coaxial fitting, chassis mounting.

K_1 —2-pole double-throw relay, 12-volt coil (Potter & Brumfield type KT or GA).

L_1 —10- μh continuously-variable inductor (Johnson 229-201).

R_1 —Approx. 100 ohms (not critical) 25-watt noninductive; may be made by paralleling twelve 1200-ohm 2-watt composition resistors.

S_1 —S.p.s.t. toggle.

Z_1 —Parasitic suppressor; 12 turns No. 24 Formvar on 47-ohm 1-watt composition resistor.

above 7 Mc.² About 45 per cent efficiency has been recorded on 14 Mc., while 60 per cent is normal on 3.5 and 7.

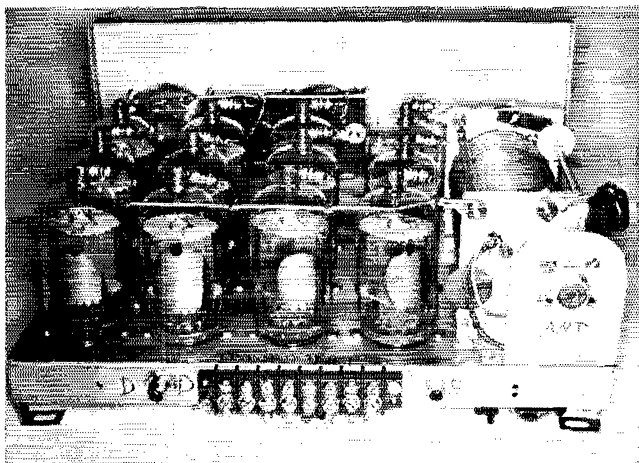
When the 12-tube model is used for fixed-

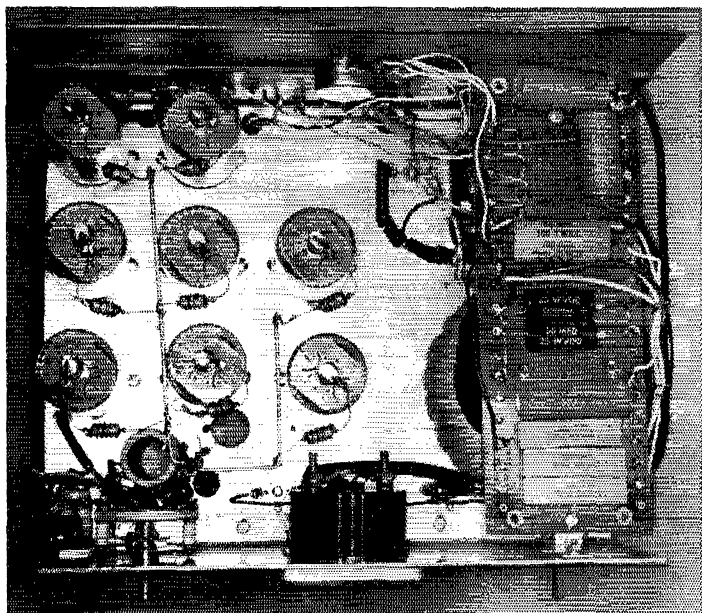
² The drop in efficiency is very likely the result of the rather large input and output capacitances resulting from parallel operation. The rated input capacitance of a single 12GJ5 is 15 pf. and the output capacitance is 6.5 pf. With 12 tubes, the capacitances become, respectively, 180 pf. and 78 pf., with no allowance for strays. At 14 Mc., this is a capacitive reactance of about 60 ohms shunting the grid resistor and about 150 ohms shunting the output load. Since the reactances decrease with increasing frequency, they are halved at 28 Mc. but rise to more tolerable values at 3.5 and 7 Mc. — *Editor*.

station operation, especially in a fringe area, a good clean signal depends upon several factors:

- 1) The exciter must be clean.
- 2) To avoid flat-topping, the tubes must not be overdriven.
- 3) The power-supply regulation should be as close to perfect as possible. The equipment will work if there is a voltage drop of 100 volts, but the power output will be reduced. Also, a large voltage drop generally is accompanied by flat-topping.
- 4) It was found that a low-pass filter, when installed adjacent to the amplifier, produced un-

Standing in ordered ranks, an even dozen tubes occupies most of the chassis space of this kilowatt broad-band amplifier. The roller coil at the right has the dual function of r.f. choke and impedance-matching transformer.





This 8-tube mobile broad-band amplifier has a built-in transistor converter power supply, occupying the right side of the chassis. The tapped coil at the front left serves the same purpose as the roller coil in the 12-tube amplifier.

usually clean signals. In the tests that were made, the broad-band amplifier gave less TVI than an amplifier using a conventional pi-network tank circuit.

The practical circuit of Fig. 2 can be used with any number of tubes from four to twelve, simply by adding identical tubes and circuits in parallel.

Mobile Operation

For mobile operation an 8-tube amplifier performs very well and does not require the use of a low-pass filter. On 80, 40, and 20, the high- Q antenna circuit is very effective in suppressing all frequencies except the fundamental.

In the 8-tube mobile version shown in the photograph you will note the tapped inductor (for which a roller coil may be substituted). This is the built-in Z match. If someone wishes to be more complete, it is possible to install an additional roller coil for resonating the antenna in conjunction with the usual fixed loading coil. A series loading coil for this purpose in the cabinet is a little more convenient, but requires additional space.

For mobile operation it is sometimes possible to increase the resistance across the grid r.f. choke. This will reduce the amount of drive

necessary for the amplifier. The value can be found by experiment, and may be from 100 to 250 ohms instead of 50 to 100 ohms.

Power Supply

In operating a broad-band amplifier, where low plate voltage is a requisite, power-supply voltage regulation becomes very important. If everyone had three-phase power available it would be no problem to supply plate voltage with practically ideal regulation. Since only single phase is available, the question of voltage drop must be carefully watched in every phase of the design.

First, the power line must be checked to see if it will sustain the load. For example, for every volt drop in the 115-volt line, there will be about 5 volts drop in d.c. output voltage. The rectifiers must have as low voltage drop as possible, and the filter capacitors should have low leakage and as much capacitance as possible.

After observing the flat-topping that was taking place in a power transformer because of the power-supply load, it became evident that this type of handicap would have to be overcome either by increasing k.v.a. ratings or by special design. When choosing an isolation or power

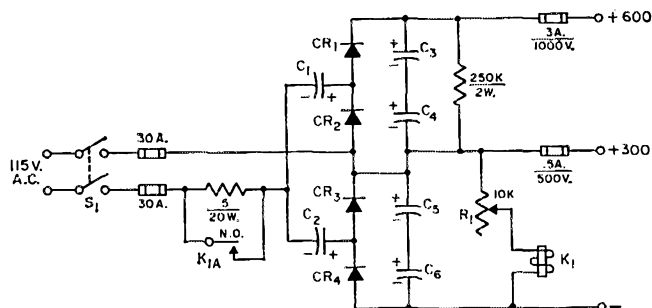


Fig. 3—Circuit of the transformerless voltage-quadrupler power supply. Resistances are in ohms.

C_1 — C_6 , inc.—1250 μ f., 180 volts (Mallory 3040578).

CR_1 — CR_4 , inc.—Silicon. 15 amp., 400 p.i.v. (Motorola 1N3212).

K_1 —D.p.d.t. used as normally-open s.p.s.t.; 2500-ohm coil, 5-amp. contacts, with contacts in parallel (Potter & Brumfield type GA).

R_1 —10,000 ohms, 10 watts, adjustable.

S_1 —D.p.s.t. toggle, 30 amp.

transformer for a 1-kilowatt load, the transformer should have a 2-kw. or higher continuous rating. The individual desiring lightweight equipment should use all the tricks in transformer design, such as a large toroid or E-I core, with bifilar or pi windings, and never reach saturation of the core. In general, keep the conductor resistance low and the leakage reactance at a minimum.

If simplicity and weight are of primary importance, the voltage quadrupler, Fig. 3, has the best regulation of any of the supplies. It has one disadvantage: in a voltage quadrupler there is no isolation from the line, and the positive and negative terminals have a potential of 300 volts d.c. to ground. I have used this type of power supply with success by isolating the amplifier from the chassis with series coupling capacitors on the r.f. output, ground return of the coax line, input coax and all other circuits. The current rating on the diodes may seem unusually high, considering the output current, but smaller rectifiers get too hot in a quadrupler circuit. Diodes rated at 8 am-

peres were tried, but their temperature ran well over 60 degrees C. in transmitting operation.

in series make up a capacitance of 312 μ f., which is about the minimum that should be used. An extra four in series-parallel is a decided advantage, as the larger capacitance supplies the peak-current requirements of the amplifier better, and tends to provide better regulation.

There are other approaches to improving the regulation when a transformer is employed, for instance, regulation control in the form of output loads. Primary control may be secured with saturable reactors, or by using a pair of silicon controlled rectifiers connected back-to-back with a phase-shift control.

For lightweight, inexpensive and simple supplies, the voltage quadrupler has the best characteristics to supply the broad-band amplifier with its needed plate and screen voltages. In some areas where the line voltage is high, it is recommended that the supply voltage be reduced to 96 to 100 volts a.c. instead of 120, which supplies over-voltage to the amplifier tubes. During the first tests these amplifiers were operated from

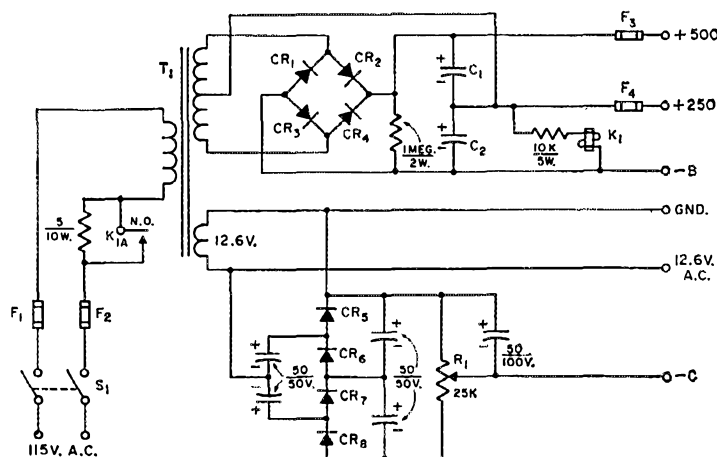


Fig. 4—Power-supply circuit using transformer and bridge rectifier. Capacitances are in μ f.; capacitors are electrolytic.

C_1, C_2 —625 or 1250 μ f., 350 volts (for 625 μ f., two 1250- μ f., 180-volt Mallory 3040578 capacitors in series; for 1250 μ f., four in series-parallel).

CR_1 — CR_4 , inc.—Silicon, 3 amp., 1200 p.i.v.; two 600-p.i.v. units in series.

CR_5 — CR_8 , inc.—Silicon, 500 ma. or more, 100 p.i.v.

F_1, F_2 —10 amp. for 500-watt supply; 20 amp. for 1000 watts.

F_3 —1 amp., 1000 volts, for 500-watt supply; 2 amp. for 1000 watts.

F_4 —0.5 amp., 500 volts, for 500-watt supply; 1 amp. for 1000 watts.

K_1 —D.p.d.t. used as normally-open s.p.s.t. with contacts in parallel; 2500-ohm coil, 5-amp. contacts (Potter & Brumfield type GA).

R_1 —25,000-ohm control.

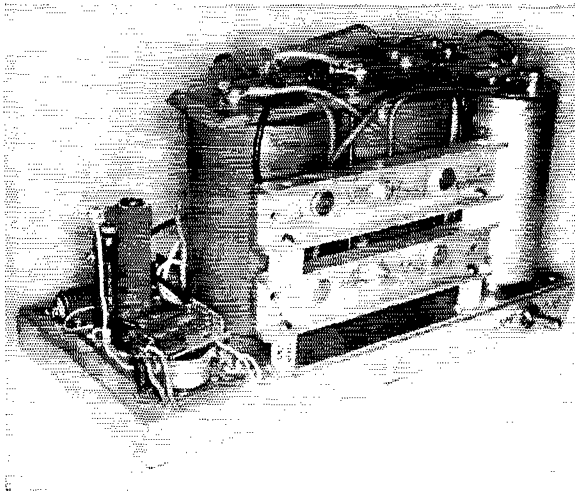
S_1 —D.p.s.t. toggle, 30 amp.

T_1 —See text

peres were tried, but their temperature ran well over 60 degrees C. in transmitting operation.

If a transformer is used with a full-wave rectifier the percentage of ripple is about one half as great as with a voltage quadrupler using the same filter capacitance. When a power transformer is used for isolation, there doesn't seem to be too much difference between the full-wave bridge, the voltage doubler or the quadrupler as far as voltage drop is concerned, provided adequate filter capacitance is employed. A quantity of 180-volt 1250- μ f. Mallory capacitors has been available in surplus. I have used these with success and also new capacitors from Mallory and Sangamo. Four

power supplies with well over 650 volts, without fuses, I had always been reluctant to employ fuses, but it wasn't long before I learned that fuses are a "must." On one occasion while in contact with a station one of the 12 tubes instantaneously vaporized—and the unusual part about it was that the transmitter kept on operating and the ham at the other end wasn't aware of any electrical failure. After blowing out several others in like fashion, it became evident that the fuses not only save tubes, but ammeters as well. Surplus Buss fuses of the 500- and 1000-volt class are available very inexpensively, and these give ample protection for all the equipment.



A voltage-quadrupler power supply working directly from the 115-volt line, using the circuit of Fig. 3. Rectifier diodes are mounted on sections of aluminum channel for heat sinking. Note: See text for precautions that must be taken in using a transformerless supply.

In addition to the plate ammeters, it is also wise to have a plate voltmeter. A 600- or 750-volt version is available with multipliers. The two meters will tell if anything is malfunctioning, especially if the plate current does not reach its peak readings on modulation.

Note that the power-supply circuits shown have the normally-open contacts of a relay connected across a series resistor in the a.c. input circuit. If the line is heavy enough and the primary fuses do not blow out, the quadrupler circuit will take about 200 amp. for an 8-millisecond period. This current rapidly tapers off as the filter-capacitor bank charges. With approximately 5 ohms in series with the line to limit the surge current, the capacitor bank will charge to roughly 90 per cent of its operating voltage before the relay closes and shorts out the series resistor, allowing full power for the amplifier to be developed. The circuit is simple, and could be used in other places when high inrush currents would blink the lights.

Fig. 4 shows a standard a.c. bridge-rectifier circuit using a transformer having a 370- to 400-volt secondary with a center tap. Bias voltage is supplied from a voltage quadrupler connected to the filament winding.

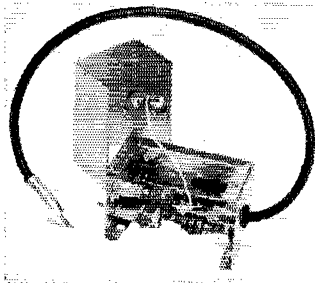
In conclusion, the author has used the 12-tube broad-band amplifier as well as the 8-tube model for mobile, and after going through a large number of tubes has come up with a very startling recommendation: do not overload the tubes! The power output goes up very rapidly as the voltage is increased above 600, but the danger of destroying the tubes likewise increases just as rapidly. So for consistent results, and a high degree of reliability, it is recommended not to use the higher voltages but to use a few more tubes if the increased output is necessary. Distortion checks have indicated that the reduced output is also responsible for much lower third-order distortion, so for the best results be conservative.

QST

• New Apparatus

Mobile Transistor Converters

The accompanying photograph shows a transistorized 40 meter converter made by Scientific Associates Corp., Box 1027, Manchester, Connecticut. This is only one of a series of miniature transistor converters designed for use



with the automobile broadcast receiver. Models are available for the 40, 80, or 160-meter bands. Two versions of the converters are made for each band, one for low impedance antennas and one for high impedance antennas.

The "Miniverter," as they are called, are contained in natural aluminum finished Miniboxes that measure $3\frac{1}{4} \times 2\frac{1}{8} \times 1\frac{1}{8}$ inches. One end of the box has a Motorola female antenna connector attached to it, the other end a Motorola antenna plug at the end of a 15-inch cord. Mounted on top of the converter box is a slide switch that turns the built-in 9-volt power supply on and off.

Connecting and using the Miniverter is a simple matter: plug the receiving antenna into the Miniverter, plug the Miniverter into the car b.c. set's antenna jack, and throw on the power switch. The automobile receiver's input trimmer and the converter's output coil may require some minor touching-up to peak the signals up.

The Miniverter circuit is a crystal-controlled transistor oscillator along with a transistor mixer. Since the converter is crystal controlled, it is necessary to use the b.c. receiver as a tunable i.f., and do all of the tuning at the b.c. receiver. A construction technique used in the converters should be of interest to build-it-yourselfers: the crystal and transistors are anchored to the chassis with epoxy cement, thus saving the need for sockets. — E. L. C.

Annual ARRL Novice Roundup Competition

NOVICES, this is your one and only opportunity to participate as a Novice in your own operating activity, the Thirteenth ARRL Novice Roundup Competition. You're only a Novice once, you know, so don't miss this chance to operate in this contest for Novices. The Novice Roundup begins on Saturday, Feb. 1, 1964, at 1800 local time, and runs through Feb. 16, Sunday, 1800 local time. Operating, listening, and logging time must not exceed 40 hours.

How to Participate

Just get on the air any time during the two-week period and contact as many Novices and non-Novices as possible, exchanging QSO number and ARRL section. Non-Novices work only Novices, of course. "CQ NR" means CQ Novice Roundup and you can either answer such a call or call "CQ NR" yourself to get contacts. Here's an example. KN0BPO in Minnesota hears KNIQFC in the Western Massachusetts section calling CQ NR.

CQ NR CQ NR CQ NR DE KNIQFC
 KNIQFC KNIQFC K
 KNIQFC KNIQFC DE KN0BPO KN0BPO
 KN0BPO AR
 KN0BPO DE KNIQFC R HR NR 3 WMASS
 BK
 KNIQFC DE KN0BPO R HR NR 1 MINN
 BK
 KN0BPO DE KNIQFC R TNX ES 73 SK
 DE KNIQFC

ROUNDUP PERIOD	
Starts	Ends
Feb. 1 6:00 P.M. Local Time	Feb. 16 6:00 P.M. Local Time

On his next contact KN0BPO would send NR 2 (meaning contact number 2) then NR 3, NR 4, etc.

Scoring

A certificate is awarded to the highest Novice scorer in each ARRL section. Complete results will be in *QST* including the scores of those non-Novices that enter as well. To obtain your final score simply add the total of your NR QSOs to the highest w.p.m. from your Code Proficiency certificate. Multiply the sum by the number of *different* ARRL sections (see page 6, this *QST*) worked during the contest. That CP certificate really helps out your score, and you still have time to qualify, so don't miss out. Full details on the Code Proficiency Program are on page 103, this *QST*.

Novices should keep a look out just above and below the Novice frequencies (3700-3750 kc.; 7150-7200 kc.; 21,100-21,250 kc.; 145-147 Mc.) for the higher-power Generals.

Log forms like the one in the sample are yours for the asking simply by writing to: ARRL Communications Dept., 225 Main St., Newington, Conn. 06111. Study the following rules, and then stand by for the fun of your Novice career, the ARRL Novice Roundup Competition! But don't forget to send in a copy of your log to make your entry official; logs must be postmarked by February 28, 1964.

Rules

- 1) *Eligibility:* The contest is open to all radio amateurs in the ARRL sections listed on page 6 of this *QST*.
- 2) *Time:* All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but must not exceed 40 hours total.

(Continued on page 150)

This is a sample log form that must be used by all contestants and also shows how to score. You can obtain these forms free by writing to ARRL.

SUMMARY OF EXCHANGES ARRL NOVICE ROUNDUP							
Call. KN0BPO.				Section... MINN (See page 6 <i>QST</i>)			
BT N OFF D AIR	TIMES OR OF CONTACT	DATE, TIME	MY NR SENT	MY SECTION	HIS NR RCVD	HIS CALL	HIS SECTION
80	1803	FEB. 3	1	MINN	1	KN0AKM	MINN
	1815		2		3	KN9WRX	ILL
	1835	1820	3		2	KN9ZDL	ILL
15	1400	FEB. 6					
	1412		4		15	KN7MNL	NEV
	1425	1418	5	↓	7	KNIQFC	WMASS

Summary: (Enter below on last sheet used)

Bands used... **80, 15** Nr. diff. stns. wkd... **5** Nr. diff. sections... **4**
 Total hours operation... **1:00** Code Proficiency award credit... **10** w.p.m.
 Type transmitter (tube line-up if home-built).....
 Receiver.....; Antenna.....

SCORING:
 **5** QSOs plus... **10** c.p. points times... **4** sections equals... **60**

I have observed all competition rules as well as all regulations established for amateur radio in my country. My report is true and correct to the best of my knowledge.

Signature and call.....
 Address.....

New ARRL Message Precedences

BY GEORGE HART*, WINJM

FOR many years our amateur service has gotten along all right without any special consideration for the messages we handle in the casual pursuit of our art. Now, with the adopting of three standard message precedences, many old-time traffic handlers are asking why, after all these years, have we taken this step? Have we, some of them ask, gone off our collective rockers?

The truth is that amateur radio is entering a new era of public service consciousness, one in which the necessity for emphasizing the service aspects has become paramount. This awareness has already produced a consolidation between our two principle public service vehicles, the Amateur Radio Emergency Corps (originated in 1935) and the ARRL National Traffic System (originated in 1949) to form the Amateur Radio Public Service Corps, about which perhaps we can be more explicit at another time. The important thing to be noted here and now is that the traffic men must learn to handle traffic on an *emergency* basis, and the Emergency Corps must learn to handle it on a *routine* basis — and what's more, they must learn to do it *together*. Early experience has shown that traffic men have a tendency to handle all traffic in stride as it comes, regardless of its apparent importance, and that emergency enthusiasts often do not know the fundamentals of traffic procedure at all. The adoption of a precedence system is just one step of many which need to be taken to make a big family out of these two groups of amateurs who have gone their own ways for such a long time.

Just What Is This "Precedence," Anyway?

A precedence, in message-handling parlance, is an order of handling. We pronounce the word with stress on the *second* syllable (*prise*cedence) so it won't be confused with the plural of the law term, "precedent." Those messages with the highest precedence are handled first, those with the lowest last. Yes, it's that simple. The precedence of a message is assigned by the operator of the originating station; along with his responsibility for putting a worthwhile message on the air, he is also responsible to see that it is assigned the proper precedence.

ARRL Precedences Delineated

The aim was and is to keep it as simple as possible. Thus, only three precedences are set forth: *Emergency*, *Priority* and *Routine*. Although it is difficult to set down specific rules for each, let's have a try at it:

Emergency. Any message having life and death urgency to any person or group of persons, which is transmitted by amateur radio in the absence

of commercial facilities. This includes official messages of welfare agencies during emergencies requesting supplies, materials or instructions vital to relief of stricken populace in emergency areas. It does *not* include "worry," "agony" or "notification" traffic between individuals trying to get information as to the status of friends or relatives, or notifying friends or relatives of their well being. This category will be *very rare* in normal times. When in doubt, *do not* use it. The precedence "Emergency" is *never abbreviated*, even on c.w.

Priority. This precedence may be abbreviated P on c.w. It covers several categories: (1) important (but not life and death) messages having a specific delivery time limit; (2) official messages other than those covered in the "Emergency" category; (3) personal inquiry and notification welfare traffic; (4) press dispatches and other emergency-related traffic requiring prompt handling but not of the utmost urgency; (5) official agency messages reporting conditions but having no urgent bearing on public welfare. This precedence does *not* include birthdays or anniversaries or other similar "dates" unless there is an aspect of urgency about them. The Priority (P) precedence will be fairly common in an emergency situation, relatively rare in normal times.

Routine (Abbreviated R on c.w.). Nearly all traffic in normal times will bear this designation. In an emergency situation, traffic labeled "Routine" should be handled last, and not until circuits are clear of "Emergency" and "Priority" traffic; but note that this does *not* mean it may be neglected.

Precedence Procedures

The precedence is a *mandatory* part of the message form, unlike handling instructions and filing time, which are optional. Every message should have a precedence, even though most of them normally will be "Routines." We should get used to having them in the preamble so that come an emergency they will not "throw" us.

The precedence appears in the preamble of the message between the number and the station of origin. Note that the precedence is *not* part of the message number, but a separate prosign which should be sent separately. Here is an example of a preamble of a message bearing a precedence of "Routine", as it would be transmitted on c.w.: NR 207 R W4MLE CK 12 TALLAHASSEE FLA 2236Z MAY 17.

As a mandatory part of message procedure, a precedence should appear on every message handled. Thus, if a message comes into your station without such a prosign, it should leave your station *with* one (always "routine," in this case).

Whatever precedence appears in a message entering your station should also appear on it

(Continued on page 160)

* National Emergency Coordinator, ARRL.

• Beginner and Novice

Indoor and Outdoor Antennas for Apartment Dwellers

Some Tips on Getting a Signal on the Air

BY LEWIS G. McCOY,* WIICP

MANY amateurs who live in apartments or rooming houses find that they cannot get permission to put up outdoor antenna installations. Many of these same amateurs feel that the only way that they can get a signal on the air is by operating mobile. While mobile operation can be a lot of fun, there usually comes a time when a ham wants a station at home. The purpose of this article is to describe some antenna systems that will permit such an amateur to get on the air.

Most of the antennas described here were tested in the ARRL laboratory, and when we say "in" we mean exactly that. The new Headquarters building is constructed of concrete and steel and the laboratory is at ground level. In fact, one side of the lab is actually *below* ground level. It can be safely assumed that if these antennas worked in such a location they would do even better at a higher level, as in the case of a ham who doesn't live in a basement flat. (Even for basement flat dwellers we may have an "out," so read on.)

With any of the antennas described in this article there is no way of predicting what the antenna impedance will be or what kind of a radiation pattern the system will have. This is strictly a case of put it up and try it. You may be pleasantly surprised.

Random-Length Indoor Antenna

The first antenna tried was a wire about 25 feet long strung up on the lab ceiling. There was nothing magical about the 25-foot length; it just happened to be something we picked out. The wire was strung up along electric-light fixtures under the worst possible conditions. For a ground, we connected the transmitter cabinet to the metal wire-mold for the a.c. line. The wire-mold was grounded back at the a.c. power entry box. For all the tests, the transmitter was run at about 50 watts input.

With this antenna, and for that matter all antennas tested, a transmatch was used. This is important for two reasons. First, the transmatch provides additional selectivity which is needed for harmonic attenuation. Entirely too many Novices receive citations for harmonic violations from the FCC, particularly the second harmonic from 80-meter operation. The transmatch will

* Technical Assistant, QST.

help prevent this. Second, the impedance at the end of an end-fed wire of random length is an unknown quantity, and the transmatch allows you to match to the transmitter tank circuit and permits you to load the amplifier.

With the random-length wire antenna, an L-network transmatch, such as shown in Fig. 1, was used.

As to your actual antenna installation, we suggest running the wire up to the ceiling and then around the room. You can get up more wire — and as a general rule, the more wire the better — by running the wire up to the ceiling, over to a corner, down to the floor and along the wall and then back up to the ceiling and so forth around the room. What is most important, don't be afraid to try different configurations. It is impossible to tell in advance which arrangement is best; just don't be afraid to try different ones. Also, don't try the antenna for just a few hours and then give up on it; conditions may be such that you aren't giving the system a fair chance.

Fig. 2 shows a hookup for using the system with a transmatch. If you have a Monimatch or s.w.r. bridge, it should be inserted in the coax line between the rig and the transmatch. If you don't have such a unit — and you really don't need one to tune up the system — you can use one of the simple output indicators described in a recent article.¹ Make up such an indicator and connect it to the antenna where the antenna leaves the transmatch. The object here is to adjust the transmatch and the transmitter for maximum output as shown on the indicator, staying within the rated input of the transmitter.

If you find you cannot load the amplifier by adjusting it and C_1 of the transmatch, then short out a couple of turns on L_1 and try loading again. You'll hit a condition where you start to get

¹ McCoy, "Neon Bulbs and Dial Lamps," QST, Nov. 1963.

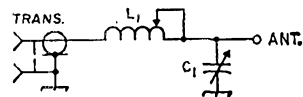


Fig. 1—Circuit diagram of an L-section transmatch.

C_1 —140-pf. variable. This value isn't critical and a capacitor with a higher maximum value can be used if you happen to have one in the junk box.

L_1 — $1\frac{1}{4}$ -inch diam., 16 turns per inch, 4 inches long, No. 18 (B&W Miniductor 3019).

output, as shown by the indicator, and then you just keep adjusting until you get rated power input on the rig.

With such an antenna here in the lab we made contacts on all bands from 80 through 10. We worked several stations on 80 meters, during the daytime, with readable reports from up to 200 miles away. One of the boys came into the lab and said we weren't being fair because the antenna ran along the outside wall. We changed the antenna so that it ran back into the building and, believe it or not, we got a better report from one station 200 miles away! The moral is: try it in different setups. We weren't breaking any S meters on any of the bands but we *did* make contacts. Our best DX was on 15 meters with a 5-7 report from W6EJC.

Half-Wave Dipole

The next antenna tried was a full-size 40-meter half-wave dipole, fed at the center. Based on fitting such an antenna into a 10- \times 12-foot room with an 8-foot ceiling, we managed to string up about 70 feet of wire by utilizing as many corners as possible. Using a transmatch similar to the one described in *The Radio Amateur's Handbook*,² for balanced antennas, we could tune the system up on the 80- through 10-meter bands. Surprisingly, the 80-meter reports weren't as good as with the random-wire job. However, the antennas were tested on different days, so conditions could have been considerably different. The important thing, again, is that this antenna worked, and we made several contacts on the different bands.

This system had no feed line as the center of the dipole was tapped directly on the transmatch coil. No difficulty was encountered in getting the transmatch adjusted on the various bands.

An Indoor Beam

Another antenna that we tried was a 3-element 15-meter beam consisting of a director, reflector and driven element. We used the standard *Handbook* figures, making the director 5 per cent shorter than the driven element and the reflector 5 per cent longer. The spacing between the elements was 5 feet (based on a 10-foot-wide room). In order to get the full element lengths, the ends of the elements were dropped down on each side as shown in Fig. 3. The driven element was fed with 300-ohm Twin Lead and coupled to the transmitter through the balanced transmatch mentioned before.

The wires for the elements were held to the ceiling with Scotch tape. Naturally, to change the direction of such an antenna would take

² *The Radio Amateur's Handbook*, 1963, Fig. 13-22.

several minutes' work to reorient the wires. We don't suggest you try to make front-to-back measurements unless you can rotate the apartment building (!).

Several contacts were made with the beam, and while it is impossible to make any startling claims for the system, it did produce favorable results.

Some Ideas for Outdoor Antennas

If you have access to a window, and many hams do, it is possible to get better results than with indoor systems, even though antennas are forbidden on the apartment roof.

One simple antenna is our random-length wire. It is made by dropping a wire out the window and letting it hang down. How long it will be depends on how high your room is above ground. In any event, you can make the wire long enough to reach the ground, or almost so. There is no electrical law that states that a vertical antenna must be fed at the bottom. You can couple the antenna to the rig with an L coupler the same as shown in Fig. 1.

If you are concerned that somebody will see the antenna, then use a very fine wire, such as No. 28 or even thinner. To all intents and purposes the wire will be practically invisible. We would suggest putting a small lead sinker on the bottom of the antenna to keep it taut. It might be a good idea to force the sinker inside a small sponge-rubber ball so you don't break any windows at the lower levels.

The idea of using invisible antennas is not a new one, and many hams who are forbidden to put up antennas use such systems. One trick is to suspend an antenna between two buildings, using a wire of about No. 30 size. The end insulators can be rubber bands. It is impossible to see the antenna from even a few feet away. The one real trouble with such a system is that the birds cannot see it and if it happens to get in their way they'll break the wire. Such a wire can be ended, using the L coupler shown in Fig. 1.

Many apartment dwellers have clothesline mounted on pulleys. One New York City YL we know connects a wire to the line and runs out the antenna when she wants to operate. When she is finished she reels the antenna back in. A local ham has a similar clothesline made from steel wire, and all he does is connect a wire to the pulley mount and use the L coupler to couple to the rig.

For those hams who live in basement flats — and there must be some around the country — the random-length wire antenna would provide an answer. Run the wire outside, making sure that it doesn't accidentally get grounded on the

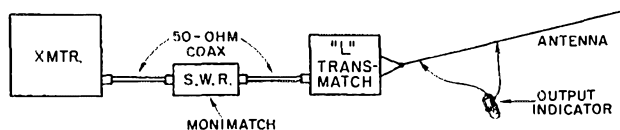
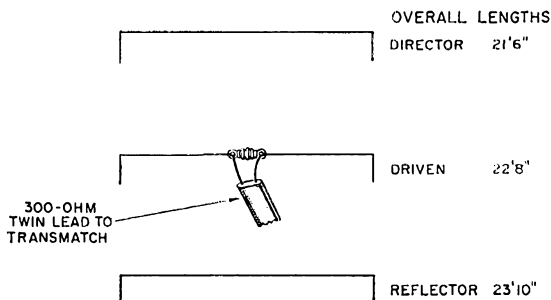


Fig. 2—This drawing shows a typical setup using the transmatch with a random-length antenna.

Fig. 3—Drawing of the 15-meter beam. Spacing between elements will depend on the room size. The driven element can be approximately centered between the director and reflector. Driven-element length is determined from the formula: l (feet) = $\frac{468}{f}$; f = the frequency in megacycles. The director is 5 per cent shorter and the reflector 5 per cent longer.



way out. You can then use the invisible idea, getting the wire up over the roof or as high as possible.

Using a rain gutter (metal) for an antenna is another trick that hams use. Connect a wire to the rain gutter and the other end to the L coupler. Don't worry if the rain gutter is grounded. If you can get your amplifier to load by adjusting it and the L network, the power will go out and get radiated. We cannot guarantee any results, but we know of many hams who

have used such systems. One local boy with a rain-gutter antenna on 40 meters has worked all states, so we know it works.

In addition to rain gutters, hams have used tin roofs, barbed-wire fences, bed springs—in fact, almost anything made of metal.

The important point is that you shouldn't be afraid to try some of these systems. You may be pleasantly surprised. And if you have a novel indoor antenna, send the idea along and make our "Hints & Kinks" editor happy! QST

Strays MRO W

The late W0WAP had resigned himself to having his ship's radio equipment inspected every time they were in the Port of New York, but was pleasantly surprised one day when it wasn't. Seems he had just been named a member of the A-1 Operator Club, and his brand new certificate hung on the wall of the shack. When the radio inspector saw the award, he wouldn't even check the gear, saying "you probably know more about that equipment than I do." Now that's wallpaper that *means something!*

K7OLZ is twelve years old and holds an Extra Class license! Can anyone beat that? — K7OLZ

Oooh, that population explosion! Ten hams call 221 Linden Boulevard, Brooklyn, New York, home—Among them are WB2CVK, WB2EJL, WB2EUY, WB2FOG, WN2GSL, WB2HHX, WN2HNM, WB2JSN, WB2LNK, and WA2VOW. There are *nineteen* antennas on that roof!

LA8IG would like to hear from other sightless amateurs. His address is Knut Jens Kaasa, LA8IG, Bostrak, Drangedal, Norway. Knut, 20 years old, would like to exchange tape recordings or letters, as well as 20-meter QSOs. — W1SGU

K2LTW now owns cards from fifty states, confirming six-meter QSOs. The first, from Virginia, was K4EYE; the fiftieth state, Colorado, was checked in by W0EYE; and K2LTW is an eye doctor.

Involved in a recent tongue-twisting round-table QSO were W6LK, W6LKE, and WA6LKE.

KL7TI has worked Australia using only 100 milliwatts' power input. Is this a transistor record?

A suggestion for hams who used to belong to college radio clubs: many clubs have no records of the past and would like to hear about former calls, major achievements, etc. The University of Pittsburgh (K3RIA), and the University of Maryland (W3EAX) are among those asking for information.

Stolen equipment: The following gear was stolen from the Radio Club of the State University of Iowa last October 25. Contact SUI Campus Police or K0UJJ, S-308 Hillcrest, Iowa City 52241.

Collins 32V-1, serial no. 862; Collins 75A-1, serial no. 624; Collins speaker model 2700-1, serial no. 1626; an Electro-Voice model 630 microphone; and an Astatic T-3 microphone on a model G grip-talk stand.

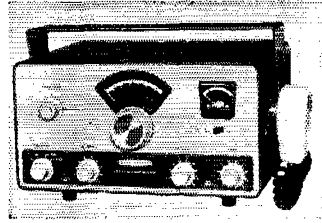
QST author Benjamin H. Vester, W3TLN, accepts the June 1963 QST Cover Plaque voted him by the ARRL Directors for his article "A Solid-State S.S.B. Transceiver." Director Gil Crossley, W3YA (left), and ARRL President Hoover, W6ZH, presented the award at the Atlantic Division Convention in Washington on September 1.



• Recent Equipment —

Heathkit One-Band

S.S.B. Transceivers



IT is difficult to decide whether the Heath HW-12 line is primarily mobile or fixed station equipment. It is light in weight, power supplies are available for either 117 volt a.c. or 12 volt d.c. (negative ground only) operation, and the appearance of the unit will suit either the shack table or the family car. If car operation is desired, a gimbal bracket is furnished for under-dash or transmission-hump mounting.

Circuit features of the transceivers include push-to-talk or VOX (voice operated break-in), a.l.c. (automatic level control), and provisions for a 100-ke. crystal calibrator in the receiver. The physical make-up of the transceivers is interesting too. In fact, the HW-series of transceivers can truly be called "wireless" sets since most of the components in the unit are mounted on a printed circuit board, and this includes i.f. transformers, final amplifiers and tank circuit.

The assembly is simply a one-piece steel chassis frame with a few components mounted on it—controls, transformer, tuning capacitor, loading control, and relay—and the printed circuit board with the remaining components. The printed circuit board is, of course, pre-punched and ready to assemble. Component silhouettes with values are printed on the board so that, along with the step-by-step instructions in the

manual, the method is practically fool-proof. The printed circuit makes for fast assembly, too, especially when compared to wiring the same circuit using wire and tie-points. Some wiring is, of course, necessary. Heath furnishes a wiring harness which connects up the various sections of the board and the components mounted on the steel frame. One other advantage of the printed circuit is that all of the heat-generating components—tubes, resistors,—are mounted on top of the phenolic board, which makes for good ventilation.

We wired the 75-meter model (HW-12) within the Heath-predicted time of 15 hours. No unusual difficulties were encountered and, when the project was completed, it seemed as though it was one of the most pleasant kit-wiring experiences we had ever had. The printed circuit undoubtedly was responsible for this impression. Alignment, too, was a breeze and will be covered later in this write-up.

The Circuit

The 75-meter transceiver, the HW-12, is the model described here. Except for a few minor circuit differences (an additional mixer), the 40- and 20-meter models are about the same. The outward appearance and operating controls are

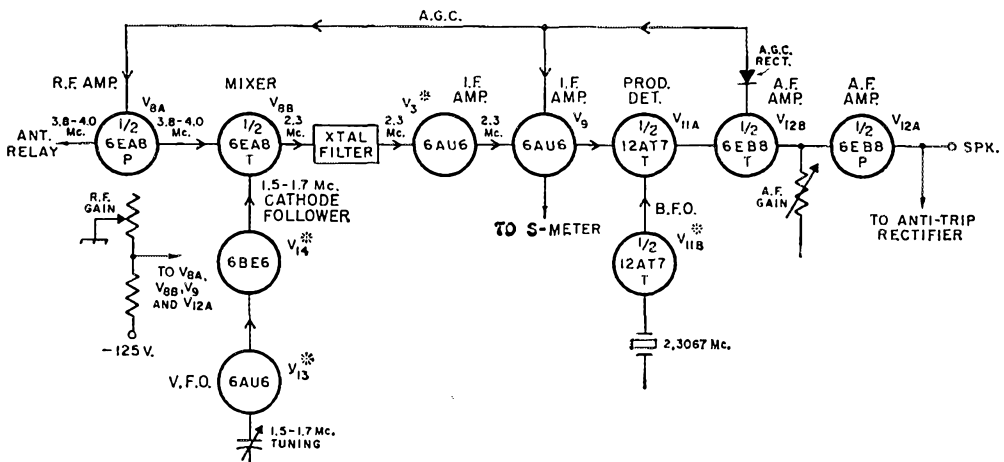


Fig. 1—Block diagram of the receiver section of the HW-12. A star alongside a tube indicates that the tube operates in both transmitting and receiving.

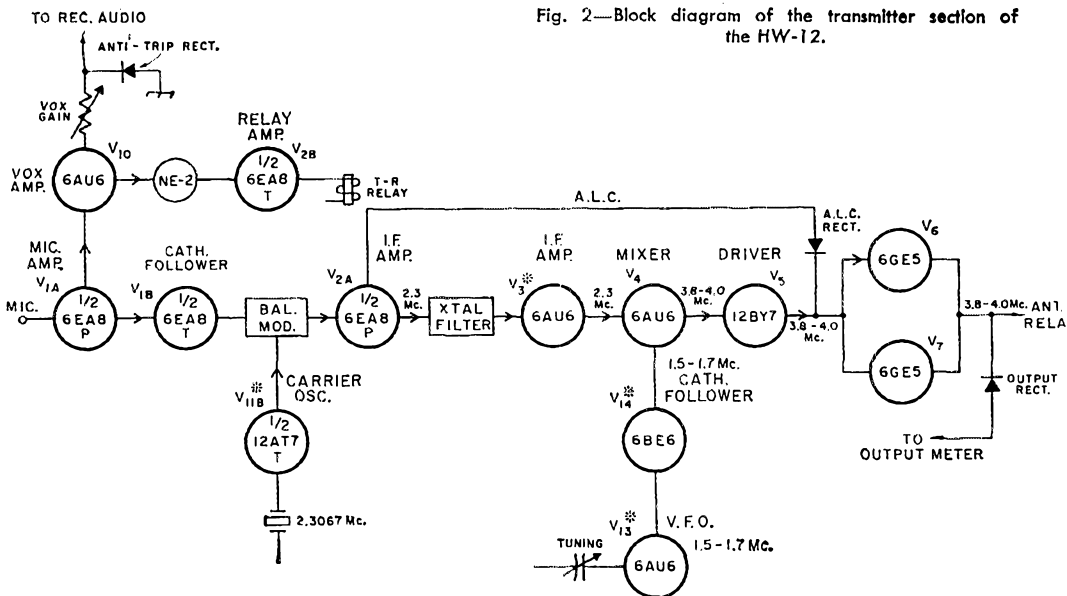


Fig. 2—Block diagram of the transmitter section of the HW-12.

identical for all models. The 80- and 40-meter models operate on lower sideband only, the 20-meter model on upper sideband only. The 40-meter (HW-22) unit covers 7.2 to 7.3 Mc., and the 20-meter (HW-32) unit covers 14.2 to 14.35 Mc.

Receiver Section

A block diagram of the receiver used in the HW-12 is shown in Fig. 1. It covers the frequency range of 3.8 to 4.0 Mc. Several of the tubes used in the receiver also work during transmission and are so identified in Fig. 1 by a star alongside the tube.

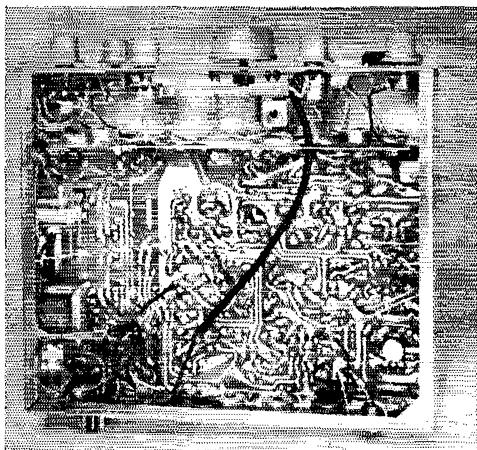
Signals arriving from the antenna system (must be 50 ohms, unbalanced) are switched through relay contacts to the receiver's r.f. amplifier V_{8A} , a 6EA8. This tube is a.g.c. controlled at all times and is completely cut off during transmitting by a bias that is applied through relay contacts. Output from the r.f. amplifier is fed to the triode mixer, V_{8B} , along with energy from the v.f.o. which operates in the 1.5 to 1.7 Mc. range. A 6BE6 is inserted between the v.f.o. and the mixer for isolation and it is this tube that operates as a mixer/oscillator in the 40- and 20-meter models of the transceiver.

A Colpitts oscillator is used for the v.f.o. and, because of its low frequency of operation, along with temperature compensation, is more than adequately stable. Frequency drift is rated at less than 200 cycles per hour after warmup. The oscillator is capacitor tuned through a 7 to 1 planetary dial drive. The dial, which sits behind an arc-shaped dial window, is calibrated in 2 kc. increments from 3.8 to 4.0 Mc and offers about 6 inches of bandspread. The tuning rate is approximately 55 kc. per knob rotation.

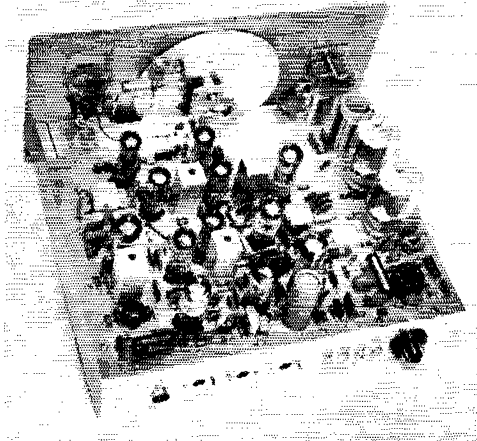
Output from the mixer, which is at 2.3 Mc., feeds into a crystal lattice filter and then into two

stages of i.f. amplification. Selectivity for the receiver is rated at 2.7 kc. at 6 db., 6 kc. at 50 db. The second i.f. amplifier, V_9 , has its gain controlled by a.g.c. and, along with the r.f. amplifier, mixer and the final a.f. amplifier, is cut off during transmission by a negative bias supplied through the T-R relay contacts. The S-meter is also part of the i.f. amplifier (V_9) circuit.

S.s.b. signals are detected in V_{11A} . Injection is furnished by the crystal-controlled b.f.o., V_{11B} . A.g.c. voltage is derived from audio voltage obtained at the plate of the audio amplifier, V_{12B} . A semiconductor voltage doubler produces the a.g.c. negative bias which is applied to the r.f. amplifier and second i.f. amplifier. Time constants in the a.g.c. circuit are designed for fast response and slow release time.



Bottom view of the HW-12 75-meter s.s.b. transceiver. It should be obvious in this shot that most of the package is printed circuit.



The use of a printed circuit board contributes to the neat appearance of the HW-12. Rear-apron connectors and controls are, from left to right, microphone, microphone gain, tune-level control, final-amplifier bias (all three screwdriver adjusted), speaker, external relay, antenna, and receiver (phono connectors), and octal plug power connector. The carrier-null control knob is adjacent to the transformer can at the lower left of the chassis in this view. The empty socket at the lower right is for the accessory 100-kc. calibrator.

The final audio amplifier, the pentode section of a 6E5S, develops up to 1 watt of audio output to drive an 8-ohm speaker (speaker is not furnished). The power audio stage has built-in shaped frequency response (400 to 3000 cycles) so that the receiver output is peaked to the voice frequencies. This gives the HW-12 receiver a crisp, "communications-quality" sound.

Some of the audio output from V_{12A} is sampled and fed to the anti-trip rectifier, so that signals coming from the speaker will not activate the VOX system.

Transmitter Section

Fig. 2 shows the block diagram of the transmitter portion of the HW-12 s.s.b. transceiver. Output from any high-impedance microphone (no microphone is furnished with the kit) is amplified in V_{1A} and then applied to the audio-frequency cathode follower, V_{1B} . This stage, V_{1B} , has low-impedance output to match the input impedance of the semiconductor ring-diode balanced modulator. Energy from the crystal-controlled carrier oscillator, V_{11B} , (which is the b.f.o. when receiving) is also fed to the modulator. Output from the balanced modulator is double sideband, no carrier. Rated carrier suppression is 45 db. A panel FUNCTION switch, when in the TUNE position, applies a d.c. voltage to the modulator and unbalances it to produce some 2.3-Mc. carrier, which is used to give a sample signal for transmitter tune-up.

Balanced-modulator output is amplified in V_{2A} and fed into the crystal filter. The filter attenuates the upper-sideband frequencies, leaving the lower-sideband signal for further ampli-

fication in V_3 . Sideband suppression is rated at 45 db.

Output from amplifier, V_3 , is at 2.3 Mc. and is fed, along with output from the v.f.o./cathode follower, to the transmitter mixer, V_4 . The resulting output is in the 75-meter amateur band, 3.8 to 4.0 Mc. The 12BY7 driver uses broad-band input and output circuits so that there is no necessity for tuning this stage when shifting frequency.

Two Novar television horizontal amplifier tubes, 6GE5s, are operated as linear r.f. amplifiers in the HW-12 for a rated input of 200 watts, p.e.p. If these tubes are driven into grid current, a d.c. signal is developed, fed through the a.l.c. rectifier and applied back to an earlier stage, the i.f. amplifier, V_{2A} , to cut back automatically on the drive. This a.l.c. action provides protection against overdriving the final r.f. amplifiers. Bifilar wound chokes are used in the heater leads of the amplifier tubes to isolate them from the rest of the circuit.

The final-amplifier output circuit is a pi-section arrangement with a fixed-value loading capacitor. The final is tuned by a variable capacitor in the pi circuit. Output impedance of the transmitter is fixed at 50 ohms.

The VOX system used in the HW-12 is similar to that used by Bigler in his popular "Side-Band Package."¹ Some of the output from the microphone amplifier, V_{1A} , feeds the VOX amplifier, V_{10} , which is running at maximum plate current and low plate voltage in the normal condition. The negative portion of the audio signal from V_{1A} biases back the VOX amplifier, reducing its plate current and increasing the plate voltage to a point where the NE-2 in the plate circuit fires. The positive pulses from the neon bulb are amplified in V_{2B} and close the T-R relay which is in the plate circuit of V_{2B} .

All of the switching between transmit and receive is done by the built-in ceramic-insulated T-R relay, and it can be controlled by the VOX circuit or triggered directly with the push-to-talk switch on the mike. As mentioned previously in the receiver section, several tubes in the receiver are biased to cutoff through relay switching during transmission. The final r.f. amplifiers, driver, mixer, first i.f. amplifier and the cathode follower, V_{1B} , are biased off during reception. The R.F. GAIN control is used to adjust a negative bias, which is applied to the same bias line that cuts off the receiver r.f. amplifier, mixer, i.f. amplifier, and a.f. amplifier during transmission. A spare section of the relay can be used to switch external equipment such as a linear amplifier or antenna relay. The spare contacts terminate at a rear-apron phono connector.

Alignment and Testing

Perhaps one of the main reasons (though unjustly so) why do-it-yourself or kit s.s.b. projects are shied away from by some amateurs is fear of a complicated alignment job when the equipment is ready for testing and use. Nothing could be

¹"A Side-Band Package," Bigler, June 1958, *QST*, p. 24.

further from the truth, especially with the HW-12. Heath has outlined several calibration and alignment procedures, the simplest involving nothing more than an ordinary broadcast receiver and a VOM. Even the panel meter is used in the process, for setting the final-amplifier operating bias.

Most of the fixed-tuned circuits are factory set and those that aren't need no more than a quarter-turn this way or that to bring them into alignment. The most time-consuming step in the alignment process is the 30-minute wait for the unit to warm up and stabilize so that the balanced modulator carrier null control can be set.

Panel controls on the transceiver include the main tuning (FREQUENCY), FINAL TUNE, FUNCTION (OFF-PTT-VOX-TUNE), R.F. GAIN, A.F. GAIN, and VOX GAIN. Several "set and forget" controls are on the chassis rear apron and the S-METER ADJUST and VOX DELAY control pots are behind

HEATHKIT HW-12 S.S.B. TRANSCIVER

Height: 6¼ inches
Width: 12¼ inches
Depth: 10 inches
Weight: 12 pounds
Power Requirements: Transmit: 800 v.d.c. at 250 ma., 250 v.d.c. at 100 ma., -130 v.d.c. at 5 ma., 12.6 v.a.c. or d.c. at 3.75 amps. Receive: 250 v.d.c. at 65 ma., -130 v.d.c. at 5 ma., 12.6 v.a.c. or d.c. at 0.3 amps.
Price Class: \$120.
Manufacturer: Heath Company, Benton Harbor, Michigan.

small access holes in the front panel (they are screwdriver adjusted).

The HW series of transceivers are finished in two-tone "Heath green." — E. L. C.

COMING ARRL CONVENTIONS

January 18-19 — Florida State, Miami
April 3-5 — Great Lakes Division, Detroit, Michigan
May 9-10 — New England Division, Swampscott, Massachusetts
June 12-14 — West Gulf Division, Brownwood, Texas
August 21-23 — ARRL National, New York City

FLORIDA STATE CONVENTION

Miami, Florida — January 18-19

Florida's first State ARRL Convention will be held in the Miami Bayfront Park Auditorium and the Biscayne Terrace Hotel, January 18 and 19. Convention activities will be combined with the annual Tropical Hambooree and the first Florida/Inter-American Hamfest.

Registration will officially begin Saturday at 9:00 a.m. A Hospitality Room will be open all day Friday at the Biscayne Terrace as a gathering spot for early arrivals.

Technical speakers include Stuart Meyer, W2GHH; Harold Vance, K2FF; and Bob Ruyle, W0FCH. The MARS program, featuring Chiefs of Navy and Air Force MARS plus the 3rd Army Deputy MARS Director, will be backed up by an extensive exhibit. During the Inter-American meeting, heads of South and Central American clubs will get together with the W/K group to discuss mutual problems and interests as a preliminary to the IARU meeting in Mexico City. The Floridors will operate a "Kaffee Klatch" room throughout most of the convention and will serve as official hostesses for a YL Sunday morning meeting. The YL International Sidebanders will have a luncheon as major activity. The Florida Sidebanders will start Sunday morning with a

group breakfast. Florida DX Club's Ed Cushing will present the story of his trip to Robinsou Crusoe Island as CEØZI during the DX forum.

The Hambooree exhibit area will include displays of most of the major manufacturers' products, special exhibits by clubs and similar organizations, and a large swap shop.

The ARRL organizational program will include appointee meetings, general membership meeting and exhibit. The League Headquarters' representative will be Bob White, W1WPO (DXCC awards). The ARRL Executive Committee will hold its January meeting there also.

The convention banquet will be held in the Starlite Room of the Biscayne Terrace on Saturday evening and the festivities will be enhanced by a musical program with Leo Meyerson, W0GFQ, at the organ.

Registration for all activities, except the banquet, will be \$1.00. The banquet, limited to 300 will be \$4.75. Convention rates at the Biscayne Terrace are \$8.00 single, \$10.00 double. Tickets, hotel reservations and further information may be obtained by writing to Dade Radio Club, P.O. Box 73, Biscayne Annex, Miami, Florida 33152.



New Jersey — The Raritan Bay Radio Amateurs will hold their annual dinner at the Community Hall, Outlook Ave., Sayreville, on January 11. A roast beef dinner is featured, along with prizes and an entertaining program. Reservation deadline is Jan. 3. Contact K2KFE, 23 Reid Street, Sayreville, N. J.

New York — The second annual W.N.Y. Winter Indoor Picnic will be presented by the Six-Meter Mobile Association of Buffalo, at the Club Commodore, Genesee Street, Buffalo, on January 18. The buffet begins at 8:00 p.m., followed by dancing, prizes and more. Tickets are \$3.25. For more info, contact Joe Firth, WA2TRT, 123 St. Boniface Road, Cheektowaga 25, N. Y.

V.H.F. Antenna Facts and Fallacies

BY EDWARD P. TILTON,* WHDQ

Part 1 — Antenna Design

ANTENNAS are a prime subject for discussion wherever hams gather, and because precise measurement and evaluation are difficult under average amateur operating conditions, we have built up a choice collection of conflicting ideas about antennas and transmission lines over the years. The writer, in common with many other v.h.f. men, has found work with antennas to be a most interesting, though occasionally baffling, aspect of the hobby. It is also highly rewarding, as improvements in the antenna system pay off in both transmitting and receiving, and gains achieved through antenna work often represent greater system improvement than could be obtained from comparable expenditures for other station equipment.

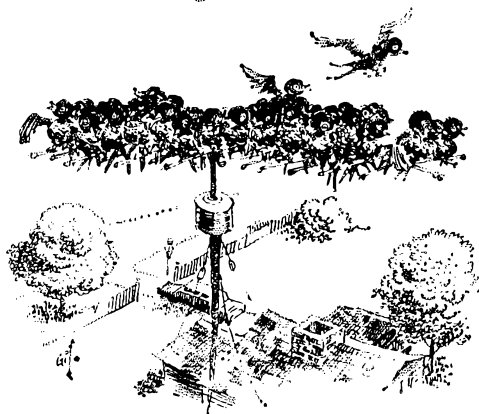
Information to be presented here was compiled to answer questions commonly asked of the writer in correspondence, in radio club meetings, conventions and on-the-air discussions of antenna problems. It is based on practical experience, and results quoted are those that can be achieved under typical amateur conditions. Let's consider the antenna factors first. We'll get to transmission lines and matching systems later on.

How Much Gain?

It's a sad fact, but antenna-gain claims tend to be on the optimistic side. Even if accurate, and quoted with the best intentions, they still may apply to only one frequency, and to a special set of conditions. Furthermore, they may be stated in terms that are confusing to the average amateur reader. Very few of us can measure antenna gain accurately. The writer frankly admits that he cannot, after many years and man-hours of trying, usually with better facilities than are at the disposal of most amateur workers. On-the-air evaluation of antennas is also far from simple or easy. What really counts is whether or not a new

antenna increases your coverage appreciably, giving you a stronger or more consistent signal at distant points than you had before. You may look for other gains, such as reduction in interference from stations off the line of the beam. The point is that some understanding of antenna principles is important if you would make an intelligent choice of antennas to be used at your station, whether you intend to buy them or build them yourself. Many factors will enter into your selection of a suitable array, and most of them will not be discussed in a manufacturer's literature. There is a great deal more to antenna performance than just a maker's or designer's gain claim, expressed to the last fraction of a decibel. More on practical evaluation later.

Gain in Yagi arrays is related to boom length, as well as to number of elements. Putting in more than the required number of elements for a given length of boom merely runs up your bill for aluminum, though it may make the beam a better bird roost. Curves given in the *ARRL Antenna*



Book make these factors stand out clearly. They show, for example, that a 5-element Yagi needs a

* V.H.F. Editor, QST.

There is probably no field in which more seemingly conflicting information has been published than in connection with amateur antennas and feed systems, particularly those for v.h.f. and u.h.f. use. Here is a distillation of many years of experience in working with beams on amateur bands from 28 through 1300 Mc. that may help to clear up some points that may have puzzled you. Though primarily concerned with v.h.f. arrays, it will be of interest to antenna experimenters on lower bands as well.

boom about $\frac{3}{4}$ -wavelength long, and that it should give a gain of $9\frac{1}{2}$ db. at its design frequency. A 10-element Yagi should be 2.5 wavelengths long, and it is good for 13 db. For 15 elements you need a 4.5-wavelength boom, and you can get up to 16 db. out of it, if you're lucky. These gains are for the center frequency, and are the best that can be expected. Anyone who exceeds them is very likely making a measuring error or trifling with fact.

Gain is achieved only by modifying the radiation pattern of an antenna, taking power from some directions and putting it into others. A convenient way to express gain, therefore, is with reference to an antenna that would radiate equally in all directions. Such an antenna would be a point source, and it exists in theory only. The *isotropic antenna* has a special appeal for the fellow who wants to make his antenna look good on paper, since it would be 2.14 db. poorer than a half-wave dipole. "Gain over isotropic" is a handy and legitimate way to express antenna performance, so long as the reader understands that it is being done this way. Chances are that you'll find it being done more often, as time goes on, but remember that gain figures so quoted are 2 db. higher than gain over a dipole, a term more familiar to amateur readers.

Single or Stacked Yagis

Whether you should stack two small Yagis or put up a single long one depends on what you want to do best with your antenna. If lower radiation angle is important, and it is for most of us, stacking will do it. Despite what one often hears to the contrary, adding elements to a single Yagi will not affect the radiation angle materially. Added elements sharpen the pattern, but the angle above the horizon does not change appreciably, so long as height above ground is not changed. Stacking two or more Yagis in a vertical plane will lower the radiation angle, and this is often beneficial. It probably will extend your coverage noticeably, yet it does not sharpen the horizontal lobe. Aiming problems are not increased, and the system's frequency response is not changed appreciably.

Doubling the number of elements, or doubling the boom length and adding the appropriate number of directors in a single Yagi may give about the same gain as stacking two small ones — about 3 db. — but it makes aiming more critical because of the sharper main lobe. It will also sharpen the frequency response quite markedly. The long Yagi is fine if you want lots of gain over a narrow segment of the band. The sharper pattern may be helpful in cutting down interference, if you live in an area of high activity. But if you want to work effectively over most of the band, with a minimum of beam rotating, a high-gain long Yagi is not for you.

Yagi or Collinear?

This is an "evergreen," for which there is no one pat answer. Like so many other antenna decisions, this one depends on your objectives in the

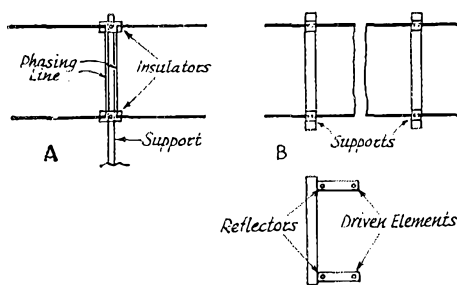


Fig. 1—Wrong and right ways to make a collinear array. At A is a method occasionally used, where elements, phasing lines and supports are joined mechanically at insulating blocks. This produces capacitive loading at the hot element ends, detuning the system and impairing its effectiveness. A much better approach is shown at B. Here the elements are mounted at their low-voltage points, and the structure for supporting the array is entirely in back of the driven and reflector elements. Supporting frame may be either wood or metal, and no insulation is required.

game. The collinear array is big and rather hard to handle mechanically, but it works well over a wide frequency range and is very easy to match and feed. If you value wide frequency response, you'll find a collinear superior to a Yagi, even though the latter has a higher gain rating. If narrow frequency coverage and critical adjustment don't worry you, the long Yagi is a very good bet.

A few words about construction of collinears may be appropriate here. Arrays of phased elements have gotten an unsavory reputation in some quarters because they were improperly designed. Impedance at the ends of half-wave elements is very high. These element ends should not be mounted on insulators. The best way to make a collinear v.h.f. array, whether you use wood or metal supporting structure, is to mount the elements at their low-voltage points. With half-wave elements this is at the center, not the ends. Fig. 1 shows the right and wrong of it.

Some years ago the writer and W1VLH ran some interesting experiments with collinear arrays on 144 Mc. One of them was a manufactured 16-element array being sold widely at that time. Its inner element ends, phasing lines and metal supports were all joined mechanically in a molded vinyl insulator, as in Fig. 1A. This made a nice-looking array having good mechanical balance and low wind resistance, but checks on its performance showed that capacitive loading caused by the insulators was throwing the thing almost completely out of whack. It was highly reactive across the whole 2-meter band, and could not be matched by any simple adjustable matching device. Putting two of these 16s together to make a 32-element array made the problem even worse. The pattern with either 16 or 32 elements was full of minor lobes, and the gains were several decibels lower than arrays of these configurations should have given.

We then built 16- and 32-element arrays of the same physical dimensions, but with the elements mounted at their centers, as in Fig. 1-B. All-

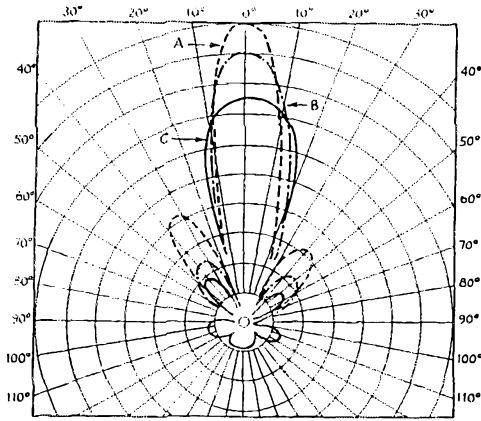


Fig. 2—Approximate horizontal patterns of a 32-element 2-meter collinear, showing the effect of increasing spacing between the inner element ends. Pattern C is with the element ends two inches apart, the procedure normally used in such arrays. Pattern B resulted when the spacing was increased to $\frac{1}{4}$ wavelength. Pattern A was taken with $\frac{3}{8}$ -wavelength spacing between inner element ends. Note that the main lobe is longer and sharper with the wider spacings. Minor lobe content also increases, and this is a limiting factor in bay spacing in all types of arrays. No attempt is made here to show fine detail in the smaller side and rear lobes.

metal construction was used, with all elements in front of the metal supporting structure, and no insulation anywhere except in the phasing lines (All-wood design would serve equally well.) These arrays could be matched perfectly with a simple adjustable "Q" section, indicating that they were resonant in the band, where they should be. Their patterns were far cleaner than the insulated models and the gains were much better. The insulator-mounted arrays worked after a fashion, simply because they were big, but the difference between them and the properly-made collinears was like the proverbial night and day.

Stacking Problems

To stack horizontally or vertically is a question that comes up most often in connection with collinears, but the principles apply to Yagis as well. Gain is more or less the same with arrays side by side or one above the other, but the difference in the patterns is important. Stacking vertically narrows the vertical pattern but not the hori-

zontal. This is usually what we want, since it gives gain without increasing aiming problems. Horizontal stacking narrows the horizontal pattern, and this may be troublesome, especially with collinear arrays, which have fairly sharp forward lobes already.

With horizontal stacking, spacing between element ends affects gain and pattern sharpness. The change in pattern is shown in Fig. 2. This was made with the 32-element array for 144 Mc. mentioned above, and shown in the *ARRL Antenna Book*, Fig. 10-35. It will be seen that gain is considerably improved at the wider spacings, and the main lobe is sharper. Widening of the spacing between the inner ends of a side-by-side 32-element array for 144 Mc. makes it something of a horse to handle, but the extra gain may be worthwhile at 220 or 432 Mc. Remember, though, that this gain comes from narrowing the main lobe. You need a stable support and something better than the average TV rotator to handle the baseball-bat pattern that comes with the wider spacings.

A 48-element collinear array for 432 Mc. is presently in use at W1HDQ. It is basically four 12-element collinears, with half-wave spacing between the inner element ends. Its design and structural features may be described in a future article.

In stacking horizontal Yagis one above the other on a single support, certain considerations apply whether the bays are for different bands or for the same band. As a rule of thumb, the minimum desirable spacing is one-half the boom length for two bays on the same band, or half the boom length of the higher-frequency array where two bands are involved.

In the stacked two-band array of Fig. 3, the 50-Mc. 4-element Yagi is going to "look like ground" to the 7-element 144-Mc. Yagi above it, if it has any effect at all. It is well known that the impedance of an antenna varies with height above ground, passing through the free-space value at a quarter wavelength and multiples thereof. At one-quarter wavelength and at the *odd* multiples thereof, ground also acts like a reflector, causing considerable radiation straight up. This effect is least at the half-wave points, where the impedance also passes through the free-space value. Preferably, then, the spacing S should be a *half* wavelength, or multiple thereof, at the frequency of the smaller antenna. The

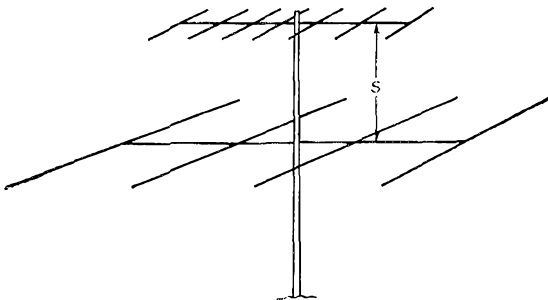


Fig. 3—In stacking Yagi arrays one above the other the minimum spacing between bays, S , should be about half the boom length of the smaller array. Wider spacing is desirable, in which case it should be a half wavelength, or some multiple thereof, at the frequency of the smaller array. If the beams shown are for 50 and 144 Mc., S should be 40 inches minimum, with 80 inches preferred. Similar conditions apply for stacking bays for a single band.

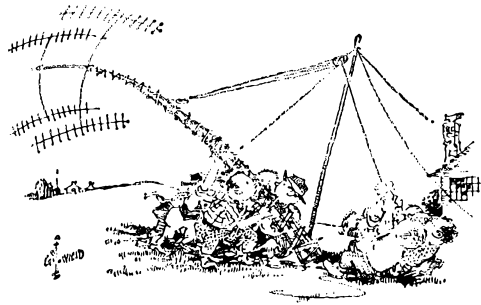
half-the-boom-length rule of thumb gives about the same answer in this example. For this length of 2-meter antenna, 40 inches would be the minimum desirable spacing, but 80 inches would be better.

The effect of spacing on the larger array is usually negligible. If spacing closer than half the boom length or a half wavelength must be used, the principal thing to watch for is variation in feed impedance of the smaller antenna. If the smaller antenna has an adjustable matching device, closer spacings can be used in a pinch, if the matching is adjusted for minimum s.w.r. Very close spacing and interlacing of elements should be avoided, unless the builder is prepared to go through an extensive program of adjustments of both element lengths and matching.

In stacking bays for the same band fed in phase, the minimum spacing for appreciable gain is a half wavelength for Yagis of up to four elements or so. For such small Yagis, and for dipoles and omnidirectional systems such as the Big Wheel¹ and the turnstile,² a spacing of $\frac{5}{8}$ wavelength will give appreciably more gain. This is convenient in that an electrical full wavelength of coax may be used for phasing. We'll get into phasing and feed problems later.

As bay spacing is increased the main lobe becomes sharper, as already indicated, but minor lobe content also increases. This becomes self-defeating if carried too far. Small Yagis spaced a half wavelength show a beautifully clean pattern, but only moderate gain from stacking. For Yagis up to two wavelengths long, a bay spacing of one wavelength is good, though minor lobes are quite pronounced when individual bays have 6 elements or less.

For arrays of more than two wavelengths, keep that half-the-boom-length minimum in mind, but space them wider if you can. It can be seen from this that stacking of long Yagis makes for large



and ungainly structures, but gain never comes easily once you get into the upper brackets.

Element Length and Spacing in Yagi Arrays

You don't have to delve very deeply into antenna literature before you observe that there is great diversity in the design of Yagi arrays.

¹ Mellen and Milner, "The Big Wheel on Two," *QST*, September, 1961.

² Campbell, "Turnstile for Two," *QST*, April, 1959.

Years ago, "close-spaced" arrays were all the thing. Today "wide spacing" is in. To complicate the picture, some designs use graduated spacing. Element length information seems equally confusing and contradictory.

The air is cleared somewhat when we realize that there are many ways to make an effective parasitic array, since it is all but impossible to design even a short Yagi mathematically, let alone a long one, anyone can become an expert if he has an open back yard, a stock of aluminum, and plenty of perseverance. This sort of thing



has been going on for at least 25 years, and the end is not yet in sight. However, some guidelines are fairly well established.

The fellow who doesn't have the facilities and fortitude to undertake an involved experimental program can relax and take the *Handbook* and *Antenna Book* information for granted. It works. In small Yagis, element spacings of 0.15 to 0.25 wavelength make no great difference in gain, though some change in element lengths is needed to give optimum results over this range of element spacing.

If you make your driven element from the $5540/\text{freq. (Mc.)}$ formula, for the length in inches, add 5 per cent for the reflector and subtract 5 per cent for the director, and use 0.2 wavelength spacing, you'll be very close to optimum for a 3-element beam. Closer spacings require a shorter reflector and a longer director, and wider spacings just the opposite, but dimensions are by no means so critical as some would have you believe. Substitute 4 per cent for the previously-stated 5 for a Yagi with 0.15-wavelength spaced parasitic elements.

Adding directors, you can make them all the same length for optimum gain at one frequency, or taper them slightly for increased bandwidth, with hardly-measurable gain reduction. Directors progressively shorter by about 0.5 per cent is the usual practice. Optimum spacing for Yagis of up to 4 or 5 elements is about 0.2 wavelength.

With four or more elements, graduated spacing begins to pay off. Recommended spacings (in wavelengths) are given in the *Antenna Book*, Table 4-11. If you don't have the book handy, this information shows that director spacings for medium or long Yagis should increase gradually with each additional director. The first should be about 0.15 wavelength from the driven element.

The spacing between directors 1 and 2 should be 0.18λ , between 2 and 3 0.25λ , and so on until 0.35λ to 0.42λ is reached at the sixth. From then on, all are the same wide spacing. Reflector spacing can be anything from 0.15 to 0.25 wavelength. In fact, director spacings are not too critical, either. There is no need to measure to the last sixteenth of an inch in laying out a Yagi array, even on 420 Mc.

Spacings other than those quoted above are given, even in our own publications. W2NLY and W6QKI worked out a highly successful long Yagi, and described it in a now-classic *QST* article.³ They used 0.1 wavelength for the first two directors, slightly more for the third, 0.2 for the fourth, and 0.4 for all thereafter. There probably is no better Yagi than this, but the graduated spacing above is equally effective, if all matching and measuring factors are taken into account.

There are many other ways to do the job. One well-known beam manufacturer uses a system that looks strange to the casual observer. Element spacings vary at a seemingly random rate throughout the length of his long Yagis — and so do his element lengths. The writer has checked these beams carefully, and has also run through many variations of the first two systems, finding little on which to base a choice between them.

Changes in appearance, in antennas as well as the yearly output of certain Detroit stylists, are not always of earthshaking importance. There is probably enough leeway in design factors to provide entirely satisfactory new models in the antenna field for some time to come.

Evaluation

When the writer put up his first 16-element beam,⁴ he encountered a condition that has confused antenna experimenters since time immemorial. The first two on-the-air checks were made with nearby stations, both shielded by intervening hills but near enough so that strong signals always prevailed over the paths, regardless of antennas used. The 16 was tested against a comparison dipole mounted nearby. To our dismay there was hardly any difference in signal strength. When the 16 was rotated we got the impression that it was a total loss, as the pattern seemed to be full of minor lobes. If we had not been worn out from the day's efforts, we'd probably have torn the whole thing down right then.

Fortunately, we decided to let it stand for a while, and that evening we had another go at it. We'd been enjoying a mild early-spring day, and as evening wore on a nice inversion developed. To our delight, we began to hear signals from Fall River, Providence and the Boston area, 75 to 100 miles away. This was real DX on 144 in 1946, and lo and behold, most of the stations were inaudible on the comparison dipole. Further more, our 16-element array had to be right-on

for direction to bring them in readably. There were no troublesome minor lobes in evidence on these distant signals.

Reflections from local hills, trees and buildings were the cause of our unsatisfactory earlier results with the locals. Their signals were bouncing all over the place, and since the direct paths were obscured, the reflected signals were about as strong as the direct ones. Our dipole picked up a composite of the reflections; the beam picked them out one at a time. Reflections were not a factor in the distant reception, so the true pattern of the antenna showed up on them.

Reflections can fool you in other ways, too. Experience with the 48-element, 432-Mc. collinear mentioned earlier is a case in point. One of our first checks on it in actual use was made by comparing it with a 16-element collinear we'd had in use for several months. By this time we knew fairly well what the 16 would do. The two feed lines were hooked up to a coaxial switch to permit instant comparisons on reception. The first signal heard was W1QWJ, in Springfield, some 25 miles away. He was beamed away from W1HDQ, and was barely audible on the 16. Switching over to the new 48 gave us the shock of a lifetime — Dick's signal jumped up by about 20 db.!

Any long-time antenna experimenter will recall experiences like these, when first checks indicated either huge success or complete failure of a new beam. These two true-life extremes are fairly typical, and they point out a moral: *never* judge an antenna on the basis of one or two checks. We called W1QWJ and had him rotate his beam while both of ours remained lined up on him. Just turning *his* antenna caused the apparent gain of our 48 over the 16 to vary between 20 db. and zero. The average was about 6, which is in line with our expectations, taking into account the greater size and better feed line of the new array.

Tests conducted under varying propagation conditions are highly unreliable, and many a 10-, 15- or 20-meter array has achieved distinction because it delivered a tremendous apparent gain under certain ionospheric conditions. Very short 50-Mc. skip may involve a high radiation angle, and under such conditions a simple dipole may look very good, while a fine stacked-Yagi array is delivering relatively low signal strengths. Tropospheric bending can confuse the issue in much the same way. The gist of all this is that we cannot tell by a few random comparisons with a dipole or other reference antennas how a new beam is doing. We have to use it over a considerable period, taking data under all manner of conditions, and then draw our own conclusions. There is a lot more to what constitutes "the best antenna" than a manufacturer's figures for gain and front-to-back ratio!

QST

³ Kmosko and Johnson, "Long Long Yagis," *QST*, January 1956.

⁴ "World Above 50 Mc.," *QST*, May, 1946, p. 56 and cover.

Part II of this series, "Choosing the Right Transmission Line," will appear in an early issue.

— Editor

1964 ARRL International DX Competition

Phone: Feb. 8-9 and Mar. 14-15

C. W.: Feb. 22-23 and Mar. 28-29

CONTEST PERIODS

Phone Section:

Starts Ends

Feb. 8, 0001 GMT.....Feb. 9, 2400 GMT

Mar. 14, 0001 GMT.....Mar. 15, 2400 GMT

C. W. Section:

Starts Ends

Feb. 22, 0001 GMT.....Feb. 23, 2400 GMT

Mar. 28, 0001 GMT.....Mar. 29, 2400 GMT

ANNOUNCING the 1964 ARRL DX Contest . . . your opportunity to show your DX prowess, bag a few "new ones" for DXCC, and to have a lot of fun working the world . . . also for the DX stations to complete those difficult states for their WAS certificates, and provinces for WAVE. This contest is nothing new by any means, the 1964 version being the 30th running with the usual two week ends for c.w., and two week ends for phone . . . phone being all modes of phone work, such as s.s.b., a.m., etc. See above for dates and times.

The object is for DX stations to work as many W-K-WA-WB-VE-VO-KH6-KL7 stations as possible per band, and for the U.S.-Canadian stations to work the DX.

Certificates are awarded to the top single-operator phone and c.w. scorer in each country and ARRL section. A special certificate goes to the highest scoring multioperator from countries and sections of at least three such entries. You may also credit your score to your ARRL-affiliated club for separate club aggregate listing (total of all club members' scores). An engraved cocobolo gavel goes to the club with the highest total, and a certificate to each club's top phone and c.w. scorer. For club credit make sure your logs are clearly marked: "Participating for club award in the (club)."

The award and scoring system is designed to encourage widest use of our bands with flexibility of operation rewarded. Repeat QSOs on additional bands are permitted. For example, W3GRF works F8VJ on 10, 15, 20, and 40 meters; both stations have added to their contact-point total, multiplier, and score. For the DX the multiplier is the total of the U.S.A.-Canada call areas (not states) worked *per band*. For U.S.A.-Canada stations the multiplier is the total of different countries contacted *per band*. No credit for W/VE-to-W/VE QSOs is allowed.

Here is a list of the 21 call areas and state/province abbreviations used by U.S.A.-Canada stations in those areas:

W1, W41, K1 — CONN MAINE MASS NH RI VT
W2, K2, W42, WB2 — NJ NY
W3, K3 — DEL MD PA DC
W4, K4, W44 — ALA FLA GA KY NC SC TENN
VA

W5, K5, WA5 — ARK LA MISS NMEX OKLA
TEXAS
W6, K6, WA6, WB6 — CAL
KH6 — HAWAII
W7, K7 — ARIZ IDAHO MONT NEV ORE
UTAH WASH WYO
KL7 — ALASKA
W8, K8, WA8 — MICH OHIO WVA
W9, K9, WA9 — ILL IND WIS
W0, K0, WA0 — COLO IOWA KANS MINN MO
NEBR NDAK SDAK
VE1 — NB NS PEI
VE2 — QUE
VE3 — ONT
VE4 — MAN
VE5 — SASK
VE6 — ALTA
VE7 — BC
VE8 — NWT YUKON
VO — NFLD LAB

U.S.-Canadian amateurs have quotas on c.w. (see rule 10), but none on phone. DX amateurs have no quotas; they will QSO as many stations as they can in the 21 call areas on each band.

Check the rules which follow below. Keep a neat and accurate log like the sample shown in this announcement. Send a copy of your log at the conclusion of the contest to: ARRL Communications Dept., 225 Main St., Newington, Conn. 06111, U.S.A. You can obtain log forms free for the asking at that address. Logs must be postmarked by April 25, 1964, to be eligible for awards and *QST* listing. All reports, big and small, are welcome.

Rules

- 1) *Eligibility:* Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
- 2) *Object:* Amateurs in the United States and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.
- 3) *Conditions of Entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.
- 4) *Entry Classifications:* Entry may be made in either or both the phone or c.w. sections: c.w. scores are independent of phone scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating functions. Multiple-operator stations are those obtaining assistance, such as from "spotting" or relief operators, or in keeping the station log and records.
- 5) *Contest Periods:* There are four week ends, each 48 hours long; two for phone work and two for c.w.
- 6) *Valid Contacts:* In the phone section, all claimed credits must be made voice-to-voice. In the telegraph section, only c.w.-c.w. contacts count. Crossband contacts may not be counted.

Banned Countries

U.S. amateurs may not work amateurs in Cambodia (XU), Viet-Nam (3W8), Indonesia (PK, JZB) and Thailand (HS).

Canadian amateurs may not work Cambodia (XU), Viet-Nam (3W8), Indonesia (PK, JZB), Laos (XW8), Rumania (YO) and Jordan (JY).

EXPLANATION OF DX CONTEST EXCHANGES

Stations in U.S. and Canada Send:

	RST or RST Report of Station Worked	Your State or Province (or Abbreviation)
Sample (c.w.)	579	ORE
Sample (phone)	57	Oregon

Stations Outside U. S. and Canada Send:

	RST or RST Report of Station Worked	Three-Digit Number Representing Your Power Input
Sample (c.w.)	579	075
Sample (phone)	57	500

7) Exchanges:

a) *Amateurs in U.S. and Canada* will transmit a three-figure number, representing the RST report, plus their state or province. (The latter may consist of an appropriate abbreviation.) Phone participants will transmit a two-figure number consisting of the readability-strength report plus the state or province. *Example:* W6YY might transmit "579CAL" on c.w., "57 California" on phone.

b) *Amateurs outside W(K) and VE/VO* will transmit six-figure numbers, each consisting of the RST report plus

three "power" numbers; the power indicator will represent the approximate transmitter power input. Phone contestants will transmit five-figure numbers, each consisting of a readability-strength report and the three "power" numbers. *Example:* VK2GW, with 100 watts input, might transmit "569100" on c.w., "56100" on phone. If the input power varies considerably on different bands, the "power" number should be changed accordingly.

8) Scoring:

a) *Points:* One point is earned by a W(K) or VE/VO station upon receiving acknowledgment of a contest exchange sent, and two points upon acknowledging an exchange received. Two points are earned by any other station upon receiving acknowledgment of a contest exchange sent, and one point upon acknowledging an exchange received.

b) *Final Score:* W(K) and VE/VO stations multiply total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of W(K) and VE/VO licensing areas worked on one band plus the number of W(K) and VE/VO licensing areas worked on each other band.

There are 21 licensing areas: 12 in the United States (W1-0, KH6, KL7), 9 in Canada (VO, VE1-VE8).

9) *Repeat Contacts:* The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.

10) *Quotas:* The maximum number of points per country per band which may be earned by W, K, KL7, KH6 stations in the c.w. section is 18, and contacts made on the same band

LOG ¹ , ARRL INTERNATIONAL DX COMPETITION										ST. PIERRE ET. MIQUELON										
Sheet...1.... of 33.. CALL. FP8BX.. ARRL Section..... or Country																				
DATE & TIME (GMT)	STATION WORKED	COUNTRY	RECORD OF NEW COUNTRIES FOR EACH BAND					EXCHANGE		P O I N T S										
			1.	8.	3.	5.	7.	14.	21.		27.	28.	SENT	RECEIVED						
2/23																				
0051	W8FGX	W8											599050	589 0H10						3
52	W8JIN												599 "	589 "						
53	W3MSK	W3											599 "	589 MD						
54	K4TML	K4											599 "	579 FLA						
0114	VE2TZ	VE2											599 "	579 QUE						
25	W3MSK	W3											599 "	349 MD						
26	W1QMM	W1											589 "	549 VT						V
27	W4KXV	W4											589 "	- VA						2
27	W4ZYS												589 "	559 FLA						3
0217	W2UOB	W2											599 "	359 NJ						
23	W3WJD												589 "	569 PA						
Total points:																				
0313	W2VL												599 "	589 NY						
21	W2KQT												599 "	479 NJ						
1725	W4QCL												589 "	559 VA						

¹This report form to be used by all phone entrants and by those c.w. participants outside W/K and VE/VO.

CD-55 (1/56) -over- Printed in U.S.A.

Sample log form that must be used by W/VE phone entrants and all participants outside U.S. and Canada, phone and c.w. This example is a DX c.w. log. U.S.-Canadian phone logs would reverse information in the "Sent" and "Received" columns; their "Sent" column would show exchanges like "59CAL," "57ONT." All DX stations, both phone and c.w., use this type log report.

Sample summary sheet that must accompany all reports.

SUMMARY, ARRL INTERNATIONAL DX COMPETITION

Entry..... Call..... ARRL Section..... or Country.....
(CW or Phone)

Name..... Address.....

Transmitting Equipment.....
.....Power Input.....

Receiver..... Antenna(s).....

(Non-W/K/VE/VO entrants show number of U.S.A. and Canadian call areas worked, instead of number of countries QSOd.)

Bands	1.8 Mc.	3.5 Mc.	7 Mc.	14 Mc.	21 Mc.	37 Mc.	48 Mc.	Totals
Number of Countries QSOd								
Number of Contacts								

Number of Different Countries Worked..... Number of Hours of Station Operation.....

Assisting person(s): name(s) and call(s).....

..... X =
(Points) (Multiplier) Claimed Score

Participating for club award in the.....
(name of club)

I certify, on my honor, that I have observed all competition rules as well as all regulations established for amateur radio in my country, and that my report is correct and true to the best of my belief. I agree to be bound by the decisions of the ARRL Award Committee.

.....
Operator's Signature and Call

*Figure in this box is the multiplier.
**Count 3 points per completed QSO; see contest rule 8a in January QST.

with the same country after the quota is filled will not count. Thus complete exchanges with 6 stations in one country on one band fill the band quota for that country. The maximum number of points per country per band which may be earned by VE/VO stations in the c.w. section is 24, and contacts made on the same band with the same country after the quota is filled will not count. Exchanges with 8 stations in one country on one band are thus permitted Canadian participants. There is *no* quota for stations in the c.w. section *outside* of the U.S. and Canada. There is *no*

quota for any station in the phone section.

11) *Reporting:* Contest work must be reported as shown in the sample forms. Each entry must include the signed statement. Contest reports must be mailed no later than April 25, 1964 to be eligible for QST listings and awards. All DX Competition logs become the property of the American Radio Relay League and none can be returned.

12) *Awards:* To document the performance of participants in the 30th ARRL International DX Competition, a full report will be carried in QST. In addition, special recognition will be made as follows:

a) A certificate will be awarded to the high-scoring single-operator phone and to the high-scoring single-operator c.w. entrant in each country and in each of the mainland U.S. (plus Alaska and Hawaii) and Canadian ARRL sections (see page 6, QST) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section or country from which three or more valid multiple-operator entries are received.

b) A suitable certificate will be awarded to the operator making the highest single-operator phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three phone entries by members of the club and that these scores are confirmed by receipt at ARRL of the individual contest logs from such members. The highest single-operator c.w. scorer in each club will be awarded a certificate under the same conditions. Only a bona fide resident member, operating a station in local club territory, may compete for club certificates.

c) ARRL will award a gavel to the affiliated club submitting the greatest aggregate phone and c.w. score by its members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL of the individual contest logs from such members. Only scores of bona fide resident members, operating stations in local club territory, may be included in club totals.

13) *Judges:* All entries will be passed upon the ARRL Awards Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

14) *Disqualifications:* Each participant agrees to observe the contest rules as well as all regulations established for amateur radio in his country. Violation of any regulation, as confirmed by a single FCC citation or advisory notice or two ARRL accredited Official Observer reports, may constitute grounds for disqualification. Some examples of practices which can result in disqualification: off-frequency (out-of-band) operation, harmonics, spurious emissions, low tone reports in logs, key clicks, splatter, excessive sidebands, W(K) stations working banned countries. **QST**

1964, ARRL INTERNATIONAL DX COMPETITION

Call... **W1AW**..... ARRL Section..... **CONN**.....

Band... **1A**..... Contest... **15**.....

Country*	Station Worked	Late	Time (GMT)	Exchange Cont.	Exchange Received
SPAIN	EA4CF	2-23	1300	589 CONN	479100
	EASFT		1345	579 "	379075
ENGLAND	GK3XG	2-23	306	599 CONN	469150
	GM3DQ	2-23	1245	575 "	493130
	GM3DQ	2-23	1430	569 "	363130
	GM3DQ	2-23	1630	469 "	363130
	GM3DQ	2-23	1837	479 "	363130
UKRAINE	UB5M2	2-23	1245	599 CONN	599100
AUSTRALIA	VR2GW	2-23	1003	569 CONN	569100
	VR2APK	3-23	1101	569 "	559120

*Canadian entrants should allow two "blocks" for each country, but may record no more than eight contacts therein.
*This report form to be used by W/K and VE/VO c.w. participants.

10-34 (1-7-64) (over) Printed in U.S.A.

Sample of log form that must be used by W/VE c.w. participants. When a station is worked for less than the maximum number of points allowed, the additional contact to make up the points not earned in the first contact should be entered at the bottom of the sheet. Canadian entrants should allow two blocks for each country, but may record no more than eight contacts therein. A separate set of sheets should be used for each band.

The 1963 Geneva Space Conference

144-146 Mc. Earmarked for Amateur Space Activity

THE international radio conference held at Geneva, Switzerland, in 1959¹ examined the entire body of radio regulations and, after four months of intensive sessions, completed its work of revision to meet the needs of the day. However, as the conference was held less than two years after the first orbiting of an artificial earth satellite, the delegates recognized their inability to assess accurately the world's requirements in the rapidly-developing field of space communications, and accordingly agreed to meet at some later time in a special conference held exclusively to deal with this matter.

Subsequently, the date of October 7, 1963, in Geneva was set, and some 400 delegates, observers, representatives of private operating agencies and the International Telecommunications Union staff convened for five weeks in an Extraordinary Administrative Radio Conference on Space Communications. Of the 122 member-administrations of ITU, only about 70 were represented, perhaps because of the specialized nature of the conference.

In the United States, preparatory work had begun more than a year in advance of the opening date. ARRL officials had expressed the view that no amendment of the international regulations was required in the case of the amateur service, contending that current language of definitions, regulations and allocations table entries were all sufficiently broad to encompass experimental space communications activity. Except for one band-edge (450 Mc.) government telecommand channel, the resultant U.S. proposals for the space conference contained no reference to amateurs or amateur bands (nor did Canada's). As it was therefore contemplated by U.S. officials that amateur matters would not be an essential part of the conference agenda, a representative of the amateur service was not included in the U.S. delegation.

However, as had been previously planned by member-societies, the International Amateur Radio Union participated in the conference in observer status, and was represented for all or part of the time by John Clarricoots, G6CL, Secretary of RSGB and of IARU Region I; Per Anders Kinnman, SM5ZD, vice president of SSA and vice chairman of IARU Region I; Arthur Milne, G2MI, former RSGB president; William I. Orr, W6SAI, of Project Oscar; Robert M. Booth, Jr., W3PS, ARRL General Counsel; and John Huntoon, W1LVQ, ARRL and IARU Secretary.

Under the capable chairmanship of Gunnar Pedersen of Denmark, the Geneva Space Conference quickly got down to business (after the usual hassle about admission of Communist

China, the request again being rejected), establishing a setup of committees and working groups to deal efficiently with the various proposals which had been made. Looking over those which in any way affected the amateur bands we found (1) a series of similar proposals by Canada, France, Japan, Nigeria, the United Kingdom and the U.S. for a space telecommand channel at 450 Mc.; (2) a proposal by the U.S.S.R. to use 3400-3900 Mc. for communications satellite operation, thus impinging on half the amateur 3300-3500-Mc. band; (3) a proposal by U.S.S.R. similarly to use 5725-6225 Mc. for Comsat, affecting our 5650-5925-Mc. band; and (3) a proposal by U.S.S.R. to use 10,230-10,250 Mc. for radioastronomy, with amateurs relegated to secondary status in Region I (Europe-Africa).

It shortly developed, however, that through some oversight the United Kingdom had failed to include another proposal in its original filing, and a corrective paper was issued by U.K. after the conference began, proposing the addition of a footnote in the 144-146-Mc. worldwide amateur allocation to authorize amateur space satellite activity! Apparently in the thought that this would be a comparatively simple matter to handle in the conference, Working Group 5-C took it up as one of the first items of business.

Simple, eh? Wow! U.S.S.R. emphatically rejected the idea, saying amateurs had no place in space activity, that satellites were too expensive and complicated for us to build, that ham satellites if launched might well disrupt normal terrestrial amateur communication, or might drift into adjacent bands and cause interference to other services! While several nations supported the U.K. proposal (including the U.S. and Canada, which suggested additional bands as well), U.S.S.R. also had several backers, and the matter was stalemated temporarily. After a day or so of meetings, in which the amateur matter occupied a substantial portion of the time, it was finally agreed that (1) an *ad hoc* group of Canada, the U.K., U.S., and U.S.S.R. would meet privately to attempt a compromise, and (2) the representatives of IARU would prepare an official conference document on amateur space communications activity with particular reference to Oscar projects. The latter was accomplished promptly by the IARU team, with the particular help of W6SAI of Project Oscar.

The *ad hoc* group met for several hours on a Saturday morning, and while the discussions were private the highlights were later disclosed. Canada and the U.S. not only supported the 144-Mc. proposal but expressed a desire for additional space bands for amateurs; the U.K. wanted 144 Mc. but positively nothing more; U.S.S.R. maintained its opposition to *any* amateur space

¹ Budlong and Huntoon, "The Geneva Radio Conference," *QST*, March 1960, p. 55.

activity. Finally the meeting compromised by agreement to the U.K. proposal, but only with two conditions imposed by U.S.S.R. — (1) that the authorization include a requirement for coordination between national amateur organizations involved, and (2) that the CCIR (the technical study body of ITU) be asked to appraise amateur space communications and evolve a set of standards and preferred technical characteristics under which hams could engage in space work. This compromise agreement was rather promptly adopted by the Working Group the first of the following week. Thereafter, for several weeks the amateur 144-Mc. space matter was officially dormant, although an undercurrent of buzzing comment continued informally throughout that period, largely among the IARU group and amateurs on official delegations.

Meanwhile, the other proposals listed earlier herein were, along with the major space problems of the conference, taken up by appropriate working groups and settled. In our field, the space telecommand channel at 450 Mc., with a bandwidth of 500 kc., was agreed. A Comsat allocation was added to 3400-3500 Mc. The allocation of 5650-5925 Mc. was slightly rearranged, the principal effect on amateurs being insertion of Comsat activity in Region I in 5725-5850 Mc. U.S.S.R. eventually withdrew its proposal for radioastronomy in the amateur 10,000-Mc. band. To save space, we should state here that the working group agreements mentioned in this paragraph later become final conference decisions.

During this period IARU representatives submitted a second paper, and a later revision, in an attempt to convey to the delegates information on the practical aspects of amateur space communication; e.g., that amateurs were quite capable of such projects, as exemplified by Oscar; that extremely low powers were involved, and interference to other amateur communication would be no problem; that amateurs were accustomed to interference anyway, so accordingly administrations need not be concerned

about this aspect; and that to allow maximum freedom for amateur experimental space communication activity other amateur bands allocated on a worldwide basis should be also specifically earmarked for this work. In view of the known objections by a number of countries, however, not much hope was held for success, and indeed no delegation undertook to offer a formal proposal to that end.

Running behind schedule, in the last two weeks the conference began holding Saturday and evening sessions. The amateur 144-Mc. matter came up for approval in Committee 5 (allocations) and received spirited discussion. A number of delegations (at least one making reference to the IARU paper) pointed out that amateurs could take care of their own technical problems, and it was therefore improper to require CCIR to spend time and money in a study of such matters; this view had majority support, and the CCIR study was therefore deleted. Some administrations also felt that the requirement of coordination among amateur societies was not within the capabilities of ITU since no control is exercised over such societies (there were also some who felt that such a requirement tended to take authority away from the administrations), but in Committee 5 it was not the majority view.

As expected by the IARU team, however, the same matters were brought up a second time in the full plenary meetings the last week of the conference. Again an intensive discussion ensued. It soon became apparent that a majority of administrations agreed that ITU regulations could not impose a requirement on national societies, and that part of the footnote was accordingly deleted. U.S.S.R. attempted to reinstate the CCIR study, but in a roll-call vote (unusual in such matters), its proposal was again defeated.

Thus the conference adopted a clean footnote appended to the 144-146-Mc. worldwide allocation stating that artificial space satellite activity by amateurs is authorized in that band.

(Continued on page 162)

Members of the IARU team huddle with VE3ATU (back to camera) of the Canadian delegation. L. to r.: W6SAI, G6CL, W3PS, SM5ZD, W1LVQ.





Hints and Kinks

For the Experimenters



INSULATED TOOL HANDLES

SOME technicians like to have insulated handles on their working tools. This can be accomplished in several ways, including the use of products currently available for this purpose. However, a very simple way to cover tool handles is by using shrinkable tubing, available now from most radio-parts mail-order houses. Just slip the tubing over the handle, snip off at the appropriate point, and apply heat with a soldering iron, hair dryer, hot plate, or match. The tubing will shrink neatly into place to form the desired tight insulated covering. The only precaution to observe is to make sure the final size of the tubing will be small enough. This is generally automatic if the original size of the shrinkable tubing is just sufficient to fit over the tool handle. — *Dwight B. Olson, DL4AGF/W9EAM*

CRYSTAL DIODE IDENTIFICATION

IDENTIFYING crystal diodes can be difficult if the "code" is not known. If the diode symbol is not printed on the diode, the cathode side of the diode is identified by a band, several bands, dot mark, check or a plus sign. Modern diodes use a color-code system for identifying the type number which was listed in *QST*, July 1960, page 46. In the case of microwave mixer diodes, the base is the anode and the tip is the cathode. R-types of microwave diodes have the opposite polarity. — *Robert H. Kernen, W4MTD*

EXTENDING THE HEATHKIT Q-MULTIPLIER RANGE

BY ADDING an 880- μ f. fixed mica capacitor to the tuning capacitor of the Heathkit Q multiplier, the unit will cover the 400-ke. range. I now can use the multiplier on my Navy RBC receiver, which has a 400-ke. i.f. — *Gerald Wyatt, ON8FN/K4UNW*

CORRECTION AND IMPROVEMENT FOR HANG A.G.C.

THE "Zener-Limited 'Hang' A.G.C." circuit by *TKSJX* in the "Hints & Kinks" column of *QST* for November 1963, should be shown with the 4-position rotary switch grounded. Better yet, the switch can be bypassed to ground with a large-value paper capacitor and returned to the arm of an r.f. gain control, which is connected across a negative bias source.¹ This method of r.f. gain control is very convenient. The variable negative bias selected by the control does two

¹ Arnold and Allen, "Some New Ideas in a Ham-Band Receiver," *QST*, May 1960.

things: it feeds through the attack gate diode to the a.g.c. line and controls the r.f. gain. It also acts as additional delay bias on the a.g.c. rectifiers. For example, if the receiver's S meter is monitoring the a.g.c. bias in the normal manner, and the r.f. gain control is set to give an S-6 reading on the meter, any signal weaker than S-6 will not operate the a.g.c., whereas a signal stronger than S-6 will produce full normal a.g.c. action. This action is ideally suited to s.s.b. round tables, where signals may range from S-6, say, to S-9 or over. During any pause, the gain rises to the proper level for the weakest signal in the group (set by the r.f. gain control), rather than rising to full blast and forcing the operator to listen to weaker signals and hash below S-6. — *Craig R. Allen, W7661AQ*

SOME NOTES ON HIGH-POWER OPERATION ON 144 MC.

READING the article on v.h.f. r.f. chokes in November 1963, *QST*¹ prompted me to let you know of some troubles encountered with a 4X150A push-pull amplifier on 144 Mc. This amplifier was built exactly as described by *W0MOX* in *QST* for December 1961.² It operated perfectly in Class C, but when the bias was reduced for AB₁ linear service, a tuned-plate tuned-grid oscillation developed at around 110 Mc. This was the result of resonance in the Z-144 r.f. chokes used in both plate and grid circuits. The trouble was cured by replacing the grid chokes with 270-ohm 1-watt resistors.

Though the amplifier mentioned above and its predecessor described in February 1960, *QST*³ are designed for current types of tubes, many builders want to use 4X150s, obtainable at low prices on the surplus market. This can be done, but some care should be exercised in the amount of power used with the older tubes. Most 4X150s will take a kilowatt c.w. input, if the amplifier is efficient and a large blower is used. I have even seen 4X150s run at 1 kw. on 220 Mc., plate modulated, but I had one arc over from plate to screen at 1750 volts. Fortunately, this broke down a feed-through bypass capacitor in the screen lead, preventing breakdown of the built-in screen bypass capacitor in the socket.

Users of 4X150s may want to build in some kind of protection against this sort of thing, if they intend to try running more than the maximum rated 1250 volts on the plates. — *Alan Parrish, K1KKP*

¹ Tilton, "R.F. Chokes for the V.H.F. Bands," *QST*, November 1963.

² Breyfogle, "Top Efficiency at 144 Mc. with 4X250Bs," *QST*, December 1961.

³ Tilton, "A High-Efficiency 2-Meter Kilowatt," *QST*, February 1960.

ON-OFF SWITCH IDENTIFICATION

THE name plates on small toggle switches are not always legible enough to show their off or on positions. A positive indicator is desirable and can be obtained by using some quick-drying red lacquer or red nail polish. Apply the paint to the under side of the switch handle with the switch in the off or down position. Make sure the red is not visible when the switch is in the down position. After the lacquer is dry, snap the switch handle up and the red indicator, showing the switch is on, will be visible. I have tried this idea on a small switch panel which has a row of nine toggle switches and the on positions of the switches really stand out. — *Peter H. Sharney, Sr., W3PFR*

TOOLS & TRICKS—OLD AND NEW

WHILE the abuse of tools is not a practice to be universally recommended, there are many small jobs that most hams have learned to make easier by using some tools that weren't necessarily designed for the purpose. For instance, if you have to do all your chassis work with a hand drill that won't take a drill larger than $\frac{1}{4}$ inch, enlarging holes to $\frac{1}{2}$ inch can be a tedious process. But if you have a dime-store carpenter's brace, you can clamp a rattail file (minus the handle) in the brace and do the job easily. Simply turn the brace in a counterclockwise direction and the file will walk through a chassis as though it were cheese. You can get these files up to $\frac{1}{2}$ inch diameter or more. Don't rotate it in the opposite direction, because the file will lock up in the hole and snap off.

If you have a lot of holes to tap in sheet metal, you can speed up the job of threading by using the tap in the hand-drill chuck. You will have to use a little care to avoid snapping off the tap, but if you put a drop of oil on the tap every hole or two, hold the drill steady and back it up whenever it sticks, you shouldn't have any trouble. A two-speed drill at low speed is ideal for this sort of work.

If you are making a metal box, or putting a bottom plate on a chassis, it is seldom that all of the holes in the pieces to be joined will line up accurately, making it difficult to get the screws in place. After the first screw has been started, you can line up the others by jabbing an ice pick through the two holes and prying them into line. If they won't stay in line long enough to get the screw started, use the ice pick in an adjacent hole, prying in the direction that will bring the desired holes into line. The ice pick, as well as a machinist's scriber, is also an aid in steering a nut onto the end of a screw in a place where you can't reach it with your hand. If the scriber is of the type that has one end bent at right angles, you can use the bent end to rescue the nut if it falls off. As simple an item as a pair of tweezers can save a lot of wear and tear on the nerves.

Several manufacturers have recognized the need for special tools of the gadget class in radio-assembly and repairing work. Most hams are familiar with the screw-type socket punches

made by Greenlee and also by Pioneer. But perhaps you haven't noticed that they have four marks around the "cup" part that make it possible to center the punch when the pilot hole is much larger than the screw. Just scribe lines at right angles through the center of the hole and match up the centering marks on the punch with the lines on the chassis. This makes it easy to increase the hole diameter to take a five-prong socket, for instance, where an octal socket originally was mounted. The easy way to use these punches is to clamp the head of the screw in a vise and cut the hole by turning the chassis or panel instead of the screw.

Most radio-parts catalogs carry a small angle-mounted mirror with a long handle that can be used dentist-fashion to get a peek at some hidden part. Some of these are illuminated with small batteries.

Most of these tools are inexpensive items and are of the sort that can take the cussing out of otherwise awkward jobs. They are well worth adding to the ham's workshop equipment.

— *Donald H. Mix, W1TS*

LINE VOLTAGE ADJUSTER

IN SOME areas, line voltage is either too high or too low. Most electronic equipment is designed for a nominal voltage of, say, 120 volts and serious damage can occur to the equipment when the voltage swings far beyond this value.

One obvious solution is to use a variable autotransformer (Variac), and simply adjust for the desired voltage. However, there is another method that has been used for many years, yet may not be familiar to the new generation. The

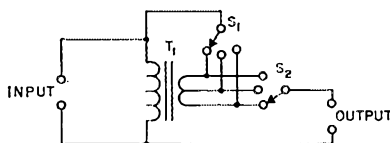
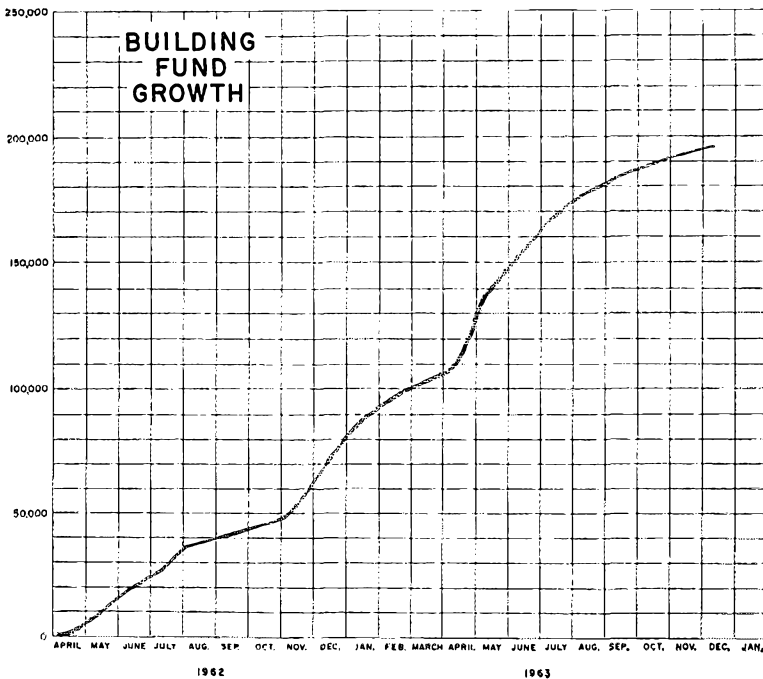


Fig. 1—Line-voltage adjuster.
 T_1 is a 6.3-volt filament transformer.

line-voltage adjuster consists of a common junk-box variety 6.3-volt center-tapped filament transformer, T_1 in Fig. 1. The transformer is in the circuit so that, by positioning switch S_1 and S_2 , the 6.3-volt winding will either "buck" or add to the line voltage. Switch S_1 and S_2 allows for either adding 6.3 volts or 3.15 volts, or subtracting 6.3 volts or 3.15 volts.

Power rating of the system is determined by the current rating of the filament transformer. If the transformer is rated at 5 amp., then the total power to the load should be limited to 5 amp. Only one caution need be observed: the center tap of some filament transformers is a small conductor, smaller than the two outside leads. If this is the case, it may be necessary to assign a lower power rating than indicated to the transformer. Of course, other filament transformers can be used for more (or less) voltage. — *E. L. C.*



Building Fund Progress

Although no other divisions have joined the charmed circle of those who have met their assigned quota, a couple made some very impressive gains in their march toward 100%. The Canadian Division made a 10% jump in its achievement, while the Central Division had an increase of 21%, and moved from 10th to 5th spot in the over-all standings. This great boost in the Central Division came largely through the

generous donation of a well-known Central Division amateur. His gift, when coupled with other donations and matching funds, jumped the Central Division total by more than \$5000. The accompanying graph shows how the Fund has progressed. If you have been putting off making a contribution to the Building Fund, how's to go ahead with it right now, and get that graph headed uphill a little faster?

Members Are Saying . . .

At its regular monthly meeting held this evening we voted to [contribute to] the ARRL Building Fund. . . . We are but a small organization but our membership is 100% with your organization. — *Fl. Venango Mike & Key Club*

Here is my contribution to the Building Fund along with my thanks to the ARRL for all they have done for a wonderful hobby. — *W2VUF*

Forgive me for being so slow in responding to the invitation to participate in providing a new home for the organization which has meant so much to the radio amateur. — *W2DYR*

The members of the club would like this to be a token of appreciation for the fine work the League is doing on behalf of radio amateurs everywhere. Keep up the good work. — *Montana State College Amateur Radio Club*

Enclosed please find my check. My personal benefits from League activity over the past thirty years have been incalculable. — *W3PTF*

Enclosed is my check for the Building Fund. I

think you fellows are doing a swell job and I am glad to lend my support even though it is as small as it is. — *Harold Burns, Falmouth, Mass.*

This contribution is in recognition of the work the ARRL has done and is doing for us amateurs. Best wishes for continued success. — *W5IUP*

I know that it is getting kind of late for me to be sending a donation for the Building Fund but I did have to wait until now when I could get my finances in shape. I think that the building we have now is a great step forward for the ARRL. I only wish that my contribution could be more, but being only 19 and paying for a KWM-2 is quite a challenge for my budget! — *W1GLWQ*

Just a short note to let you know where my heart lies. This check (from 73) is just about all I can manage, what with college next year. — *K1PAM*

Please forgive me for putting off my donation to the Building Fund. Although I have had a ticket for only three years, I realize that without the League's interest in the hobby of amateur radio there would be no such thing today. — *K3ZRT*

50

Years of ARRL

ANNIVERSARY MESSAGE FROM OUR PRESIDENT

To my fellow League members:

The coming new year, 1964, marks a very special event for amateur radio — the 50th anniversary of the founding of the American Radio Relay League. It will be a year in which we can justly take a great pride in our past accomplishments, and yet realize at the same time we have the challenge of many difficult problems still ahead.

In this and succeeding 1964 issues of QST, the editors plan to tell something of the history and accomplishments of amateur radio during the last 50 years. They will show how it grew originally from a few hundred dedicated enthusiasts in America and Europe to more than 350,000 amateurs now scattered in almost every country of the world. They will recount the story of our technical progress from the early times, when we could work each other for a few hundred miles with spark sets on 200 meters; to the modern era of vacuum tubes and transistors with which we can now talk almost anywhere in the world on s.s.b., u.m., c.w., and RTTY, using the harmonically related bands that are assigned to us throughout the h.f., v.h.f., and u.h.f. spectrum.

There were the exciting days in the 1920's, for instance, when Reinartz, Schnell, and Deloy turned the accepted theories of long-distance radio communications upside down, and proved for the first time the enormous usefulness of short wave. This spirit of technical progress and scientific adventure has persisted steadily down through the years, and there has yielded many solid contributions to radio communications. Whether large or small each of them has been a

step forward — and another feather in the cap of amateur radio. In recent times the achievements of Project Oscar have been a vivid demonstration that this pioneering tradition is still very much alive.

As we delve into past history it also becomes apparent that the founders of the League, particularly Hiram Percy Maxim and Clarence Tuska, realized from the beginning that if Amateur Radio was to persist it had to have a firm foundation of public service. It was undoubtedly for this reason they included the word "relay" in the League's name, for that was the only known way of handling traffic in those early days. They continually stressed the need for operating skill as one of the basic prerequisites for our existence, as they foresaw that nowhere could these skills be better developed and put to constructive use than in handling traffic and emergency communications. We must be everlastingly grateful to those old timers for handing down to us these traditions of public service, technical progress, and operating skill. Without them ham radio would have perished long ago.

In our concern with today's problems we sometimes forget that the old timers had plenty of troubles, too. But they met them with courage and foresight, and they have left us with a great heritage for the future. We owe the founders of the League a great debt of gratitude, for their vision and leadership provided the basis for our growth and have made amateur radio and the League what they are today.

—HERBERT HOOVER, JR. W6ZII
—President, ARRL

A Memorable Meeting

BY C. D. TUSKA *

MY FAMILY moved to Hartford, Connecticut, and entered me in the ninth grade elementary school at a time when Hiram Percy Maxim had already made a name for himself. While he might have rested on the laurels of his distinguished father, Sir Hiram S. Maxim¹ — inventor of the Maxim machine gun — or his equally distinguished uncle, Hudson Maxim — inventor of maximitite (a high explosive) he was known for his pioneering in the automotive field² and for his invention of the Maxim silencer for firearms. I shall report the first meeting of the schoolboy and the distinguished citizen that preceded the formation of the American Radio Relay League by several years.

About 1909-1910 the rubber-powered model aeroplane craze came into being. While my first love was wireless, I learned how to build dual propeller pushers in which pairs of rubber-band motors were simultaneously wound with converted egg-beaters to provide motive power. Pocket money had to be earned, so I made and consigned model planes to the Harris Parker toy store on Asylum Street, Hartford. When bad flying weather came, wireless took over.

I had arrived in Hartford with an untuned

* 401 Mercer Rd., Princeton, N.J.

Author's Note: Throughout I have tried to use the vocabulary of the earlier years.

¹ Maxim, Hiram Percy *A Genius in the Family*, New York, Harpers & Brothers 1936.

² Maxim, Hiram Percy *Horseless Carriage Days*, New York, Harpers & Brothers 1936.



Clarence D. Tuska, ex-1 WD, co-founder, ARRL and QST.

spark coil transmitter and a coherer-decoherer receiver (both with small dipole aerials) that operated across the room. I also possessed a two-slide tuning coil and an E. I. electrolytic detector that did not operate at all well because the Wollaston wire kept burning out. Before long these crude instruments were replaced with a homemade loose coupler, a crystal detector, and a pair of Brandes phones. About that time the sales of model aeroplanes petered out and soon after my supply of pocket money nearly vanished.

In an attempt to replenish the pocketbook I made a wooden box with a hinged lid. The box was big enough to hold a single slide tuner, a crystal detector and a single telephone receiver. Based on the successful sale of model planes, Mr. Parker did not hesitate to take my small wireless set on consignment and to put the outfit in his window.

Harris Parker's store was on my way to high school to which I had been promoted. I usually waited in front of the store for the trolley car that took me out Farmington Avenue. You may be sure that I watched the store window and my set every day. There was great excitement the day the set was not in the window. That afternoon on my way home I went to Mr. Parker to collect. The conversation went about as follows:

"Mr. Parker, I saw the wireless set was gone so I am here to collect."

"Well now, son, I let a customer take it and if it works O.K., he'll be in to pay for it. If it doesn't work to his satisfaction, he'll return it. Drop around in a day or so."

Perhaps two days later, I went to Mr. Parker and there was the set on a rear counter and I was told: "The man who took the set returned it and said it was no good."

Since I had successfully operated the set these were "fighting words". I volunteered: "Probably the man did not know how to operate a wireless set and undoubtedly he failed to adjust either the tuner or the crystal detector."

My words probably went completely over Mr. Parker's head but he gave me a stopper for an answer: "Oh, I think he knew how. You see, this was Mr. Maxim, the inventor, and I am sure he'd know all about wireless sets."

When I arrived home my mother could feel that something was wrong and she finally dragged the story out of me. During most of my youth she had to be both father and mother. This time I got fatherly advice: "You go promptly to see Mr. Maxim and ask him to tell

you what was wrong!" It took a lot of persuading but finally I agreed; provided my good friend, William Ball, who was my partner for the sale of enameled wire, Brandes phones and custom-built loose couplers, went with me.

Bill and I started for Mr. Maxim's one evening without an appointment. Mr. and Mrs. Maxim and their two children were living on Prospect Avenue, just south of Farmington Avenue. It was quite a long trolley ride from where we lived. Although I did not admit it, my enthusiasm for the confrontation diminished with the distance.

It was after dark when we found the house, rang the doorbell, and waited for the door to open. A man appeared. He was in his early forties, of medium height, his hair (which was beginning to gray) stood straight up,³ and he was having obvious trouble with one of his garters. When the garter was fixed, we were given a friendly look of inquiry.

I came directly to the point, and give or take a word or two, I can almost remember saying in one breath: "Mr. Maxim I am the boy who made the wireless set you got at Harris Parker's and you returned it saying it was no good and I want to know why!"

This was obviously no trivial matter to be handled at the open door. Either we were to be shut out or invited in. I was never sure what prompted him to ask us in other than he was naturally kindly and always gentlemanly.* He quickly disposed of the "no good" comment about the set by explaining: "I did not tell Mr. Parker that it was no good or did not work. I told him it would not serve my purpose and that I wanted something better — something more professional."

Before we said good night, Ball and Tuska had Mr. Maxim's order for a loose coupler, a variable condenser, a crystal detector and a pair of Brandes Navy Phones. The rig was installed in due course and gave satisfactory service for a number of years. Throughout those years, and for many years thereafter, my friendship with Mr. Maxim grew. Looking back, it was more of a father-foster-son relationship. It was he who urged me to go to college. It was he who took the time to drive me over to Trinity College and to introduce me to dear old Dr. Luther and to Professor Henry Perkins. But I am getting ahead of the story.

Mr. Maxim and his young son, Hamilton, acquired a spark coil transmitter and we communicated by wireless in the days before amateur licenses were required. At that time most of the call letters around Hartford began with SN to which one added any third letter not previously pre-empted. I believe Maxim's was probably SNW and mine was SNT. We became members of the Radio Club of Hartford. The informal

³ Maxim, Hiram Percy "Practical Relaying". *QST*, Vol. I, No. 3, page 19, Feb. 1916.

* About seven years later in a very personal letter he specifically referred to that night and indicated that he "was impressed".



This picture of Mr. Maxim's station was published in *The Hartford Times* on January 17, 1914. Mr. Maxim is at the right—the other operator is not identified. This engraving was made directly from a clipping furnished us by David Moore, first prexy of the Hartford Radio Club and now a winter-time resident of Florida.

call letters soon gave way under the new law to station licenses with assigned call letters. The stations were operated by licensed amateurs.

The power limitations of spark coil transmitters led to power transformers, first with fixed spark gaps and then with numerous styles of rotary gaps. Our signals went well beyond the city boundaries. It was not long before we had intercity and interstate communications. The growing communication range led me to discuss with Mr. Maxim the possibility that amateur stations' operators with whom we were in communication must also know other amateur operators beyond our range and beyond them still others. Therefore it would be interesting to organize a relay—say from Hartford to Buffalo or even farther.

While I was thinking of a one-shot proposition, Maxim, who had no end of imagination,⁴ foresaw an amateur communication network. He dreamed of a network from the East to the West, from the North to the South.⁵ I have no doubt that he also saw the lasting advantages that banding the amateurs together would give to our country⁶ and to the amateurs. Thus came the first step leading to the founding of the American Radio Relay League.

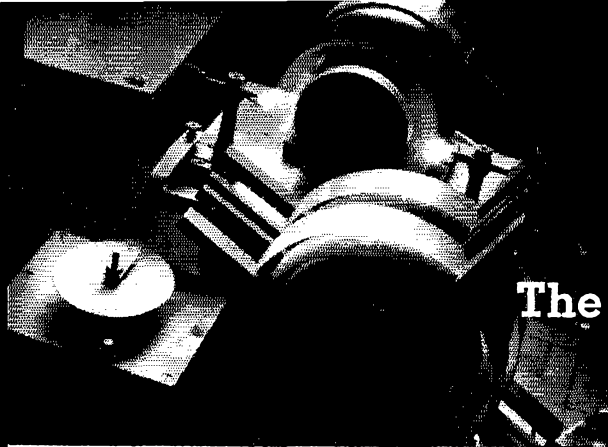
To Hiram Percy Maxim wireless must have been a romantic thing, a new tool, a great adventure in which thousands and then tens of thousands of amateurs could communicate freely and easily and instantly over greater and greater ranges. It was he who rendered the necessary leadership.

QST

⁴ Tuska, Clarence Denton, *Inventors and Inventions* pages 116-117. McGraw-Hill Book Company, New York, 1957.

⁵ Maxim, Hiram Percy "Practical Relaying," *QST*, Vol. I, Nos. 3 & 4, pages 19-22 and 45-46, Feb. and March 1916.

⁶ "WAR", *QST*, Vol. II, No. 6, pages 3-4, May 1917. "Wanted: By Uncle Sam," *QST*, Vol. II, No. 8, pages 3-5, July 1917.



The Birth of A.R.R.L.

The Background and Formation of Our League

IN THE latter years of the nineteenth century there existed a considerable body of experimenters, of all ages, who made small electromagnets, motors, batteries, static machines, erected neighborhood telegraph lines, and built all the other experimental electrical apparatus within their ken—purely as a hobby, and with no commercial interest whatsoever.

The fascinating new art of radio received many converts from their ranks. Particularly in the case of the neighborhood telegraphists did the possibility of signalling without cumbersome, expensive, deficient wires hold appeal. And in addition to those with an experimental background, there were many of the lay public to whom the romance of wireless called irresistibly; a large proportion, perhaps a majority of the early amateurs came directly from this group.

These enthusiasts read with avid interest of Marconi's early experiments. They thirsted for details of his methods, so that they might duplicate his feats. The articles in the scientific magazines were barren of constructional information, but finally, in July, 1899, the *American Electrician* carried the first answer to their prayers—the first actual constructional information on wireless—and it was hailed as a great find by amateurs everywhere. . . .

In 1901 there came to pass the incident that really brought about the widespread development of amateur radio—and of all other branches of radio, for that matter. On December 6th, Marconi arrived from Europe at St. John's, Newfoundland, with two assistants, and proceeded to erect the most advanced wireless receiving station of the time in the old Barracks of Signal Hill, at the mouth of the harbor. On December 10th he

sent up a huge hexagonal kite of bamboo and silk, nine feet long. The wind snapped the trailing wire, and the kite drifted out to sea. The next attempt was a 14-foot hydrogen balloon; this, too, broke away and floated off into the fog. Finally, on December 12th, a kite was successfully sent aloft to four hundred feet and held. Marconi cabled his station at Poldhu, Cornwall, on the southwest tip of England, to begin transmitting. With one assistant present he started listening for the signal—the pre-arranged code letter "S". The transmissions were to begin at 11:30 a.m. Just before noon-time, Marconi heard a repeated trio of buzzes in the head telephones . . . three dots . . . the letter "S"! His assistant verified the reception. Again, twice in the early afternoon, the signal was heard.

Two days later Marconi released the results of the tests to the press. Two thousand miles of space had been bridged—without wires. The press of the world went mad—pages were filled with jubilation, disbelief, triumph. "Wireless" was on everyone's tongue. But most of all it filled the hearts and minds of the hordes of electrical experimenters and other kindred souls throughout this and other countries, and by the hundreds they turned from their backyard telegraph systems, their electric motors and their wet cells, and all their other hobbies—a bunch of tousled, patient, eager-eyed enthusiasts filled with an insatiable curiosity and undaunted by a thousand failures—and, perceiving that here was something a hundred-fold more engrossing than all else, they plunged into wireless. . . .

Early Progress

For the first ten years, progress was slow and fraught with difficulties. Technical and constructional material was scarce. Although a number of articles on wireless were published, often in con-

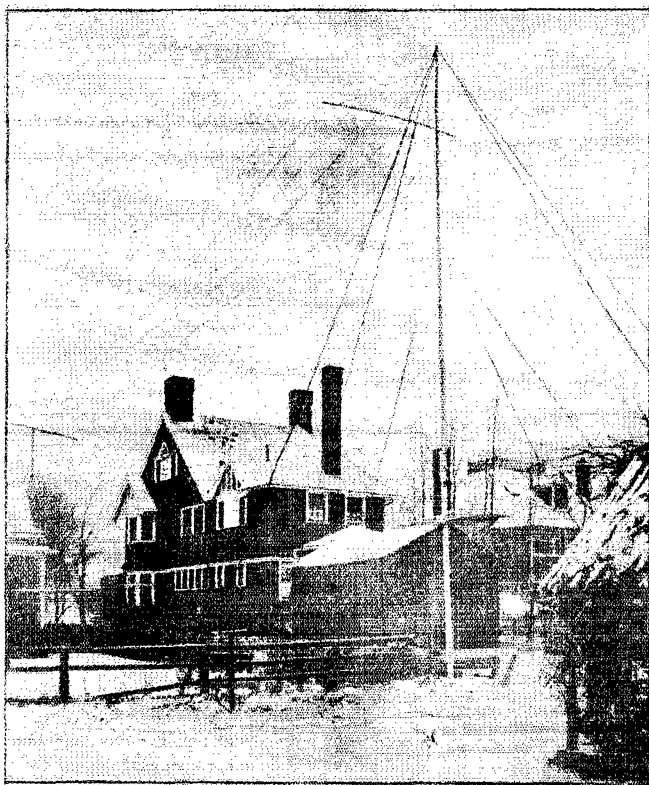
EDITOR'S NOTE: Some portions of this story (in contrasting type) are excerpted from *Two Hundred Meters and Down*.

sumer magazines, they were usually for the layman; only occasionally was useful constructional material included. In 1908 Hugo Gernsback, already well known through his Electro-Importing Company catalog and wireless supply house, began the publication of *Modern Electrics*, which as a result of enthusiastic reader acceptance quickly adopted a policy of covering wireless almost exclusively. This, plus lesser treatment in other magazines, and a textbook or two, made generally available to embryo hams the information necessary to assemble a station.

The typical amateur station of those days was an induction coil, a condenser and spark gap for the transmitter, and a simple coherer-decoherer or galena crystal for the receiver/detector, usually into a single head telephone. Better-equipped stations had receiving tuners (most U. S. commercial receiving equipment was untuned, since patents on the loose-coupler system of tuning were held by Marconi, a legal problem which did not bother amateurs). Although the Fleming valve had been invented in 1904, and the deForest audion in 1906, neither found immediate general acceptance in wireless communication — in the case of amateurs, probably because of the high cost compared with only slightly improved results. Distances ranged up to several hundred miles for the larger stations

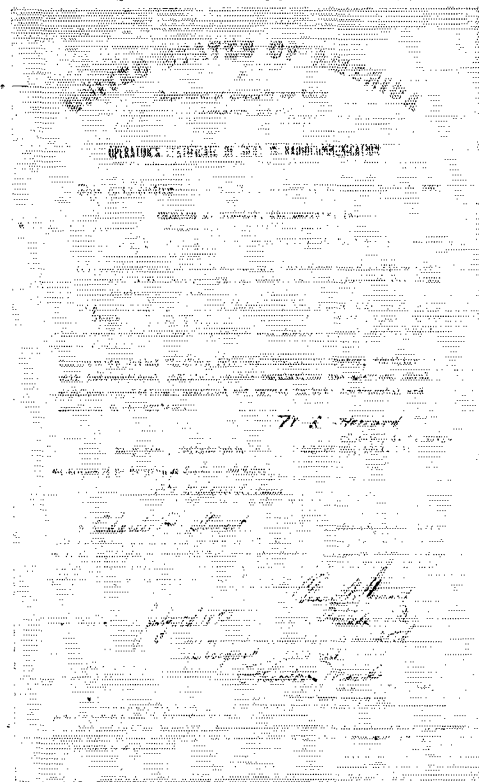
with several kilowatts, but for the most part hams were content with 50 or 100 miles with average gear.

Regulation was non-existent; there was no radio law. The Navy did issue "certificates of proficiency," but this was not a requirement for operation. Everyone had an equal right to the air. Operating conflicts between amateurs, military (mostly Navy) and commercials occurred often. The Navy and commercials charged that amateurs were cluttering up the air and interfering with important traffic; the amateurs in turn claimed that if the complainants would use modern (tuned) receivers, they would have no difficulty! Trouble was brewing; many amateurs had better and more powerful stations than those used by the Navy and commercial services, and were often better operators. The opponents of amateur radio took their case to Congress, and in the period 1906-1911 a flurry of bills was introduced. In one way or another, each would have spelled doom for amateur radio; one, urged by the Navy, would have made wireless an exclusive government monopoly (as indeed developed in most foreign countries). None of these succeeded. Although generally unorganized, amateur radio of 1910 had enough small clubs and capable individual representatives to block the bills. Admittedly, this was accomplished with the help of the Marconi company (not necessarily



In 1914, as in 1964, the goal of every amateur was a bigger and better antenna system. This was Hiram Percy Maxim's house on Prospect Avenue in Hartford, and this 80-foot-high antenna was erected by his son Hamilton and himself. (Photo from *Hartford Times*, January 17, 1914.)

through any love for amateurs), who supported the amateur's contention that U. S. commercial gear was inferior (implying, of course, that Marconi's tuning system was much better). The Radio Club of America and the Wireless Association of Pennsylvania (represented by Charles H. Stewart, later to become ARRL vice president) were among those who appeared in opposition



This was the Navy Certificate of Proficiency. This one, issued to Charles Stewart, is on permanent exhibit in the ARRL Museum of Amateur Radio.

to the bills which would have spelled the death knell for amateur radio.

The Coming of the Law

But some sort of law was inevitable; uncontrolled, the situation was becoming impossible. What to do with amateurs? Although having no effective national organization, from a political standpoint they were already too numerous and outspoken to be completely relegated to oblivion by a stroke of the regulatory pen. Finally the commercial and government interests hit on a solution. The scientific world at that time believed that long waves were most valuable, and that short waves were pretty much useless. "Ah, that's it — put the amateurs below 200 meters, where they'll never get out of their back yards, and then we can conduct our important business on the long waves without interference."

The Radio Act of 1912 was pushed through Congress and signed by President Taft on August 17. Amateurs could use only wavelengths

below 200 meters, and were limited to a kilowatt input. The law required that henceforth all transmitting stations would be licensed, under the jurisdiction of the Secretary of Commerce and Labor. There were sections calling for the use of a pure and sharp wave, one requiring listeners to observe the secrecy of messages, and provision for punishment of violations of the regulations or the transmission of false distress calls. No individual services were defined except the coastal stations and ship stations.

But at least ham radio had not been completely abolished. And it set to work, determined to maintain its existence. Little did amateurs know then that soon they would prove the short-waves the most valuable of the entire spectrum for long-distance communications.

Organization

In January, 1909, the first amateur radio organization had been formed — the Junior Wireless Club, Limited, of New York City, eventually to change its name to the Radio Club of America. Editor Gernsback of *Modern Electrics* in the same year started the Wireless Association of America. With famous names as honorary sponsors, and with no dues and no obligations, it grew rapidly to a claimed total of 10,000 a year later. This figure was indicative of the national interest in wireless, although certainly not of the number of active transmitters, of which there were (not counting small spark coils) about 600.

In January, 1914, the scene of *Destiny in amateur radio shifted to Hartford, Connecticut. On January 14th there was held the first meeting of the Radio Club of Hartford, at that time just another of the large group of radio clubs that had been springing up throughout the country for the past four years. In the chair at this first meeting was Hiram Percy Maxim, the brilliant engineer who had already achieved lasting fame through his pioneer work in the development of the auto-*

The Hartford Radio Club formed on January 14, 1914, and I became first president on my 21st birthday (that date). As I recall, the club was formed in hopes of bringing some order out of the unregulated ether. The conflict then was mainly between the hams with tuned signals (albeit unearthly broad) with rotary gaps and helix, and those whose transmitters consisted of Ford coils whose spark simply went to antenna and ground. This was really an "all-wave" sending device which rivalled the later jamming devices of the Russians. In order to attempt a tone tuning effect, so that possibly more than one coil might operate within a five-mile radius, the "rubber band" tension on the vibrator gave character, and with several going at once it produced all the cacophony of a frog pond in April. . . .

— David L. Moore

mobile, and for his invention of the Maxim silencer. He had become interested in amateur radio through the activities of his son in 1907, and soon developed one of the dominant stations of all New England.

Temporary secretary of this first meeting of the Radio Club of Hartford was an eighteen-year old Hartford amateur named Clarence D. Tuska. Before the meeting was over, David L. Moore had been elected president of the club, while Tuska continued as secretary. Bi-monthly meetings were scheduled. A constitution was drawn up and adopted at the next meeting. Twenty-three charter members were on the rolls. By March 9th the attendance had mounted to 35.

Then Destiny encamped. At that time, the demand for vacuum tubes had reached a peak as a result of publication of the wonderful Armstrong regenerative circuit. Production could not keep up with the demand. No longer was it possible to go up to the Metropolitan Tower in New York, leave five dollars with the deForest Radio Telephone Co., and depart with the precious audion. H. P. Maxim was very anxious to secure one of these vacuum tubes, but he had been unsuccessful in his attempts to purchase one. Sometime during the four-week period between March 9th and April 6th, however, he learned that an amateur in Springfield, Mass., had an audion for sale. That night he sat down at his transmitter and attempted to send a message to Springfield opening negotiations for its purchase.

Maxim's one-kilowatt station, IWH, at that time had a maximum sending range of about 100 miles under favorable conditions. Springfield was only thirty miles north of Hartford. Yet it so happens that from time immemorial right up to the present day some peculiar transmission condition has made direct ground-wave radio communication between Springfield and Hartford difficult if not an impossibility. Maxim could not "raise" Springfield.

Pondering the problem, with characteristic insight he divined the solution. To one of the early meetings of the Radio Club of Hartford there had come a young lad from Windsor Locks, a small town intermediate between Hartford and Springfield, who said he had a transmitter on the air. The topography of the intervening region was such that he could work both Hartford and Springfield with ease.

Maxim solved his problem by calling this Windsor Locks amateur and asking him to relay the message to Springfield. The feat done, he sat back in his operating chair, puffing his familiar pipe, and pondered more. Driving from his home downtown to his office behind the wheel of his huge automobile the next morning, he continued to think about the incident of the night before, and an inspiration was born.

He has always been careful, since that time, to explain that no significance attached to that particular relay. It was not the first time that relaying had been accomplished. "Ships at sea were using the relay principle to get messages from mid-ocean to shore. Amateurs themselves had probably relayed messages beyond the limits of their particular sets before. It is certainly true that the Central Radio Association ("From the Rockies to the Ohio"), which was organized in 1911 and which in 1914 had several hundred members, shortly afterward was relaying messages over hundreds of miles. No, the relay was not especially significant.

The real significance attached to the thoughts that went on in Maxim's mind after the relay had been accomplished, for that next morning there was born the germ of an idea for the long-needed and much-desired truly representative national amateur radio organization. Maxim had for many months felt the need for such an organization, just as he had felt the need for a local club in Hartford. The latter had come to pass. Now the realization of the former was at hand.

The relay idea represented an ideal basis for the needed national organization. Some basic principle, some prime moving force, was essential for the success of such an organization. Americans have always been great "joiners" but if an amateur organization were ever to progress beyond the paper stage, or expand into more than a local club, it must offer more than a gaudy membership certificate and one's name on the rolls. The futility and early decrease of the Wireless

Handwritten notes and signatures in blue ink, including names like "Maxim", "Thiede", and "Windsor Locks". The text is illegible due to the image quality and includes various scribbles and initials.

This letter was received at League Headquarters in September, 1914. Apparently Mr. Thiede was sufficiently intrigued by the reply to continue with amateur radio. He is still active, as W2EC.

Association of America had shown this clearly, as did the restricted appeal, limited to the New York metropolitan area, of the Radio Club of America.

At best, ranges in those days were limited. With the power and the equipment and the wavelengths then available, there was little hope for enlargement of the distances covered. After all, the only way radio folk of those days knew how to get greater distance was to increase power, and amateurs were limited to one kilowatt. Even if this were stretched to two or three, as was still occasionally done, the improvement was not appreciable. But an intermediate amateur

could relay messages over greater distances with ease and expedition. The only requirement was to achieve some sort of mutual understanding so that each amateur would aid his fellows. Organization was needed—organization that would accomplish the dual purposes of opening relay facilities to all and of bonding together the amateurs of the country into one strong, cohesive, self-reliant body.

Mr. Maxim discussed his idea with the Hartford Club prexy, David Moore, and then wrote him the historic letter reproduced in these pages. At its meeting on April 6, 1914, the Radio Club of Hartford voted to take charge of the development of a relay organization, and a committee to handle the details was appointed.

March 25th, 1914

David L. Moore, President,
Radio Club of Hartford,
18 Asylum Street,
Hartford, Conn.

My dear Mr. Moore:—

I am enclosing herewith copy of letter which I have sent to *Modern Electric* and also to *The Electrical World*. As you will see it "opens the ball" on the subject of our Relay Scheme.

Now, what I want to do is to get you and Tuska together some time, within the next day or two, and organize the AMERICAN AMATEUR RADIO LEAGUE. We three can draw up in a few minutes a very simple straight forward statement of the objects of this League. We can then decide who the officers should be and elect them. Then, at the next meeting of the Radio Club of Hartford, we can let the Club decide if it is to become a member of the League. We will then be regularly started and can probably get the Connecticut Valley Radio Club in Springfield to join and it would not be long before we could get others also.

The object of securing the membership of the various Clubs, would be to have those Clubs advise us as to what stations in their locality are the best ones for us to appoint as OFFICIAL RELAY STATIONS. We probably would get wise advice in this manner, because it would be quite a distinction for a station to be appointed to a long distance relay point. It is the only way we will have of getting at the proper stations who could be counted upon to always be in working order and able to read and transmit at decent speeds.

My letter describes the whole matter. I am sending a copy of this letter to Tuska. I wish both of you would give this subject careful thought and be prepared to bring up all possible objections so that we will make no mistakes in the beginning.

Very truly,
HIRAM PERCY MAXIM

The League Grows

By middle May application blanks bearing detailed questions concerning receiving and transmitting equipment and performance were printed, and Maxim and Secretary Tuska sat down and wrote letters to every amateur station they could think of, announcing the formation of the American Radio Relay League and enclosing one of these blanks. There were no dues; membership was free on application. At the same time, the requirements were set at a high standard and rigidly maintained, so that only qualified amateurs were accepted as relay stations. The response was tremendous. Application blanks came back in every mail. On June 16th the Radio Club of Hartford appropriated the sum of fifty dollars to be spent in further development work. Prior to this time, Maxim and Tuska had paid for the solicitation letters out of their own pocketbooks. The influence of the League was mounting rapidly. It had members in every section of the country . . .

By August, 1914, more than two hundred relay stations had been appointed, from Maine to Minneapolis and from Seattle to Idaho. One of the stations belonged to a man 64 years old; others were owned by youths just entering high school.

In September the League published a map of the United States showing the location of 237 stations in thirty-two states and Canada. In October the League published its first call book, actually a List of Amateur Stations, a little blue-bound book showing the names, addresses, calls, power, range, receiving speed and operating hours of 400 stations. One-kilowatt stations were surprisingly numerous; they claimed ranges from 50 to 350 miles. The smaller stations, using from 10 to 100 watts, worked from 10 to 20 miles. This call book, the United States map, seven state maps, and a pad of 50 official message blanks were sold for 50 cents.

In late 1914, Maxim went to Washington and conferred with the Commissioner of Navigation of the Department of Commerce. The object of the conference was to establish the League in official circles, and to secure

AMERICAN RADIO RELAY LEAGUE

HEADQUARTERS RADIO CLUB OF HARTFORD
HARTFORD, CONN.

OFFICERS
PRESIDENT: HIRAM PERCY MAXIM
VICE PRESIDENT: CLARENCE D. TUSKA
SECRETARY: LAWRENCE A. HOWARD
TREASURER: DAVID L. MOORE
DIRECTOR: R. C. PALMER
DIRECTOR: W. W. HOWE

Your Name _____ Address _____
 Your Age _____ Your Station Call Letters _____
 Are you a member of any Radio or Wireless Club, and if so give name and address _____
 Length of last device _____ Height above ground _____
 Number of wires in series and space between _____

SENDING EQUIPMENT

Do you obtain your power from a Battery or City Current? _____
 Do you use a Spark Coil or a Transformer? _____
 What is your Power Input? _____
 Is your Spark Coil Rotary, Hand or Hand-crank? _____
 What Transformer spark gap? _____ Approximate Wavelength _____
 Give name and address of the MANUFACTURER obtaining the equipment, with _____

RECEIVING EQUIPMENT

Do you use an Inductor or Transformer? _____
 What are your approximate receiving range or ranges? _____
 Are you satisfied with your receiver? _____
 What are your most interesting or surprising features of work done by you during the past year? _____
 Have you telephone connections at your home or office? _____
 Do you keep your station primarily for emergency or emergency work? _____
 Can you receive Morse Code? _____
 About how long have you been using your receiver? _____
 What is the nearest Commercial or Government Station to you? _____
 Have you any Government Station, and if so what kind? _____
 Please indicate the reasons for members which you think will be of help in perfecting a chain of American Radio Relay Stations in the South of the country.

The above information is to be used for engineering studies which are necessary to perfect a RELAY SYSTEM. The League does not wish to be considered as guaranteeing that this information is correct for the purpose of the AMERICAN RADIO RELAY LEAGUE and it is not to be used for any other purpose than that for which it was intended. The League is hereby advised by submitting the foregoing that no member is making a contract.

I HEREBY OFFER TO RELAY OR DELIVER ANY AMERICAN RADIO MESSAGES THAT ARE SENT TO ME.

Those who wanted to take an active part in the early activities of the American Radio Relay League filled out one of these applications. The application listed Directors of ARRL as Hiram Percy Maxim, Clarence D. Tuska, Lawrence A. Howard, David L. Moore, R. C. Palmer, and W. W. Howe.

the important concession of permission to operate stations at strategic points along the relay routes of the country under restricted special licenses, enabling them to use the wavelength of 425 meters. These licenses were issued wherever necessary to enable relaying to the next point on the chain, and were granted only to stations sufficiently remote from the sea-coast to avoid interference. The sole restriction was that the 425-meter wavelength was to be used exclusively for the relaying of bona fide messages, and not for idle conversation.

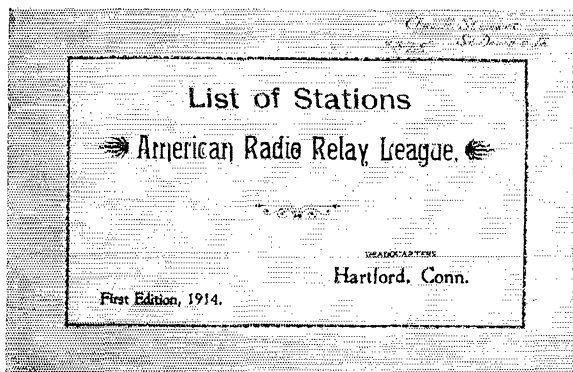
The League was actually relaying messages by this time. One station reported handling forty messages in two weeks. Another station owner hired an extra operator, to keep the transmitter constantly on the air and prevent an accumulation of messages. Dozens of other stations were on the air practically continuously, doing nothing but handling traffic. Relay networks had been lined up with fair efficiency over most of Eastern United States.

Local trouble was in the offing, however. Here again one sees the working out of the Destiny that was the League's, courage that was to preserve the working out of an idea of untold eventual national and international importance from the short-sighted hobble of local control. At the January 11, 1915, meeting of the Radio Club of Hartford, friction between some of its members and those of the League began to appear, the source being a disagreement as to whether the League was to be an unfettered and unhampered national organization, or subject to the control of the club. In H. P. Maxim's

absence, discussion was postponed until a later meeting. In view of these difficulties, as a result of mutual agreement, Maxim divorced the activities of the League and the club, reimbursing the club from his own pocket for expenditures beyond the original appropriation, the appropriation itself being repaid later. At the February 15th meeting, Maxim and Tuska resigned as members of the club, and David L. Moore resigned as president. From that time on, the two organizations went their respective ways and each fulfilled the purposes for which it was intended. The League was incorporated under the laws of the State of Connecticut, to give it legal status.

Now entirely on its own, the League had to give careful consideration to the question of finances. Selling a 40-page booklet, 8 maps and 50 message blanks for 50 cents left little margin of profit. It was decided to assess each member 50 cents a year for "station dues." This was not a compulsory charge; members could contribute or not, as they wished. There was, however, a gentle hint that non-paid-up members would be so listed in succeeding issues of the call-book.

The membership grew steadily. A few stations were deleted from the relay station list for inactivity, for operating standards were kept very high, but the increase more than offset the deletions. In March, the second edition of the List of Stations was issued. Six hundred members were listed, an increase of 50 per cent in less than six months. Equally significant was the changing character of the listings. Several one-kilowatt stations showed ranges approach-



This collector's item is the cover of the first *List of Stations*, published by ARRL in 1914

ing one thousand miles. Operating speeds were increasing. The increased proficiency developed by the additional operating practice and the advantages of organization were manifest.

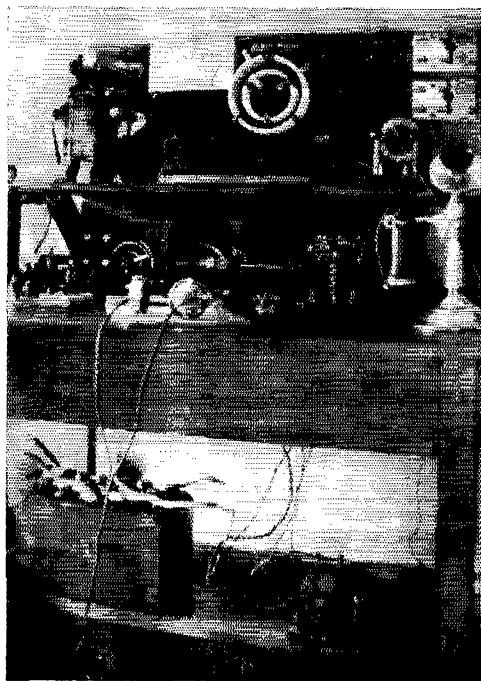
Indeed, by the end of 1915 amateur stations were accomplishing what were in those days unbelievable feats in transmission and reception. With homemade equipment, often not exceeding a hundred dollars in total cost, and in the despised 200-meter region, they were frequently out-performing government and commercial plants representing investments of thousands of dollars. True, amateurs had similarly outperformed these stations prior to 1912—but then they had not

been handicapped by power and wavelength limitations. Even if these limitations were not too strictly observed, they still served as a hampering factor, and it was not until three years after the passage of the Radio Act of 1912 that amateurs again achieved superiority in performance. The reason for this regained superiority obviously lay in the improved internal organization, which lent added facilities for increasing both technical and operating ability.

Meanwhile, through radio contacts and correspondence, the building up of the relay routes for which the League had been formed was going on. Considerable success was had, but the difficulty of adequate organization contact, especially with distant states, seemed insurmountable. It was proving a real task to acquaint the growing membership with new plans and schedules by means of correspondence alone. It became increasingly apparent that some kind of general circular or bulletin was necessary. The League, however, had no funds; the nominal optional membership assessment was not remunerative; there was no profit in publications which were sold at cost.

The answer, seemingly obvious but surveyed with some reluctance by Maxim and Tuska, was a self-supporting magazine. In December, 1915, each member of the League received in his mail a sixteen-page magazine called QST—the "December Radio Relay Bulletin." This, it was announced, was being published privately at the expense of Maxim and Tuska. It was to be sold independently of the League, on a subscription basis. The subscription fee was to be \$1.00 per year. The stated object of the magazine was "to maintain the organization of the American Radio Relay League and to keep the amateur wireless operators of the country in constant touch with each other."

Having now for the first time a journal devoted solely to the chronicling of its activities, amateur radio rolled up its sleeves girded for accomplishment. The accomplishment was to come, and other things as well.



A typical amateur station of those early days looked something like this.

How DX Kings Rate Antennas

● Including Results of a World-Wide Survey

BY DONALD G. ROSS,* JR., W2JMZ

Like many hams who work DX occasionally the author has wondered which type of antenna is really the most effective for DX work. Each type, seemingly, has its vociferous supporters and its claims of superiority, and trying to sort fact from fantasy is difficult, if not impossible, for the average ham who might be contemplating erecting a better antenna in the future.

WHICH is better — the Yagi or the Quad? How do the many fixed arrays compare with the rotary designs? Is height as important as some say? What better way to learn the answers to questions such as these, it was reasoned, than to ask the leading DXers of the world what they have used for antenna systems and for them to rate them for DX effectiveness. Although a nontechnical approach to the subject, this method should produce information and opinion based upon heavy experience, DXing being the competitive avocation that it is.

Questionnaires Sent Out

Questionnaires were sent accordingly to members of the DX Century Club credited with 280 or more countries as listed in the July 1963 issue of *QST*. None of these "DX Kings" or their opinions were known in advance by the author. A total of 24 antenna designs having gain advantage over a simple dipole were listed, and each DXer was asked to check off only those types which he had used personally, and then to rate them using 1, 2, 3, and so on, as to the best DX antenna, 2nd best DX antenna, etc. A column was provided for listing any antenna types intended for trial in the future, and another column for listing any types that would be tried if space, time and cost permitted.

Each recipient was requested further to explain why the antenna he rated No. 1 was the favorite and to submit any other general information on antennas he wished. Inclusion in the format of the two columns for antenna types that will be tried or that would be tried if circumstances permitted was for the purpose of determining whether some responders had reason to feel that there was a type superior to their favorite, it being reasonable to assume that few would install a new antenna not considered to offer some additional advantage.

* P.O. Box 317, Katonah, New York

Results of the Survey

It proved fascinating to go through the 57 returns received and observe a rather definite pattern of agreement emerge from the many experiences and opinions expressed, a composite opinion which may hold for you a few surprises, as it did for the author. In order of importance the leading DXers say that:

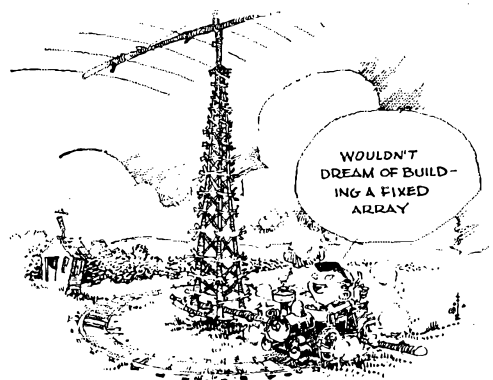
- a) Height is more important than antenna type.
- b) A good natural location can offset antenna shortcomings.
- c) An antenna must be rotatable to be truly effective.
- d) Fixed arrays, including verticals, are relatively poor.
- e) The best antenna is the Quad.
- f) The most popular antenna is the 3-element monoband Yagi.

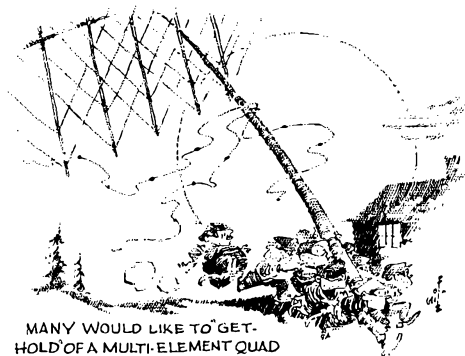
Height and Location

Before getting into comparative ratings and other, perhaps controversial, aspects of the survey findings, let's hear what some of the lads say about the importance of height and location to putting out a signal effective for DX work.

W7YGV — "It is well known that a low angle of radiation is the secret to putting a good signal out over a long distance. The two factors which determine the angle of radiation are the antenna itself and its height. I use a tower of 70 feet. All of my experiments have been conducted at this height — and at 50 feet — and I am convinced that the extra 20 feet of tower height is the best investment that I ever made."

W2PCJ — "More important than antenna type is location, to provide lowest angle of radiation. This, of course, is dependent upon height of antenna and ground conductivity. A reduction of radiation angle of 4 degrees will cause an effective 6 to 10 db. gain at a receiver 8,000 miles or more away (calculated)."





W2LPE — "Get the highest practical height above ground — it helps a lot on the long-haul DX."

W8KML — "Height buys db. — the higher the better."

W5BR1 — "I feel the location is just as important, maybe more important than the type of antenna. A perfect location would be a hill of salt water with a gentle slope. Since this is impossible, the closest thing to it would be a gently sloping hill with high soil conductivity which would provide a ground reflection coefficient low on the horizon."

W4QCV — "My antenna height is 60 feet, but the boys 75 to 125 ft. up do better on long-haul."

W0DI — "I believe height is an important element. Mine is 55 ft. but believe it should be 65 ft. or more. On short hops any antenna at a given time may stand out, but not consistently like the multi-element jobs high up on DX halfway around the world."

W7GUY — "A height of 60 to 90 feet is about optimum. A good part of an outstanding signal many times is a particular geographical location. The particular ground conductivity and lay of the land is important."

W8DAW — "Gain is not the only thing. It's where you put it that counts. Have used stacked beams for over 10 years. Nothing else will pull down the angle of radiation so well."

W6GPB — "My past experience with DXing boils down to this: location is most important, then comes the antenna, receiver next and lastly the operator. Power enters into it if the location is not too good, then power helps a lot. With Gus at Yemen, only the boys with the good locations worked him around here, so good operating won't help if you can't hear them."

W6EBG — "It is my good fortune to have a fine DX location which makes up for the lack of a super antenna."

The importance of radiating at a low-wave angle is obvious from these comments. Height is the variable most under the control of the average amateur. It appears that a height of from 60 to 90 feet is necessary (on 20 and 15 meters where more than 95 per cent of all DX is worked) to obtain the low angles of radiation so important for long-haul DX. In most situations a significant increase in antenna height will achieve a greater improvement than changing to another good antenna design. If a move to a new QTH is being considered, however, you'd better include topography and soil conductivity among your criteria for that new location.

The remaining findings of the survey relate in one way or another to the information listed

in Table I, a compilation of the data from the returns, so a few words are in order before proceeding further.

Except for the column "Composite Rating," the number shown in the other columns for each antenna type is the total in each instance from all returns. For example, 42 report having used a 3-element monoband Yagi and 8 a Vee beam. One of the responders intends to try a 3-element Quad, and 6 would like to.

It was neither possible nor valid to include all of the data in rating the antennas for performance as some failed to rate the antennas they listed and others had used but a single antenna. The composite rating is simply the average rating of the valid individual ratings, discarding the "worst rating" in each instance. Had the individual ratings been 2, 3, 1, 2 and 5 for some mythical antenna, for example, its composite rating would be 2.0, the 5 being discarded in the determination. (Only those ratings based upon 4 or more valid, individual ratings are shown. Of course these ratings have no technical significance; it's merely a case of the lower the rating, the more effective the antenna for DX work. While the rating method employed may cause the professional statistician to blush — the sampling quantities are low — it has the advantage of simplicity. Further, with but one exception covered later, the results fit the story spelled out by these DXers in their written comments.

Rotatable Versus Fixed Arrays

By noting the ratings in the composite rating column, one can conclude quite readily that

ANTENNA TYPE	A	B	C	D
Rotary Horizontal Element Types				
Rotatable dipole	23	—	0	0
2-element parasitic beam	37	3.18	0	1
3-element (monoband) parasitic beam	16	1.34*	4	4
4-element (monoband) parasitic beam	2	—	4	5
5- or 6-element (monoband) parasitic beam	7	—	0	0
ZL Special	6	—	0	1
G4ZU beam	22	2.07	0	1
3-element triband parasitic beam	8	—	5	1
Other	—	—	—	—
	133	—	13	12
Rotary Loop Types				
Rotatable loop	2	—	0	0
2-element Quad	13	2.00	5	2
3-element Quad	1	—	1	6
4-element Quad	1	—	5	10
Other	2	—	1	0
	19	—	12	18
Fixed Arrays				
Long single wire	24	3.92	0	4
Vee beam	8	3.00	0	6
Rhombic	3	—	0	13
Extended double Zepp	10	4.20	1	1
Other collinear arrays	6	—	1	7
Lazy H	3	3.67	0	0
Other broadside arrays	3	—	0	0
End-fire arrays	3	—	0	0
Combination driven arrays	2	—	0	2
Sterna array	2	—	1	4
Brace array	1	—	0	0
Vertical antennas with gain (including ground planes)	13	3.37	2	3
Other	4	—	0	0
	82	—	5	36

A: Number tested.
 B: Composite rating.
 C: Number to be tested in the future.
 D: Number that would be tested if possible.
 * See text.

fixed arrays are held in rather low esteem by the fraternity. They rate them no better than 3rd and 4th choices at best, and only the long single wires, extended double Zepps, ground planes and Vee beams are modestly popular. The more intricate arrays are definitely unpopular. Only a few responders made mention of them in their comments, indicating again the lack of interest in them relative to the rotary types. The rhombic and the Vee beam are obviously felt to be good antennas, for a total of 19 of them would be erected if circumstances permitted, yet none from this group of DXers actually intends to! In fact, only 5 fixed arrays of all types will be put up and evaluated — so they say.

Perhaps it is not too difficult to understand why the fixed arrays hold so little interest. Likely few of them were installed at heights enjoyed by the Quads and Yagis because of the difficulty and expense of providing 2, 3 and 4 supporting structures rather than the one required for a rotary. If so, it follows that the majority were evaluated under less than optimum conditions and hence suffer by comparison. Most fixed arrays offer no more gain than rotary designs, so there is little to recommend them apparently, except the ability of some to perform adequately over several bands.

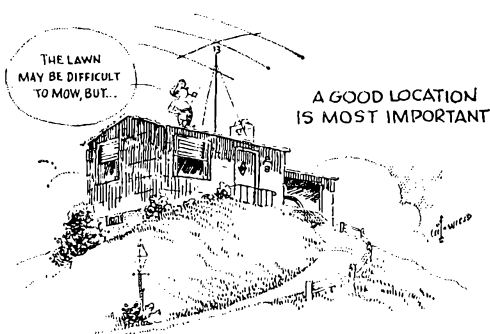
The vertical ground plane deserves minority opinion mention here, as it has its supporters despite preponderant opinion favoring rotaries. It is known that for 80 and 40 meters a ground plane (or a vertical worked against ground) is effective for low wave angle radiation. The American DX leaders rate them ineffective for use on 20, 15 and 10 meters. Some European and African DXers find the omnidirectional pattern of benefit in *finding* the DX before switching over to their beams to work the station. Others use ground planes for both transmitting and receiving as they feel it is a definite asset to be able to receive and radiate equally well in all directions, and they are willing to put up with their susceptibility to ignition noise pickup and, at times, to QRM from all points of the compass.

Taken in the overall, the world's DX leaders believe the rotary beam antenna designs to be noticeably superior to any fixed array. Could it be that the facility to aim a signal at the DX target overshadows all other considerations?

The Best Antenna is The Quad

The composite rating for the 2-el Quad shows it to be superior to the 2-el Yagi and to the 3-el triband Yagi, and not as good as the 3-el and 4-el monoband Yagis. If there is any validity whatsoever to the theory that the more elements the better the performance, then one is led to the conclusion that on an element-for-element basis the Quad will outperform a Yagi under equivalent conditions. Some of the comments from DXers who have used both a 2-el Quad and one or more of the Yagis are revealing:

G3AAM — "Over several years the outstanding signals from U.S.A. east and west coasts seem to come from 3, 4 and 5-el Yagis. The gain of a Quad



on DX seems about same as 2-el full-sized Yagi but the discrimination on Quad is better." [He also rated his Quad better than triband Yagi.]
W3LMA — "Find the Quad about equal to a 3-element parasitic beam of the triband type. Think the 4-el Quad tops."

ZLHY — "Quad has most gain. My 3-element beam was close-spaced and maybe not tuned at its best. Quad is easy to tune, match and maintain. No copper-aluminum corrosion troubles like in Yagis."

P10PX — "The G4ZU antenna is just a marvel on 21 Mc. and 28 Mc. but no good at all on 14 Mc. I replaced the G4ZU with a 21- and 14-Mc. Quad. Any station (and I mean rare DX station) I hear I can work earlier and longer than hams using 3-element beams, both on 14 and 21 Mc. Give me a Quad any time."

Here is what three DXers say who have not as yet used a Quad themselves:

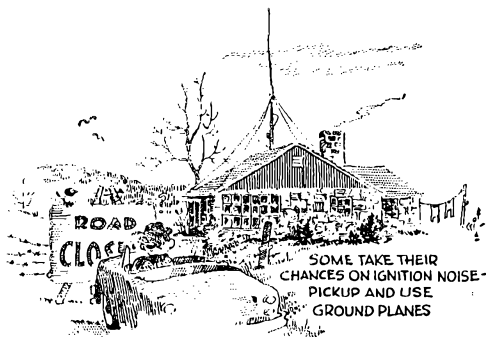
W0QVZ — "4-element Quads beat me every time, but I can't put one up. So I stay happy with my 3-element monoband Yagi."

W4QCW — "The boys with the 5- and 6-element parasitic arrays seem to have the edge — also I put the 4-element Quad in their class."

VQ4ERR — "The best signals consistently heard in East Africa are from users of 4-el Quads. Next in order are from 5- and 4-element monoband Yagis."

It is worth mentioning here that among all the written comments there was not a single instance of a DXer citing the Yagi to be the better design! It was always a case of the Quad being mentioned in a positive sense, praising it and frequently comparing it to a Yagi.

(Continued on page 164)



Happenings of the Month

Election Results

More on Advanced Class

Examination Schedule

DIRECTOR ELECTION RESULTS

The contested portion of the ARRL autumn elections has resulted in the selection of two new directors and four new vice-directors, and in the reelection of three incumbent directors and one vice-director.

In the Atlantic Division, incumbent Director **Gilbert L. Crossley, W3YA/W3DKN** won a clear majority of 2498 votes, defeating Harold P. Grace, W3HFY, who had 1258 votes and Allen R. Breiner, W3ZRQ, with 991. Mr. Crossley will thus embark on his sixth consecutive term as director.

Also in the Atlantic Division, Col. **Edwin S. Van Deusen, W3ECP**, won a third term, chalking up 2845 votes to 1884 for Fred C. Kaffer, W2PPS.

In the Dakota Division, **Charles M. Bove, W0MXC** of Minneapolis, garnered 360 votes to 224 for Martha J. Shirley, W0ZWL, and 186 for John W. Sikorski, W0RRN, in the vice-director contest. Retired from the sign-making business, Mr. Bove was Section Communications Manager for the Minnesota Section from 1951 through 1956. He's vice-president and past secretary of the Minneapolis Radio Club, and has been licensed since 1946.

In the Delta Division, **Philip P. Spencer, W5LDH/W5LXX**, topped a six-sided race to become the director. The voting went like this:

Mr. Spencer	496 votes
Thomas J. Morgavi, W5FMO	283 votes
Floyd C. Teetson, W5MUG	277 votes
Robert G. Affel, W4TDW	276 votes
Sanford B. DeHart, W4RRV	153 votes
Graham H. Hicks, W5IHP	120 votes

The new director, a resident of the Lake Vista section of New Orleans, is an attorney at law. He's past president of the Longhorn and Tulane Amateur Radio Clubs and past secretary of the Greater New Orleans Amateur Radio Club, Inc. At various times since he was licensed in 1946, OM Spencer has been Section Emergency Coordinator, has held various ARRL field appointments and has been a member of WERS, MARS and AREC.

Delta members picked **Franklin Cassen, W4WBK**, as vice-director, giving him 670 votes to 556 for John S. Sisson, Jr., W4WZC, and 353 for William B. Egbert, K4JIG. Mr. Cassen is an electrical engineer with Harland Bartholomew & Associates, consulting civil engineers, and makes his home in Memphis, Tenn. He's past treasurer and presently a director of the Midsouth Ama-

teur Radio Association. W4WBK is Section Emergency Coordinator of Tennessee, and assistant radio officer for Memphis Civil Defense. He first held a license in 1919 and his present "hitch" as a ham dates from 1952.

Dana E. Cartwright, W8UPB, with 1953 votes, outdistanced John O. Baumgardner, W8BF, with 1344 votes, and E. E. Barnett, K8JSQ, with 699, to secure his third term as director of the Great Lakes Division.

The race for vice-director of the Great Lakes Division was a close one, with **Charles C. Miller, W8JSU**, topping Robert B. Cooper, W8AQA, 2002 to 1974. The new vice-director lives in Columbus, Ohio, and is a group engineer for North American Aviation, Inc. He has been an assistant director of the Great Lakes Division for the past two years. He's president of Ohio Chapter, Order of Boiled Owls, past vice-president of the Columbus Amateur Radio Association and former activities manager of the Westpark Radiops. His license-holding dates back to 1932 and he is a member of the A-1 Operators Club.

The Pacific Division director election was a landslide victory for **Harry Engwicht, W6HC** — 1948 votes to 574 for Larry M. Reed, W6CTH. W6HC has been on the Board of Directors since 1955.

It's hard to use the adjective "new" in describing **Thomas M. Moss, W4HYW**, who won election as director of the Southeastern Division. OM Moss has been vice-director of the division since 1956, and has been manager of the W4/K4 QSL Bureau since 1951. He was Section Communications Manager for Georgia in 1946-1948, is a past secretary of the Atlanta Radio Club, past president of the Confederate Signal Corps, and past director of the Southeastern DX Club. W4HYW has also been SEC of Georgia, radio officer for East Point Civil Defense and deputy radio officer for Atlanta Metropolitan Area Civil Defense. He's ORS, OPS, OBS, OO and a member of the A-1 Operator Club. Mr. Moss lives in East Point, Georgia, and is a communications equipment operator for the Third U.S. Army at Fort McPherson. In the election, he got 1015 votes to 747 for Major Albert L. Hamel, K4SJJ, and 640 for James P. Born, Jr., W4ZD.

Charles J. Bolvin, W4LVV, got 1339 votes to 1050 for Leland W. Smith, W4YE/W4AGL, in the election for vice-director of the Southeastern Division. OM Bolvin, who lives in Miami, Florida, and was first licensed in 1934, is a senior aeronautical engineer for Pan American World Airways. He has served as an assistant director of the Southeastern Division in 1954 and again

in 1963. W4LVV is DX Editor of *Florida Skip* and was a founder and first chairman of the Florida DX Club. He is presently vice-president of the Dade Radio Club and previously has been president, treasurer and director. OM Bolvin is an OO, and is a member of the A-1 Operator Club.

ADVANCED CLASS PETITION EXTENSION

The Federal Communications Commission has extended the initial comment date on the League's Advanced Class proposal RM-399 from the statutory 30 days after filing (which would have been November 11) to December 11; reply comments may be filed until December 26. The action came as a result of a petition for extension filed by J. Foy Guin, W4RLS, and others; however, the League supported the request for extension to December 11. The League comments included requests:

1. That the Commission issue an order granting the subject motion and extending the time for filing initial comments in support of or in opposition to the League's petition to a date which the Commission believes is reasonable.
2. That the Commission note in its order that no amendment of substantive rules may be adopted without the issuance of a notice of proposed rule making and without affording interested parties a reasonable opportunity to submit comments in support of or in opposition to the proposed amendment.
3. That the Commission direct that comments be reasonably related and limited to the substance of the League's proposal and may include counter proposals.

It must be emphasized that if the Commission sees fit to issue a Notice of Proposed Rulemaking, incorporating all or a part of the League's proposal, there will be a new period of sixty days or more during which comment may be filed by *any* interested party. The initial period is intended only to help the Commission decide whether it should establish a formal docket, whether there is enough substance in a proposal to warrant issuance of a Notice of Proposed Rulemaking. No substantial change may be made in amateur rules without a full-dress "Rulemaking Proceeding." Thus, any comments which were filed through December 11, and reply comments filed through December 26, are preliminary in character.

Officers of the Valley V.H.F. Society of Shelton, Conn., present a certificate of honorary membership in the Society to State Senator Frederick Pope, Jr., in recognition of his work in the legislature on behalf of amateurs, particularly in call-letter license plate legislation a few years ago. Shown with the Senator (center) are President K1MFQ, Secretary K1RKT, Treasurer K1RJD and Assistant Activities Manager K1RGY.



If and when the Commission issues a Notice of Proposed Rulemaking, there will be a bulletin from WIAW and Official Bulletin Stations announcing the docket number; the complete information will appear in the next available issue of *QST*.

LICENSE REVOKED

The FCC has revoked the license of Gilbert S. Jackson, W0FIK, effective November 4, 1963, for failure to respond to an Official Notice of Citation dated October 11, 1962, and a follow-up letter dated February 7, 1963. The citation was for operation on phone in the c.w. portion of the 20-meter band. An Order to Show Cause was released April 18. Mr. Jackson responded to this notice, and offered reasons why the original violation had occurred, why a response had not been made, and the corrective action taken. The Commission felt that there was no excuse for failure to respond, and placed into effect the revocation of the station license. At the same time, it found that Mr. Jackson's failure to respond was more a matter of carelessness than willful intent, and that he had previously had a clean record with the Commission. Accordingly, the revocation was without prejudice to the filing of an application for a new station license after thirty days.

EXAMINATION SCHEDULE

For the convenience of those planning to take an FCC examination for General or Extra Class license, we present below a tentative schedule of dates and places for the first half of 1964. All examinations begin promptly at 9 A.M. except as noted. **IMPORTANT:** New rules require that an applicant submit his application Form 610 (August 1963 revision) *in advance*, particularly when he wishes to appear at one of the field points. The application, accompanied by a check or money order for \$4.00, should be sent to the Engineer-in-Charge of the district in which the applicant resides. Where the schedule below indicates a choice of dates or places, the applicant may indicate his preference. The District Engineer will then notify the applicant when and where to appear. (Applicants for Novice, Tech-

ician or Conditional Class licenses should follow the new procedures outlined on page 79 of December (QST.)

Albuquerque, New Mexico: April 11 at 1:00 P.M.
Anchorage, Alaska, Room 55, U.S. Post Office Building:
By appointment.
Atlanta, Georgia, 2010 Merchandise Mart, 210 Peachtree St. N.E.: Tues. and Fri., 8:30 A.M.
Bakersfield, California: Sometime in May.
Baltimore, Maryland, 415 U.S. Custom House, Gay and Water Sts.: Monday through Friday, 8:30-10:00 A.M., and by appointment.
Bangor, Maine: May 13.
Beaumont, Texas, 301 Post Office Building, 300 Willow St.:
By appointment.
Billings, Montana: Sometime in May.
Birmingham, Alabama: March 4 and June 3, 1:00 P.M.
Boise, Idaho: Sometime in April.
Boston, Mass., 1600 Custom House: 8:30 to 10:00 A.M., Wednesday, Thursday and Friday.
Buffalo, New York, 328 Post Office Bldg.: First and third Friday.
Charleston, W. Va.: Sometime in March and June.
Chicago, Ill., 826 U. S. Courthouse: Friday.
Cincinnati, Ohio: Sometime in February and May.
Cleveland, Ohio: Sometime in March and June.
Columbus, Ohio: Sometime in January and April.
Corpus Christi, Texas: March 5 and June 4.
Dallas, Texas, Room 401, 708 Jackson St.: Tuesday.
Davenport, Iowa: Sometime in January and April.
Denver, Colorado, 321 New Customhouse: First and second Thursdays at 8:00 A.M.
Des Moines, Iowa: Sometime in March and June.
Detroit, Mich., 1029 Federal Bldg.: Wed. and Fri.
El Paso, Texas: June 19.
Fairbanks, Alaska: Sometime in May.
Fort Wayne, Indiana: Sometime in February and May.
Fresno, California: Sometime in March and June.
Grand Rapids, Mich.: Sometime in January and April.
Hartford, Connecticut: March 11.
Honolulu, Hawaii, 502 Federal Bldg.: 8-9 A.M. Tuesday, Wednesday and Thursday, and by appointment.
Houston, Texas, Federal Office Bldg., 515 Rusk Avenue: Tuesday, code tests 8 to 9 A.M.
Indianapolis, Ind.: Sometime in February and May.
Jackson, Mississippi: June 3.
Jacksonville, Fla.: April 15 and 16.
Kansas City, Missouri, 3100 Federal Office Bldg.: Thursday and Friday between 8:30 and 11 A.M.
Klamath Falls, Oregon: Sometime in May.
Knoxville, Tenn.: March 25 and June 24, 1:00 P.M.
Little Rock, Ark.: February 5 and May 6, 1:00 P.M.

Los Angeles, California, Room 50, 849 South Broadway:
Wednesday at 9:00 A.M. and 1:00 P.M.
Louisville, Kentucky: Sometime in February and May.
Marquette, Michigan: May 6 at 1:00 P.M.
Memphis, Tenn.: January 9 and April 2 at 8:30 A.M.
Miami, Florida, Federal Building: Thursday.
Milwaukee, Wisconsin: Sometime in January and April.
Mobile, Alabama, 439 U.S. Court and Customhouse:
Wednesday by appointment.
Nashville, Tennessee: February 5 and May 6, 1 P.M.
New Orleans, La., 608 Federal Office Building: Monday at 8:30 A.M.
New York, N. Y., 748 Federal Bldg., 641 Washington St.:
Tuesday-Friday, 9 A.M. to noon.
Norfolk, Va., 105 Federal Bldg.: Friday.
Oklahoma City, Okla.: January 17 and April 17.
Omaha, Nebr.: Sometime in January and April.
Philadelphia, Pa., 1005 New Customhouse: Monday through Wednesday, code 8:30 to 10:00 A.M.
Phoenix, Arizona: Sometime in January and April.
Pittsburgh, Pa.: Sometime in February and May.
Portland, Maine: April 14.
Portland, Oregon, 201 New U.S. Customhouse: Friday, 8:45 A.M.
Rapid City, So. Dak.: May 9 at 11:00 A.M.
Roanoke, Virginia: April 4 at 8:30 A.M.
St. Louis, Mo.: Sometime in February and May.
St. Paul, Minnesota, 208 Federal Courts Bldg.: Friday at 8:45 A.M.
Salt Lake City, Utah: March 13 and June 12, 1:00 P.M.
San Antonio, Texas: Sometime in February and May.
San Diego, California, Fox Theatre Building, 1245 Seventh Avenue: By appointment.
San Francisco, Calif., 323A Customhouse: Friday.
San Juan, Puerto Rico, 323 Federal Bldg.: Friday.
San Pedro, Calif., 356 W. 5th St.: Wed., 8 A.M.
Savannah, Ga., 214 Post Office Bldg.: By appointment.
Schenectady, N. Y.: March 11 and 12 and June 10 and 11; 9:00 A.M. and 1:00 P.M.
Seattle, Wash.: 806 Federal Office Bldg., Friday.
Sioux Falls, So. Dak.: 1:00 P.M., March 3 and June 2.
Spokane, Washington: Sometime in April.
Syracuse, New York: Sometime in January and April.
Tampa, Florida, Room 201, 221 North Howard Avenue:
By appointment.
Tucson, Arizona: Sometime in April.
Tulsa, Oklahoma: January 15 and April 15.
Washington, D.C., Room 10110, 1101 Pennsylvania Ave. N.W.: Tues. and Fri., 9:00 A.M. and 1:00 P.M.
Wichita, Kansas: Sometime in March.
Williamsport, Pa.: Sometime in March and June.
Wilmington, N.C.: Sometime in June.
Winston-Salem, N.C.: February 1 at 8:30 A.M.

Stays



Members of the Passaic Valley (N. J.) High School radio club get credit for some quick thinking during a recent school fire. The boys from WB2G VV discovered the blaze during a meeting and alerted the fire department, as well as rushing to the attack with fire extinguishers.

WA4CHM and the Washington and Lee High School of Montross, Virginia, would like to know more about lasers. Any of you fellows in industry care to help?

Hudson Division Director W2KR and K2ATA posed for this photograph at the October QCWA meeting in New York. The occasion was the presentation of the September 1963 QST Cover Plaque award, voted to W2PUL for his article "A New Approach to Receiver Front-End Design."

K2ATA accepted the award for author Squires, who was unable to attend.

CONDUCTED BY SAM HARRIS,* W1FZJ

Contests

The January V.H.F. Sweepstakes (January 4-5, 1964) is by far the most popular v.h.f. competition of the year. In fact it out-ranks many of the low-frequency contests in participation. The high participation rating of this event is certainly not due to good v.h.f. propagation conditions. Generally conditions are lousy, mountain topping tends to be at a minimum and sections are pretty hard to come by.

The popularity of this contest is due to two important factors. The first of these is the team spirit engendered by keen club competition; no score is too small to be of help. It is not necessary to personally pile up the highest score in your section in order to get that feeling of doing your part. You just do your best and help others to do the same, and the aggregate score turned in by your club is a measure of your club activity and teamwork. You don't have to beat the "Pack Rats" to prove you have an active club. All you have to do is to establish a working level for your area and improve it next year.

A second reason for intensive activity in the Sweepstakes lies in the fact that it provides a proving ground for operating ability. The ability to handle traffic expeditiously is a basic function of an amateur radio operator. There are few enough opportunities to practice this art on the v.h.f.

The Sweepstakes, while technically a contest, is actually an exercise in message handling. You owe it to yourself and the fraternity to participate to the best of your ability. And when you turn in your score, ask yourself if this is the best you could do if the cards were really down.

Band Scanning

Operating on the u.h.f. bands is many times a matter of tuning the band for long periods before a contact can be established. Naturally it is hard to do any work while you are pushing the receiver dial. Quite a few v.h.f. operators auto-tune their receivers to perform the band watching job. Jud and Paul (K2CBA/K2ISA) and Helen (W1HOY) have been auto-scanning for several years. Jud has promised a

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description of his system for a future issue.

The system in use here is shown in the block diagram (Fig. 1). It makes use of a surplus 2-phase motor which is driven by information from a discriminator fed from the receiver i.f. The only problem is to convert the d.c. output of the discriminator to variable-phase a.c. to drive the 2-phase motor in the proper direction to tune in the signal. This conversion takes place in the d.c. modulator (Fig. 2). Discriminators and d.c. amplifiers are conventional. The gear train and motor in use here were salvaged

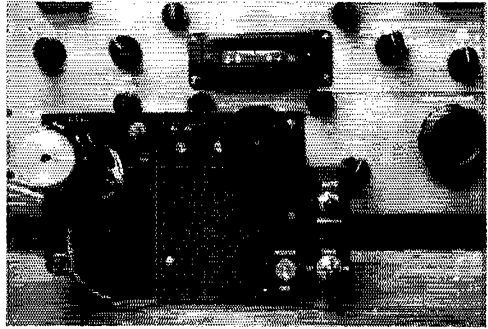


Fig. 3. Auto-scan gearbox and control panel installed on R390 receiver.

from a radar set (FPS-3) which has been showing up in the surplus emporiums for the past few years.

In use the auto-scan tunes a predetermined portion of the desired band. Limit switches are set to reverse the direction of turning. When a signal is encountered the hunt circuit is disabled and the discriminator output drive the tuning to zero the signal. When the signal stands by the hunt circuits take over again. If you intend to call the station be sure to turn off the motor. It is very disconcerting to stand by and find the receiver locked on to your own signal, leaving you with no idea where it was when the other guy stood by. Complete details of this system are not within the scope of this column. Frank (W1EHP) has a complete set of diagrams, however, and sez he will gladly send same in return for a post card request. (Address: Frank Vernon, P.O. Box 334, Medfield, Mass.)

144 Mc. and Up

Although W8CVQ sez that 220- and 420-Mc. activity and interest in the Kalamazoo area are very

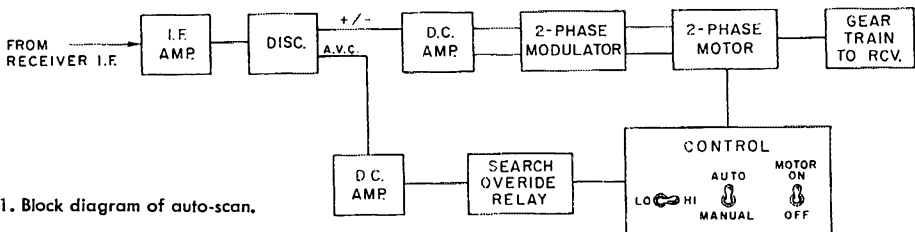


Fig. 1. Block diagram of auto-scan.

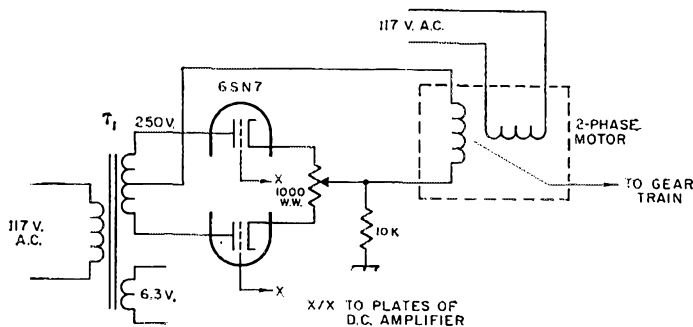


Fig. 2. D.c./a.c./modulator diagram.

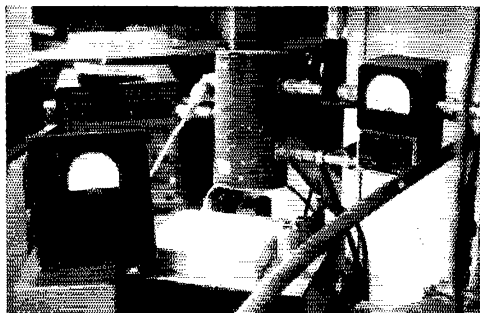


Fig. 4. 420-Mc. Paramp, converter, antenna relay and power meter at W1BU.

low, it is constantly building up (slowly) throughout the country. For instance, WB2EGZ recently made his first 432-Mc. contact with W3UJG (130 miles) with 30 watts n.b.f.m., and a 16-element collinear. Since that first contact Don has had several contacts with other 432ers and heard a number of others. K3KEO is working on his 220-Mc. s.s.b. rig and hoped to be making himself known on the band by Thanksgiving. In North Carolina, K4QIF has completed a resonant-cavity rig for 420 and has also erected a 16-element collinear up 50'. He would like skeds for 432 Mc. and is also open for skeds for M/S on 144 Mc. Howie observes that on October 12, 23, 24, 26 and 27 conditions were unusually good on 144 Mc. The 12th brought forth strong signals from Florida; the 23rd was noted because of an auroral session during which 1s, 2s and 3s were heard; 24th—strong signals from West Virginia; 26th—tropo opening into 2-land; the 27th—very good tropo to the northeast when 2s and 3s were heard and when Howie got state #22, Delaware, on 144 Mc.

Jim Rule, K4KYL, has completed his converter for 432 Mc. and is now building the r.f. section and constructing an antenna, so we can expect to be hearing him soon. W4HHK in Collierville sez, "Beacon transmissions on 432.032 Mc. are made whenever activity is likely (evening hours especially). Power output is 30 watts, emission A1, antenna 64 el. horizontal at 55'. Coding is VVV DE W4HHK." During October Paul heard or worked K4CLE (175 miles) on five different occasions. W4RFR's 432-Mc. beacon was heard on the evening of October 19 (200 miles). Paul sez that a movement is underway to get all 432 beacons on 432.000 to simplify listening for them. Such stations would shift a few kc. up or down for contacts if activity warranted it. Word from Jim, K6JC, notes that s.s.b. on 420 Mc. is beginning to be "the thing" out that way. Jim sez that K6HCP and W6FZA are keeping skeds on Sunday and Tuesday nights at 10:00 P.M.

PST, and so far contacts have been made almost every sked with signals peaking as high as S3 to 4, with occasional s.s.b. transmissions going through. The distance is approximately 200 miles with parts of it over very rough terrain. W6FZA, K6HCP and K6JC are now on 432 Mc. with s.s.b. and soon will be joined by WA6MGZ with rumors that others in the area are planning to be on 432 with this mode. K7ICW is installing a 44-element vertical beam for 432 Mc. and is rebuilding his 44 elements on 220 Mc. for upcoming skeds.

Jack Woodruff, W8PT, wants to know "Where is everybody on 432 Mc.?" During October Jack worked only W3RUE, W8RQI, W8JLQ, W8RLT, W9GAB, W9BTI, K9UIF, WA9HUV and K9DLI, so you can see what he means. Jack tells us that on October 4 he worked W3RUE on 432 Mc. and that during his 144-Mc. sked with K4IXC on October 6 his signals were copied solid by K4SJJ in Atlanta, Georgia, although no contact was made with K4IXC at that time. 144-Mc. contact was made, however, with K4IXC on October 13, just a week later on 144 Mc. A new station soon to be heard on 220 Mc. is Jim Novak, WA9FHH. Jim sez that he has completed the modulator for the 220 rig, will complete the r.f. section after the power supply gets going.

At Nashville, Tennessee, W4RFR sez that he is open for any 432-Mc. skeds and will soon be able to receive moonbounce signals on that band. Word from "Grid," W4GJO, reports that "Lou, WA4BYR and I are on 432 Mc. We have built converters with two 7077 grounded grid r.f. stages with coaxial tanks.— We run n.b.f.m. or c.w. for 'full power' (maybe 12 watts output) or reduce to about 3 watts carrier for a.m. using simple 16-element collinear antennas 40 to 50 feet up, but hope to soon have 50-watt input amplifiers and bigger antennas soon. No other signals than our own have been heard yet (30 miles) but we'd welcome skeds. Frequencies operated are at 432.1 or 432.3 but can work from 432.0 to 432.5. We do have excellent tropo ducting in these parts frequently." Late report: W4GJO has obtained special authorization for full power on 432. He is in one of the normally restricted areas. Texas and Louisiana stations please note!

In Tennessee, K4PTZ is gathering parts for 430-Mc. TV, and in Florida K4GYO has activated a television transmitter on 426.7. (To conform with ARRL band usage, amateur TV should be at 436 Mc. or higher.) W4NSA and K4GBV both have receiving gear for 420-Mc. TV, and have been running successful tests with Hal (K4GYO), but to date they have no cameras or transmitters. Hal is trying to find others in the area (Merritt Island, Florida) who are interested. Among the many either building or rebuilding equipment for 420 Mc. are: WA2UDT, W5IFB, WB6DMB, WA8DOM, WA6KVS and K8RXD are among those building for 220 Mc.

50 Mc. WAS

1 W0ZJB	22 W5FW*	43 W6ABN*	64 W7ACD
2 W0BJV	23 W0ORE	44 VE3AE	65 K6PYH*
3 W0CJS	24 W3ALU	45 W9JFP	66 W4JOB
4 W5AJG	25 W8CMS*	46 W6QIN	67 K6JJA
5 W9ZHL	26 W6MVG	47 W9WWN	68 K6RNO**
6 W9OCA	27 W6CNM	48 K9ETD	69 W9QWT*
7 W6OB	28 W1VNH	49 W0FKY	70 W6EDC**
8 W0INI	29 W00LY	50 W8LPD	71 K6VLM**
9 W1HDO	30 W7HEA	51 W0ZTW	72 K6GOX**
10 W5MJD	31 K6GGQ	52 W6GGC	73 W0EDM
11 W2IDD	32 W7FFE	53 W2RVG	74 W9JCI**
12 W1LLZ	33 W6PPF	54 W1DEI	75 W0LLU*
13 W0DZM	34 W6BJI**	55 W1HOY	76 W7RT**
14 W0HVM	35 W2MEU	56 W6ANN	77 W7RDY**
15 W0WKB	36 W1CLS	57 W1SUZ	78 W6KIN**
16 W0SMJ	37 W6PUZ	58 W1AEP*	79 W6OKR**
17 W00GW	38 W7ILL	59 W5LFH	80 K6GMX**
18 W7ERA	39 W6NDX	60 W6NLT**	81 W7DYD**
19 W3OJU	40 W0DO	61 W7MAH	82 K6ZEE**
20 W6TMI**	41 K9DXT	62 W8ESZ	83 K6HCP**
21 K6EDX	42 W6BAZ	63 W2BYM	84 K6YIL**

* 49 states ** 50 states

VE7CN	45 EI2W	37 LU3DCA	27 SM5CHH	20
KL7AUV	44 CO2SZ	36 LU3EX	27 LA7Y	20
VE1EF	42 ZS3G	32 ZE2JV	26 VQ2PL	18
VE4HS	41 SM6ANR	30 LU9MA	26 JARAO	18
XE1GE	39 CO2ZX	30 CO2DL	25 JARRU	17
VE2AOK	38 SM7ZN	29 CT1CO	24 JA1AAT	17
KH6UK	37 PZ1AE	28 CO8WW	21 JA1AAH	16
	SM6BTT	28 LA9T	21 VP5FP	7

An interesting report of portable activity received from Doug, K1UGQ/1. Doug sez "During the first part of the summer we came up every other weekend (Biddeford Pool, Maine) and got the equipment ready for 50-, 144- and 220-Mc. operation. During our month's stay, from August 17 through September 17, we worked over 300 different stations on these three bands. Principal effort was on 144 Mc. and 13 states plus four Canadian provinces were worked during this period. Under normal conditions we could work several stations in Eastern New York, Long Island, New York City and northern New Jersey on phone. VE2-land was another sure bet." Moral of the story — for vacations, go portable in Maine!

In Westport, Connecticut, W1WHT is looking forward to a change of QTH. Arnold tells us that the new QTH in Monroe, Connecticut, he will have two 120' towers, one for 50 Mc. and one for 144. According to George, WB2FXB, two meters had exceptional conditions during the latter part of October. Climax of the period for George was when he worked K8WXB in West Virginia for state #10 on 144 Mc. WA2UDT, at Plainfield, New Jersey, seems to go along with this by stating that on October 18 conditions were good from Virginia to Massachusetts; October 23 and 25 brought forth good groundwave conditions; September 26 brought contacts with W1JSM and WA4DKU, the latter contact giving Bill state #12 on 144 Mc. October 29 produced an auroral session with 88 and upstate New York stations heard. After one year of operating on 144 Mc. with a Gonset II and an 8-element beam, WB2EPG has a score of 14 states worked on that band. "Doc" sez. "I think this may indicate that factors other than power may be exploited to give favorable results on v.h.f. To name a few — antenna height, good efficiency and low losses, good operating procedure and lots of listening." We agree Doc, these are all important items that help a lot.

An "Orionids" report from W7PUA/2 informs us that he kept skeds with W4MNT, K5SDM and W5UKQ during the period of October 18 to 23. Contact was made with W4MNT on the 21st and also with W5UKQ on the 23rd, bringing Bob's total up to 18 states worked on two meters. Bob tells

2-Meter Standings

W1REZ	32	8	1300	W5EDZ	8	5	1375
W1AZK	28	8	1205	W5YYO	7	4	1330
W1KCS	24	7	1150	W5UNH	6	3	1200
W1AJR	24	7	1130	W6WSQ	15	5	1390
W1MMN	22	8	1200	W6RLZ	12	5	2540
W1JSM	22	7	1330	W6DNJ	5	5	1040
W1HDO	22	6	1020	K6HMS	7	3	1010
W1IZY	20	7	1080	W6AJF	6	3	800
W1AFO	19	6	920	W6ZL	5	3	1400
K1CRQ	19	6	800	K6GTG	4	2	800
W1MEH	18	6	1000	W6MMU	3	2	900
K1AFR	17	6	675	K7HKD	20	7	1330
W2CXV	37	8	1360	W7LHL	10	4	1170
W2ORH	37	8	1320	W7CJM	5	2	670
W2NLY	37	8	1300	W7JJP	4	2	900
W2BLV	36	8	1020	W7JU	4	2	235
K2LMO	31	8	1290	W8KAY	40	9	1245
K2COT	35	8	1365	W8PT	39	9	1260
W2AZL	29	8	1050	W8SDJ	37	8	1220
K2IEJ	27	8	1060	W8IPX	35	8	980
K2CEH	25	8	1200	K8AXU	34	9	1275
W2AMJ	25	6	960	W8NG	34	8	1040
W2ALR	24	8	1100	W8LDF	32	8	1060
W2KNG	23	8	1200	W8GGH	32	8	1180
W2MIX	23	7	1090	W8BAX	32	8	960
W2LWL	23	7	1050	W8RMH	32	6	910
K2HOD	23	7	950	W8MVE	31	9	1155
W2DWJ	23	6	860	W8NOX	31	8	1090
W2PAU	23	6	753	W8EHW	31	8	860
W2KIB	21	6	750	W8SVL	30	8	1040
W2UTH	20	7	880	W8LPL	29	8	850
W2WZR	19	7	1040	K1CRQ/8	28	8	690
W2RGV	19	8	720	W8LBN	28	8	680
WA2EMA	19	6	1010	W8DYE	28	8	720
W7BIA/2	18	7	1220	W8LCL	25	8	800
W2PZE	18	6	750	W8JVV	25	8	940
W2RLG	17	6	980	W8WNN	25	8	900
K2OEL	16	6	1010	W8GPN	23	8	640
WA2YXS	16	6	720	W8LCY	22	7	580
K2JWT	16	6	550	W8LW	22	7	610
W3RIE	33	8	1100	W8GTR	17	7	550
W3SGA	31	8	1070	W8NRM	17	7	550
W3TDF	30	8	1125	W9KLR	41	9	1160
W3GKP	30	7	1180	W9WOK	40	9	1170
W3KCA	28	8	1110	K9GJL	39	9	1100
W3BYV	28	8	1070	W9AAG	35	9	1050
W3RPH	28	8	1070	W9GAB	34	9	1075
W3LST	22	6	800	K9AAJ	33	8	1070
W3LNA	21	7	720	W9REAI	31	8	850
W3NKM	20	7	730	W9ZTH	30	8	850
W3LZD	20	7	650	K9SGD	29	8	1300
K3HDW	12	6	1015	W9PBP	28	8	820
W4HJQ	39	8	1150	W9LVC	27	8	950
W4HHK	37	9	1280	W9OJL	27	9	910
W4LTV	34	8	1160	W9ZHL	25	8	700
W4ZXL	34	8	954	W9BPE	25	7	1030
W4VNT	34	9	1050	W9LFX	24	7	1030
W4MKT	31	8	1140	W9CUN	24	7	900
W4AO	30	8	1120	K9AQF	24	7	900
W4LVA	26	8	1000	W9WDD	23	7	900
K4EUB	26	7	1130	W9LF	22	7	825
W4EQM	25	8	1040	W9KPS	22	7	690
W4ATB	25	8	900	W9ALU	18	7	800
W4RFR	25	9	820	W0BFR	39	9	1350
K4LXC	23	8	1225	W0LPE	31	9	1040
W4TLV	23	7	1000	W0HID	31	8	1030
W4JCV	23	6	725	W0LPE	39	7	970
K4Q1*	22	8	1000	K9GJL	29	9	1075
W4BLU	21	7	1080	W0BNC	27	9	1300
W4OIK	20	6	720	W0BNC	25	6	1225
W4LNG	19	7	1080	W0RUF	23	7	900
K4YUX	18	8	830	W0MOX	23	6	1150
K4VWH	18	6	590	W0IC	22	7	1360
W4MDA	17	6	775	K0TFE	21	6	940
W5RCH	39	9	1280	W0INI	21	6	830
W5FYZ	33	9	1275	W0TGC	21	7	870
W5AJG	32	9	1360	W0RYG	20	8	925
W5JWL	29	7	1150	W0DQY	20	7	700
W5DFU	29	9	1300	W0JAS	19	7	1130
W5DPU	28	8	1300	WA9DZH	19	7	1030
W5LPG	25	7	1000	W0AZT	18	7	1100
W5KTD	23	8	1200	K0AQJ	16	6	1120
W58WV	20	5	960	W0IFS	16	6	1100
W5ML	16	6	700	VE1CL	8	4	800
W5KPU	15	5	1360	VE3DR	36	8	1340
W51FO	15	4	635	VE3ATB	29	8	1340
W5PSC	12	5	1390	VE3BPR	24	7	950
W5HEZ	12	5	1250	VE3BQN	23	7	1180
W5UKQ	14	6	1150	VE3AQG	18	8	1300
W5CVW	11	5	1180	VE3DR	17	8	1340
W5NDF	11	5	620	VE3HW	17	7	1350
W5VAX	11	5	735	VE3HO	15	5	1350
K5TQP	11	5	1170	VE7HJ	2	1	365
W5VY	10	3	1200				
W5BEP	9	3	1000				

The figures after each call refer to states, call area and mileage of best DX.

us that he got on the band last March from New Jersey, has had piles of fun, and operating the band is very different from operating in Washington. From Delaware and K3OBU we hear that two meters had very good conditions on October 18 when a

(Continued on page 156)

Q SO TODAY

BY C. W. FARR,* W1WМК

IT ALL started when someone pointed out that the Morse code letter Q sounds like "here comes the bride."

After a quarter century of incubation, the urge to get an amateur license finally hatched and I was starting all over again to learn the code. Like many beginners, I could recognize letters by sight, but not by sound. For example, I found it necessary to translate "didahdidit" into a pictorial . . . which I could recognize as the letter L. This habit of mental "double conversion" is hard to break, as you probably know, and it slows you down. The phonetic equivalent of the code character seemed like a logical solution. I therefore set to work to invent a phonetic Morse alphabet.

With this phonetic alphabet, a 1937 communications receiver and generous helpings of W1AW code practice sessions, I succeeded in passing my General Class exam on the first try (with probably not much to spare). Since then I have taught the phonetics to people of various ages, and helped six Boy Scouts over the hump to first class rank in about as many short evening sessions. (Boy Scout requirements call for "getting the message through" — 20 words sent and 20 received, but no speed requirement.)

Drunk with power, I wrote the story and sent it off loftily to *QST* for all the world to read about. But lo, *QST* said (a) it had been done before, and (b) they didn't think much of tricky gadgets in learning the code. But *QST* said one other thing: "If you could come up with a phonetic list of words and phrases which were infallibly pronounced with the same swing by everyone, you would have something."

O.K. We have only begun to fight! This time the phonetic alphabet must be *infallible*, and the words

* Read's Ferry, New Hampshire.

A Array	N Navy
B Beam element	O One more ohm
C Code receiver	P Peru prefix
D Dangerous	Q Q SO today
E Ed	R Receiver
F Federation	S Silicon
G Gyration	T Tape
H Hottentoten	U Ultra high
I Image	V Vertical lobe
J July Sweepstakes	W Without doubt
K Key debris	X Xtal array
L Linoleum	Y Yagi beam boom
M May day	Z Z formula

must be slanted toward "ham lingo!"

Meanwhile, back at the ranch, more success stories. A friend used the alphabet to coach his son; he liked it so well that he used it with his Boy Scout troop, too. Some boys were "naturals" and didn't need the phonetic list. Others had difficulty, *but these were helped by phonetics*. It's hard to know who needs them. Maybe it has something to do with musical aptitude, or word memorizing ability. But for some people it's almost like magic.

So let's try again. Maybe this time we've really built a better mousetrap.

Each phonetic starts with the key letter. Dashes are represented by long vowel sounds or accented syllables (preferably both). It's not perfect (there is no genuine four-syllable word or phrase beginning with H which contains only short vowels and has no unaccented syllables, for example); but pitfalls such as the common confusion of F and L ("inversion") just don't exist under this learning procedure. No matter how you say it, "federation" just doesn't sound a bit like "linoleum!" **QST**

OUR COVER

Our cover this month is a 1964 recreation of a typical 1914 amateur station. All of the station components are from ARRL's Museum of Amateur Radio, and were assembled and hooked up by the curator, Roland B. Bourne, W1ANA. The operator, Robert Musson, is a 1964 employee of our shipping department. In the course of digging up that 1914 calendar, we were given a very great deal of help by Mr. Colin Simkin of the Traveler's Insurance Company in Hartford. It subsequently turned out, quite to our surprise and delight, that Mr. Simkin was Clarence Tuska's first employee in the very early days of *QST*. At the right of the photograph is the transmitter, with its spark coil, spark gap, condenser, and helix coil. At the center is the antenna transfer switch, and at the left an E.I.Co. 2 slide tuner with Murdoch crystal detector and phones.



January 1939

. . . W2QY/OX2QY/W10NAB reminisced about his long months above the Arctic Circle. He had just returned from 16 months with the famous MacGregor Expedition.

. . . Vertical antennas were discussed in articles by W2DEJ and W8ABX.

. . . W9YZH/4 wrote about a low-power, five-band, exciter; W1LJI about a wide-range audio amplifier; W9UVC about phone splatter; and W8QBW about an unusually selective two-tube regen receiver.

. . . League staffers Warner, Goodman, and Grammer wrote about the new Cairo Regulations, keying with controlled rectifier tubes, and technical aspects of new rigs, respectively. Those Cairo Regs, by the way, introduced the QRE 1-5 readability-report system as well as new signals QUK, QUL, QUM and TU. New c.w. punctuation marks had been announced, too, but the League wondered out loud as to their usefulness.

. . . C. C. Shumard of RCA discussed construction and alignment of television receivers.

. . . W9AUJ wrote about a compact crystal-controlled 56-28 Mc. phone transmitter, and W9PYQ described a new approach to limitation of signals and noise peaks in receivers.



How's DX?

CONDUCTED BY ROD NEWKIRK,* W9BRD

Why?

Madame μ opened the new year by yawning, stretching, arching her back, sitting down, lying down, curling up, purring, and closing her Siamese-blue eyes for a catnap. It didn't work. Her smudgy face drooped in mid-air. Our shack mascot then tried edging back a little. This gave her chin support, but her tail and hind quarters now hung over the edge of the transceiver's top. Most undignified and uncomfortable for such a v.i.p. as Madame μ .

She tried curling into an even tighter bagel-like configuration, overlapping somewhat fore and aft. This gained her no relaxation, for she soon unwound slightly and again oozed over the edges of the little gray box. Then the ash tray fell off with a clatter, startling her and sending her down to the floor in a huff. Madame μ disdainfully glared up at the cute little powerhouse and stalked off to display her serene presence elsewhere.

We salvaged the tray, critically surveying our borrowed *zenduidshniffer*. Madame μ had made a point. Its cabinet, while warm enough to serve a cat admirably, was hardly ample enough to accommodate an undernourished kitten, minus ash tray. The outfit was, as they say, compact.

"Compact" indeed. What for? It wasn't supposed to be a mobile, a CB or an NASA model. Was this part of a miniaturization conspiracy for cruelty to cats? We like compactness with an objective, like mobilizing, business travel, DXpeditioning or rocketing to the moon and back. But in the uninhibited comfort of one's home, ham-shack radio equipment might just as well be seen as heard.

We returned the midget monster with thanks and eagerly moved back among our economy-size apparatus, choosing to be surrounded by our station. The v.f.o. is here, the rest of the exciter is up there, the driver is down here, and the final is in there. The t.r. switch is under this, the antenna coupler is over there, and the audio section is around somewhere. The power supplies are well distributed, and we can still monitor our keying by the blue pulsations of picturesque 83s and 816s. The receiver? Here we're even neater. The crystal front end is boxed at left, the tuned i.f. strip is in that one-pound coffee can, center, and the audio is — well, it may be in that two-pound cookie tin at right. Not sure of those other boxes and chassis till we take another inventory. When the next issue of *QST* arrives we'll be in there with our soldering stuff to try a suggested new circuit variation or two. Plenty of elbow room, so we won't need a microscope for the job.

*7862-B West Lawrence Ave., Chicago, Ill. 60656;

Madame μ reentered the shack, appeared magically on our operating table, curled up atop the roomy v.f.o. cabinet and dozed off. The ash tray stayed put. Madame μ , an extremely practical cat, obviously prefers the rambling, relaxed and tangible approach to hamming. The purposelessly jam-packed diminutive is not for her — she's quite at home again.

What:

The outstanding DX characteristic of 1963 might be said to have been the accentuated variation between daytime and nighttime band conditions. The m.u.f. and skip status now swings daily between wide extremes but we have current enthusiastic correspondence praising the performance of every band 10 through 160 meters. If this sunspot minimum is supposed to be a period of especially disturbed and blotto ionospheric activity, by all means let's have more! We'll open '64 with a spot-check of good old 20 meters, crossroads of the DX world. . . .

20 phone, with asterisks representing outnumbered non-s.s.b. personnel, is the subject of mailbag commentary from Ws 1APA 5RU 7VR0, Ks 1VWL 3MINJ 6TAX 0JPL, WAs 4CZM 6VAT 8EWT 0EMIS, WB2BBV and listener C. Maher who give us the word on activity by AC3PT (14,111 kc.) 0100 GMT, AP2AD (114) 2, BV1USC, CE8s CF CL, CN8FW, COs 2BG* 2FA* 2PP* 2XA* 3BU* 5TZ* 6FF* 7CG* 8CO* 8JK* 8MIN* 8RA*. CRs 6ARC* 6BX 6FW 7CK (273) 12-13, 7GF 9AH (123) 13, GT3AV (130) 20, CX2CO (280)0, DU1s BSP AA, EL6A (261) 22, ET3s AP (253) 23, USA (334) 0, F9RY/FC (282) 11, FB8Y 6, FK8s AC (277) 4, AU, F08AQ* (264) 3, HIs 3GI* 4XAD 8MIN*, HK3BII*, HL9s KII KR, HR2JC*, taboo HIs B X (267) 13, HPIIE, HZ2AMS, ISIVAZ, JAIFSL, JT1s CA (110) 13, KAA, KA2s RJ YA, KCs 4USK (340) 11, 4UN 4USV (340) 1, 6BO (270) 13, 6PE (275) 6, KG6SE, KM6CE (270) 4, KX6BU (297) 7-8, KZ5s AW AX FH, LU3ZI 5, LX3QT (109) 12, MP4MIAP (260) 11, OA4s JO QN, PJs 2AA 3AO* 3CE (275) 13, 5MC (292) 22, PZ1AX, TC3ZA, TGs 8IA* 9AF* 9AI*, TIs 6CAL 0RC (300) 15, TT8AN (309) 21, TU2s AE (256) 23, AQ (263) 23, AU (115) 23, UA0s BP (132) 0-3, EH RV (111) 3, SK (106) 13, UD6KAR (250) 16, UL7FA (115) 13, UM8s FZ (110) 3, KAB (271) 15, UO5RO, UW0IP (71) 2, VE8RN, VKs 4JQ (287) 12-13 of Willis, 8KK 9DR (110) 15 of Christmas, VPs 1RT* 2AB (280), 2DA* 2GU 2KT 2VS 21, 3PS (280) 11, 3RS (330) 22, 3YG 5NK (295),



7NS 8GQ (103) 23, 8HB (145) 3, 8HJ 1, 9BO 9FH, VOs 11Z 2BK (294) 21, 4ERR (297) 20, VR4s CM (132) 5, CU, VSs 1JH 1MB (240) 16, 4RS (260) 16, 9AA (260) 21, 9AAA (124) 18, 9MB (265) 20, VU2NR, Ws 4VGL/KG6 (322) 5, 5INO/KG6 (296) 2, 6ICM/KM6, XW8AL (281) 12, XEs 11N1* 2VN* 3AF*, VNs 1LX 6MP, YSs 1A* 1M1 1JR 3TM (287) 3, ZE2KL, ZL1ABZ (322) 6 of the Kermadec, ZSTR (308) 18, 4UIITU (265) 15, 4X4DW (265) 19, 5HJR (265) 20, 5N2s HJA JKO 0, JWE (275) 15, RSB (101) 19-20, 601WF (284) 21, 9A1AL (261) 19, 9G1s DY (270) 22, 9L1HX, 9M2s CP (111) 15, 9D (265) 15, 9N1s DD (111) 2, MAM (110) 2, 9Q5UC (294) 21, 9K2AT and 9X5NV.

20 c.w. offensives are described in front-line dispatches from Ws 1ECH 2B7Q/KH6 5RU 7DUJ 7POU 7VRO 8YGR, Ks 1IGO 1IUW 1VWL 3JGJ 3M1J 3SLP 6SXX/4 6TZX 7KTE 0JPL, WAs 2ZVJ 4CZM 5AER 6VAT 6WTD 8BPu 8EWT 9FMIQ 0BMW 0EMS, WBs 2BEV 6AKZ 6DEJ, ZS2U and s.w.l. C. Maher who succeeded in capturing AC3PT (33) 13, AP5CP, BV1s USA USC, CN8s HG FE FF GG, CO2Bs, CPs 3CA 5EZ (35) 0-1, CRs 6CA 6FW 6JJ 9AH (50) 12, CTs 1AC 1DJ (1) 19, 4AR (46) 15, DM3s AEB MSF RBA ZDA, EA8DO, ELs 2S 8AF, EP2s LA RC, ET3s GG USA 17, FB8ZZ (30) 10-14, F7Gs XG XJ (66) 17, NK (38) 22, FK8AB, FR7ZL, FURAG (41) 8, FY7s YE (50) 22, YJ (40) 22-23, YS, GCs 2FAIV 3FKW 3IFB (50) 0, 4LI, HA2MJ, HC5CN, HIs 3PC 8M1M, HK0AL, HL9s KH TD, HMs 1AP 16, 9AP, HPIIE (10) 14, HR2FG, HZ1AB, IT1AL, JAs 4FW 4UH 5FQ (76) 6-7, 9CG 0XD, JT1s AG 15, JA (63) 0, KAA (29) 6, KA2KS (16) 8, KC6s BK BO (5) 5, KGs 4AM 6AA 6J 6NAA 6SA (79) 10, KR3s 6BE 6PQ 8AG, KSSAY, KV4s AA (81) 21-23, BH BO CI, KX6s AJ BU (18), LALLG/P, LUs 2ZI (97) 13, 4ZI 3-4, MP4s DAH (76) 14, QBF QDA, OA3s CG FAL, OH6NF, OX3s AY (91) 1, DL, OY1PU, PI1STC, PJs 2AE 3AO, PY4ZG, PZ1s BHBO (90), BW, RAEM (94) 15 of Moscow, SU1M, SV8s WC WO, TC3As, TFW2W, TG9s AC AD JR, TL8s AC 21, SW (45) 17, TN8s AF BE, TU2AU (50) 23-0, UAs 1KAE of Mirny base, 1KED of Franz Josefand, 9FJ 0FE 0FF 0IK 0KSS (50) 2, 0KYA 0SH, UC2LE, UD6DU (10) 23, UG6AD (84) 12, U18LB (50) 3, U17s AA (36) 2, CG (29) 2, GL, UM8KAB (21) 3, UO5WS, UP2CT, UO2s GA KAE (40) 17, UT5s FI KGa (24) 15, UV3TG, UWs 3NE 9CQ 0FI (60) 6, 0IE 0IJ (65) 1, 0IN 0IP (71) 2, VEs 8DX 8PK (65) 6, 0MC 0NV, VKs 4JQ (90) 1-5, 6RU 91R 16, 9LA (48) 14, 0DAI (94) 5, VPs 2AV 2KT 2VS 3YC (70) 22, 4TR 4W1 6AF 6PJ 6PY 6RG 7CC 8AH 8GQ (9) 0, 8GR 8HG (10) 1, 8IJ (35) 1, 8HO (47) 2, 9EP 9EU 9FK 9FJ, VOs 1IZ 1GDW 2BC 4AQ 4ER (50) 15, 4IQ 8AI 16, 8BT, VR2s DK EH (60), EJ EK EM, VSS 1FZ 1Y (75) 16, 1LD (65) 16, 1LL (40) 15, 1LV (5) 5, 4FS 15, 4RS (5) 23, 4JO 5GT 6FF 9AAA 16, 9MB 18-19, 9OC (44) 22, VU2s AJ (80) 3, BGZ BK SU, Ws 2PCJ/KJ6 4WQ/VP9 6IFQ/KG6, XW8AU (35) 15, XZ2KN, YN3KM, YO3RI, YSIO (15) 1, YVs 2AH 3AS 4CL 6BM, YK1AA (20) 16, ZBs 1BX 2A, ZDs 3A 6LA 6OL 8HB 8WF 9AF, ZLs 1ABZ 4JF (68) 8 of the Campbells, ZP5s EB JE, ZMGAB (55) 3, ZSs 2MI (58) 15 of Marion Isle, 3A 7M 9C 9AL, 3A2DE, 4UIITU (42) 15, 4X4MI, 5A1TV, 5B4NG (33) 17, 5N2s JKO JWB (31) 23, RSB, 5R8AB, 5X5s IU JG, 6O1ND (20) 21-22, 6YALT, 7G1IX 9, 6W8s AB AC DD, 9G1DZ 0, 9L1s JC TL (30) 2, 9M2UT, 9N1MAM (31) 13-14, 9Q5s AB (50) 22, PS TJ, 9U5ID and 9X5MIV 15.

* * *

Space precludes inspection of other bands this month but we thank (15 c.w.) Ws 1B1H 2B7Q/KH6 7POU 8YGR, Ks 3M1J 4OGV 6SXX/4 7O1Z 7QXG 0JPL, WAs 4CJP 4JZU 5ABG 8EWT 0BMW, WBs AKZ DEJ, WNs 2JJK 4MHU, ZS2U: (15 phone) Ws 1B1H 4PCI, Ks 4SWN 6TAX 0JPL, WAs 2000 2VPG 4CJP 4JZU 5ABG 5AER 6VAT, WB6AKZ, C. Maher: (40 c.w.) Ws 1ECH 2B7Q/KH6 6YKS 7DUJ 7POU 8YGR, Ks 3JGJ 3SLP 5JVF 6SXX/4 6TZX 7QXG 0JPL, WA8EWT, WB6s AKZ AZI DEJ, WN2HKK: (40 phone) W1APA, K4KSY: (80 c.w.) Ws 1SWX/1 6YKS 7DUJ, Ks 3SLP 6SXX/4 7QXG; and (75 phone) J. Gentry. Next month we'll also have some interesting 10-meter notes courtesy Ws 1AW 1WPR 0TRF, Ks 1W1J, 3PIE 4SWN 6TAX 0JPL, WAs 4CJP 5AER 6VAT and WB2ERAM (P/B 28-Mc. DX breaking through!) as well as timely 160-meter dispatches via W1BB, WA6IVM and other 1.8-Mc. sharpshooters. One-sixty has rarely been hotter than it is right now, a real WAC picnic.

Where:

SOUTH AMERICA — The *DX Report* of FDXC, giving a statistical recap of the club's 1961 Malpelo maneuvers, seems to support last month's "How's" contention that more and more DXers get into pile-ups just for the momentary DX excitement. How else can you explain the fact that almost 40 per cent of HK6TU's W/K/VE contacts failed to apply for QSLs from a virgin DXCC country? — VP3YG's QSLing was handled by W4OPM only for s.s.b. contacts made between October 19 and November

19, 1961. Joe can't help confirm other VP3YG QSOs. W4OPM also holds FM17WQ logs for contacts made from April 16, 1962, till September 22, 1963, at which time Miss Edith Hurricane put Pierre out of business. — VE6TP confirms his status as QSL agent for recent I.D.X. expeditious action by PJ5MF, VP2s KT and VS. "Self-addressed, stamped envelopes, or self-addressed envelopes with International Reply Coupons, and Greenwich Mean Time reference are *musts*," declares Geue, estimating his task at about 2300 QSOs per island. By the way, QSL managers in Canada cannot mail U.S.-stamped s.a.c. fellows, although unaffixed U.S. postage may be acceptable for redemption. — W2BXA has no connection with FY7YF QSL matters, but W2FXA may be of help.

ASIA — "Just finished filling out a raft of QSLs for QSOs with XW8AL," pens K4KTR, Stateside QSL agent for that station since 1960. "It seems inconceivable, but some applicants still omit self-addressed stamped envelopes. I've sent some at my own expense, but the extra addressing work, etc., just isn't fair. Some thoughtfully mark date of QSO on the outside back of the s.a.s.c. — me for them! This permits me to set the envelopes up in order, and when the log comes in (they arrive from XW8AL about every six weeks) I can really make time." Three more XW8s now are available to take some of the Laos pressure off Dwight and XW8AL. K4KTR adds, "This may startle you. I myself have yet to work Phanh's s.s.b." — Ex-1L9KT, now W61TD, further unburdens himself re QSLing from Korea: "Trying to convert local times on QSL cards to GMT for log check was a large pain in the neck. Needless to say, cards properly inscribed in GMT with s.a.s.c. or IRCs got prompt results, usually same-day service. Regarding the Coupons, however, the APO postmaster in Seoul had never heard of them. He finally found something on them in his postal manual, so he accepted them, but only 15 at a time. I wound up using IRCs merely to apply for awards as it was just too much trouble to cash them." — WGDXC's *Bulletin* has it that W4ECI concluded AC7A and 9N1MAM QSLing in November — 1L9TH operators Bob, Howard and Bud have left for Uncle Sugar. The latter, WA9FFV, answers to the address D. C. Tyson, Co. A, 4th Sig. Bn., Box 317, APO 20, San Francisco, Calif., and he may have leads on the whereabouts of the others. — ZS2U recommends W6GHF for MP4DAIT QSL action. — KA2CM stresses that the FEARL QSL bureau functions on a members-only basis. Ship your KA-bound QSLs to FEARL only when instructed to do so by stations worked. The members-only QSL bureau policy is not uncommon among overseas societies, so it's wise to use the bureau route *only* when so advised by DX stations themselves. — K4WIS may be able to run down TA4RZ QSLs.

AFRICA — Ws 1VG and 3PVZ relay 9LINH's offer to act as QSL manager for Sierra Leone. Nick's address appears in the roster to follow. He's G3RWF back home and also signed 9L1PI for a spell. — "I'm very disappointed with you Stateside folks," 5X5IU declares via Ws 1WPO and 3LCC. "Less than half of the 3000 QSLs I sent from Uganda in 1962-'63 have been answered. In the future I'll QSL only on receipt." — K2MGE of LIDXA mentions ZS6BBB's desire for s.a.s.c., or s.a.c. plus IRCs, concerning confirmation of his current ZSS and ZS9 QSOs. — "S.a.s.c. is a must, GMT too," states W1BPM who does QSL chores for TL8SW (ex-XW8AH-3V8CA). "Syd will be sending logs weekly." — ZD3A insists that ZD3AL is fictional. — All QSLs received direct with IRCs or equivalent will be answered direct," promises 5N2RSB, intending early activity in Tchad, Camerouns, Dahomey and perhaps Niger. "Otherwise cards will go via RSGB." K3M1N also may be of assistance. — "9G5TF (DL3TJ) has no QSLs in the Congo," finds W2QHH, advising that cards be sent only via DL40P or DARC. Likewise for 9Q5AB whose QSL aide is W2HMLJ/4 (address in last month's "How's"). — W2SNM is set up to give same-day service to requests for 5I3JR pasteboards. — K4JLD, awaiting his 601 suffix for an 18-month Somalia tour, designates WA4PXE as his Stateside QSL charge.

OCEANIA — "Lots of fellows are wasting postage on mail sent this way," says KC6BK of Ponape. "The Pacific Trust Territory has the same postal facilities as other U.S. territories and possessions. Eight cents is sufficient for air mail." Stanley offers some rare Zipcode numbers for your growing collections: Koror, 96940; Ponape, 96941; and Wake, 96930. — ZK1BS knocked off for N.Z. return but W7ZAS still assists with QSLs. — WA6LDV, through W1WPO, hears that VK4RZ has some 650 unclaimed VR5RZ QSLs cluttering up the place. S.a.c. and IRCs, together with full QSO data, are suggested. — "All my KN6BK QSOs will be QSL'd 100 per cent," guarantees K5COU. "I signed that call on Kwajalein from March till August, 1963. Those who sent s.a.s.c. with their cards already have received fast answers."

EUROPE — "Effective this date [October 21, 1963] I have assumed the position of DL4-DL5 QSL Bureau manager," informs DL4RT. "All cards for DL4s and DL5s



CR9AH, a DX man of the old school, sends this up-to-date photo of his Macao station via QSL manager W7ZAS. John lately likes his c.w. around 14,050 kc., single-sideband near 14,125 kc., at 1200-1400 GMT.

can be sent via this address: Capt. Robert C. Theisen, DL4RT, Hq. SASCOM, APO 403, New York, N. Y. . . . DJ2OV wonders if it's legal for KL7s to QSL. "I've worked several Alaskans but no confirmations." . . . Ex-KL7JDO, now WA5IHE, welcomes inquiries re his Alaska QSLs, also DL4JD cards for his European stint. . . . K9FBE assures W9AC's 300 September HV1CN contacts that QSLs are a cinch. . . . W4OPM affirms that he takes care of W/K/VE QSLs for E18P. . . . SV1AT, general secretary of RAAG, promises that the hundreds of QSOs scored by SV1SV, ham installation at the 11th International Boy Scout Jamboree last August, all will be QSL'd in due time. . . . Speed? SM3TW answered WB6AKZ's card in 15 minutes. SM3TW's manager, WA6NON, lives nextdoor to Mike, you see.

HEREABOUTS—Our "QSLers of the Month" spotlight shines on CR9AH, F7RK, GW3KSO, HC1DC, HK3RQ, HM9AP, HP1IE, JTK1AA, LA4Y, OD5LX, PZ1BO, SM3TW, TG9AD, VKs 4JQ 9DR, VP's 2AV 2MV 2SY 2VS 6AT 8GQ, VR2s E1E EK, VSs 1KZ 4RS 9MB, Ws 2PCJ/KJ6 4WQQ/VP9, XE2s AAG MK, ZB1BX, ZD8HB, ZK1BV, ZL1HW, 5B4RA, 6O1ND and 9N1DD, plus QSL managers Ws 2CTN 4ECI, WA6NON and VE6TP, all nominated by "How's correspondents Ws 1B1H 1ECH 6YKS 7DJU, Ks 11GO 3SLP 6TZX 7QXG, Ws 4DZU 0ABG 6VAT 8GUN 0BAMW and J. Gentry in acknowledgment of particularly prompt pasteboards. Any deserving candidates in your mailbox lately? . . . W7ZAS offers to take on QSL chores in behalf of deserving and needful overseas operators. . . . Halp! W1ECH needs leads on F18s AC and AP of 1957-'58 vintage, PZ1AO, VP2DX '57 or '58, VP4LQ '58, Y12RM '57; K9UIY wants hints on Dan of CS3AC '54, Jim of FA8JD '46, GD2FRV '53, SV1AJ '60, Dave of XABY '46; and VU2MD has just about given up on old SV0WB. . . . W4OPM holds VP2GAC logs only for single-sideband work

prior to June 15, 1963, but he does all QSLing for VP6WD, S.a.s.e., or s.a.e. with IRCs and GMT, of course. Incidentally, W4OPM has a new address: C. J. Hiller, 2208 Dinwiddie Rd., Bayside, Virginia Beach, Va., 23455. . . . KZ5AZ and XE1VT QSL'd all of the many QSOs they rolled up in the '63 ARRL DX Contest, mostly via bureaus. So far XE1VT has received only 336 returns for 1016 cards sent out. . . . NCDXC's DXer salutes W2CTN, QSL aide for some 140 DX stations in eighty countries. Many W/Ks owe their DXCC standings to Jack's prompt and thorough paperwork. . . . The DXer also includes W2GHK's observations on Hammarlund DXpedition QSLing: "Virtually all complaints of lack of QSL delivery is attributable to wrong dates and/or wrong times. The most common mistake is failure to recognize the change in date that takes place in the early evening local hours when going from 2400 to 0001 GMT. . . . We must find each QSO in the log beyond a shadow of a doubt." . . . WGDXC says that W2YTH may be of assistance in running down s.s.b. QSLs for VP2s KA KI and KX, also that K1UFE can help confirm 6YAAH contacts made between March 24, 1962, and April 11, '63. . . . K4SWN, doing QSL work for KV4s DE and DF, requests the usual s.a.s.e. or s.a.e.-plus-IRCs courtesy. . . . Now let's spread out for inspection this month's outcropping of mailbox recommendations in the line of individual DX-type addresses, bearing in mind that the suggestions are necessarily neither "official", complete nor accurate. . . .

- CN8FE (via W2CTN)
- CN8FW, D. J. Woolley, CT/2 USN, 18 rue Beckmuere, Kenitra, Morocco (or via W2CTN)
- CR9AH (via W7ZAS)
- DL5AU, Sgt. J. Guaderrama (K6QQB), Hq. & Hq. Co., 24th Inf. Div. LRRP, APO 112, New York, N. Y.
- DU5DM (via DU1CE)
- E11KD/mm, V. Moran, *Petra Imperor*, % J. F. Moran, 22 Monument Sq., Portland, Md.
- F2P2C (to K1KOM)
- ET3GC, APO 843, New York, N. Y.
- ET3PT (to W8IEB)
- FP8CK (to W2JAE)
- FS7MB (to W3ZQ)
- FY7YF (via W2FXA)
- FY7YK, % PTT, Cayenne, Fr. Guiana
- H18MMP, M. Perez, Dominican Radio Club, P.O. Box 1157, Santo Domingo, D. R.
- HK5SL, Aptdo. Aereo 277, Palmira, Colombia
- HK0AI (via W9WHM)
- HL9TH (see preceding text)
- ex-KA2RC, C. Rakestraw, W6BJJ/1, Hq. ESD (BMEWS), L. G. Hanscom Field, Bedford, Mass.
- KC4AAC (via VK2VK)
- ex-KL7JDO-DL4JD, T. Smaker, WA5IHE, 5222 Tavenor Ln., Houston, Texas, 77048
- KP4BJM, A. Mona, Box 5306, Puerta de Tierra, P. R.
- KV4DF, H. Woertendyke, 42 King St., Christiansted, St. Croix, V. I. (or via K4SWN)
- KV4DF (to KV4DE or via K4SWN)
- ex-KX6BK, E. DeYoung, K5COU, P.O. Box 4086, El Paso, Tex.
- KZ5AF (via KZ5AZ)
- KZ5AZ, G. Spencer, Box 367, Albrook AFB, C.Z.
- LU3ZI (via R0A)

Oakland Radio Club (W6OT) long has tantalized the world of DX with its Worked All California Counties certification, a granddaddy among reputable operating awards. It took eight years for OK1CG to work and confirm the necessary 58 counties, thus becoming the first overseas station to turn the trick. W6TWW (then in Arizona), W3FYS and W2QHH are the only other non-Californians to win diplomas among 61 issued. Complete information on WACC is available through ORC president K6LWA.



WACC

THE OAKLAND RADIO CLUB, INC.

1957-1958

Certificate of Appreciation

Presented to

[Name]

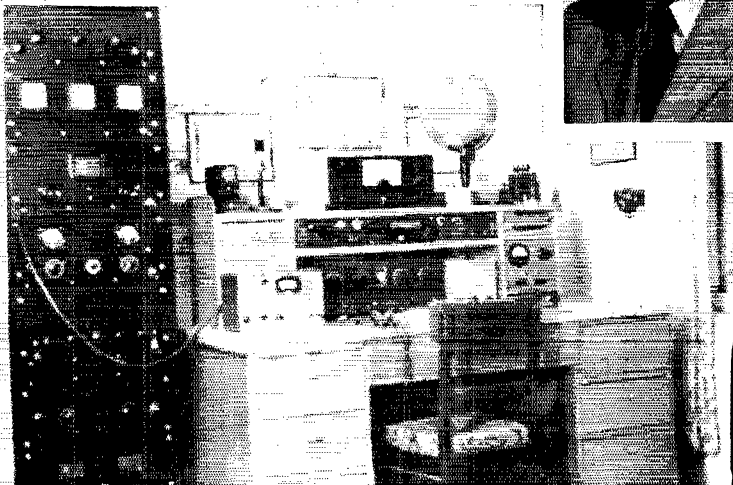
For the day submitted to it satisfactory evidence of
uninterrupted working communication with other
stations in other states in every county in the State of
CALIFORNIA

This certificate is issued in recognition of his willing
conformance

[Signature]

[Signature]

[Signature]



MP4DAH (via RSGB)
PY7VHA (via LABRE)
SP5AHL, % R. Wallis, 152 Sumac St., Philadelphia 28, Penna.

SP5ARI, P. Ligezinski, P.O. Box 8, Warsaw 86, Poland
TC6CW, R. Sinibaldi, P.O. Box 1397, Guatemala City, Guatemala

TL8SW, S. Wagoner (ex-XW8AH-3V8CA), B. P. 302, U. S. Embassy, Bangui, C.A.R. (or via W1BPM)
UR2BU, K. Kallemaa, Vaikae-Iahe 14-1, Tartu, Estonian S.S.R., U.S.S.R.

VE3BSB/5V4 (via VE3AXC)
VK8KK, Radio Stu., Alice Springs, N.T., Australia
VPIRP, G. Pearce (ex-G3AYL), % F. R. Mallory Co., Indianapolis, Ind.

VP2KT (via VE6TP)
ex-VP3GT (to VP4LA)
VP5RG (via VP5BB)
ex-VR2EH (to ZL3II)

W2BTQ/KH6, Col. T. Paul (ex-K4IGD), 3 Worcester Av., Ft. Kamehameha, Hawaii, APO 953, San Francisco, Calif.

XW8AL (via K4KTR)
YA1A (via W4ECD)
YK1AA (via K4RJD)
YN3KM (via K1KDP)

ZK1BS (via W7ZAS)
ZM6AB (via NZART)
ZS6BBB/8/9 (to ZS6BBB)
4571W (W/K/VE/V/Oa via K8RTW)

4X4DW, Box 2033, Tel-Aviv, Israel
5B4RA, A. Boxall, R.A. Heraklis, Cyprus, BFPO 53
5B4TX, B. Clark, TX Trp., 259th Sig. Sqdn. (Com'cn), Episkopi, Cyprus, BFPO 53

5N2RSB/TT8/TY2/5U7 (via K3MINJ)
5X5JK, J. Carter, Box 181, Kampala, Uganda
6W8AG, P.O. Box 971, Dakar, Senegal
7G1IX, Box 477, Conakry, Guinea

7X2VX (via W4UWC)
9G1EZ, Box 3247, Kumasi, Ghana
9LINH, N. Henwood (G3RWF), Technical Institute, Free-town, Sierra Leone

ex-9LIPH (to 9LINH)
9LTL (via ISWL or direct)
9Q5TJ (via DJ4OP)
9Q5UC, P.O. Box 1459, Leopoldville, R. C.

9X5MW (to ON4HK)
If you get results from the foregoing you're much obliged to contributors Ws 1BII 1ECH 1GUC 1VG 1WPO 1YXM 2HAM/4 2QHJ 2SNI 3PVZ 7DUJ 8YGR, Ka 2AIGE 3MINJ 3SLP 51VF 6TZX 7OLZ 8JPL, WAa 2000 2QNW 4CZM 41ZU 5ABC 6YIM 8EWT 8GUN 8BAM, Wbs 2BEV 2ERM 6AKZ, ZS2U, 457WP, YV5AIP, J. Conry, A. Wicks, R. Wallis, American Short Wave Listeners Club

8JTL (628 S. Jefferson, Perry, Fla.), DARC's DX-MB (DL33RK 9PF), DX Club of Puerto Rico DXer (K2F4RK), Far East Auxiliary Radio League News (KA2s GM LL), Florida DX Club DX Report (K4IIP), International Short Wave League Monitor (12 Gladwell Rd., London, N.8, England), Long Island DX Association DX Bulletin (W2MBS), Newark News Radio Club Bulletin (L. Waite, 39 Hannum St., Ballston Spa, N. Y.), North Eastern DX Association DX Bulletin (W1BPW, K1NOL), Northern California DX Club DXer (W4GTGY), VERON'S DX-press (PA8s FX LOU YDV WWP) and West Gulf DX Club DX Bulletin (W5IGJ), Keep 'em coming, gang!

Whence:

AFRICA — W4BPD's departure to other triumphs left a DXpeditionary void on the Dark Continent but ZS6BBB, 5N2RSB and others are determined to fill the vacuum. LIDXA's K2MGE tells of ZS6BBB's imminent Basutoland and Bechuanaland activity using the calls

1964 French Contest

C.W.: 1400 GMT Jan. 25 — 2100 GMT Jan. 26
Phone: 1400 GMT Feb. 29 — 2100 GMT Mar. 1

The REF takes pleasure in announcing the 1964 French Contest, an opportunity to work French Departments for the various French Awards.

French stations will send the number of the department following the call and all contestants exchange QSO number and report. Each complete contact earns 3 points.

Multiplier: for each band 1 point for each different French department, or DUF country other than F or FC.

High c.w./W/VEs in the 1963 event were: K1SDX W1WY W1YIS WA2RUB W4HOS W7BTH W8MSR W7QG VE2AFC (phone and c.w.) and VO1AW.

A copy of your log should be sent promptly to the REF, B.P. 42-01, Paris, R.P., France.

ZS8Z, ZS9Z, or his own label with portable suffixes appended. Peter expects to fire up in ZS8-land on the 3rd of this month, continuing through the morning of the 7th, then hop over to ZS9 for operation from the 8th through 13th. ZS6BBB's s.s.b. spots will be 7098, 14,105, 14,345, 21,105 and 21,445 kc. transmitting; 7210, 14,255-14,265 and 21,410-21,420 kc. receiving. . . . According to K3MINJ, 5N2RSB plans to follow December Telud doings with January TJS action using an 8K-150 and 8X-117 loaned by Hallicrafters on 10-, 15- and 20-meter sideband and c.w. Next month, if all goes well, comes a Lahomey display possibly followed by 5U7 fun. . . . VE3AXC figures that friend VE3RSB will be in Togo long enough to give everybody a good shot at 5V4-land, mainly on 14-Mc. single-sideband. . . . K4RZL becomes CN8FW for a year's intended c.w. splurge on 15, 20 and 40 meters. . . . W1ECU hears from W9CMIQ that SUIKII is due to break loose on s.s.b. at any time. . . . W1BPM proclaims TL8SW's daily 14,050-, 14,250-kc. and 21 Mc. availability at 1900 GMT. . . . W4IDZU says EA0AY's 21,038-kc. CQs around 2000 GMT often go begging. . . . Additional Africans thanks to the clubs press: Marion islander ZS2MI appears Sundays on 14,060 kc. at 1400 GMT, also on 40's low edge around 0500, and ZS1TP hopes to make an s.s.b. visit to Marion this month or next. . . . G3PBD opens a 30-month South Africa assignment. . . . CR7CI was to take an IHB7L single-sideband rig back to Mozambique from Portugal via the Cape Verde. . . . FD8AID, 14,250-kc. s.s.b. at 1800-2100 GMT, claims to be an unofficial-type 5V4. . . . EA2CA still threatens early output from Rio de Oro, etc.

ASIA — Bill of VS9MB, Maldives, writes K1IGO: "This station is usually found on 14 Mc., single-sideband mostly. I always use c.w. and a.m. every fourth day. Our 1X-100 is overworked and likely to pack up at any time but the boys here love to chase up and down the band. I'll sure miss the warm Indian Ocean weather when I return to the U.K. in January." K1IGO finds VS9AIB signals best around 1800-1900 GMT. . . . 4S7WP forwards a flier describing WTC (Worked Ten Ceylon), an award based on QSOs made on or after January 1, 1963. . . . K6AQO (EP2BB) says VU2BK is erecting a high quad at his new Calcutta QTH. Bill, with VU2s BK GE HK LM and RF, enjoyed a personal meeting with Ws ANE and BPD at VU2LL's place last year. . . . W6RO developed quite a c.w. friendship with old J3CR beginning in 1928, and enjoyed a visit from Kyozeo in 1930. Last July, 33 years later, ex-J3CR again saw California and W6RO for a heartwarming reunion. Dwight reports, "In his opinion people are just about the same although great changes have taken place in land improvements. Ex-J3CR expects to resume amateur activity as soon as responsibilities as director and chief engineer of a large steel manufacturing concern permit." . . . "Conditions are very deceptive," opines 5B4RX. "My homebrew 6V6-6V6-807 rig and dipole still do well on c.w. but I'm beginning to suspect that some W/ks are all moults and no ears, particularly on 14 Mc. Do your East Coasters use kilowatts and beams for transmitting, and three-foot pieces of wire for receiving antennas? We 5B4s would stand a better chance for WAS if U.S. Ones, Twos, Threes and Fours would go silent for a day or two each week." . . . Forty-meter friends of JA8AE will be interested to know that Hyo now signs JA1NAE, according to W7DJU. . . . W44DZU credits JA7UJ's 300 watts and quad for the best Japanese signal on 15 phone

. . . . Ham pioneers deeply regret the passing of VS6AE who put Hongkong on the DX map in the early 1920s. Pat was an HARTS officer for many years. . . . Oriental orientations via aforementioned clubs and groups: HZ2AMS (ex-5N2AMS) is beginning to enjoy 14-Mc. c.w. work around 1300-1400 GMT. . . . W9WNV closed his IIL9KH logs with hopes of New Hebrides fun enroute home. . . . TC3ZA (W3ZA) pops up now and then on 15 and 20 sideband, and KV4DE may take on a Turkey teaching assignment with his DX-100B, SB-10 and 2-B. . . . Oman's VS9OC is reported on 14,125 kc., 1900-2000 GMT. . . . YK1AA appears near 14,315 kc. at 1400-1600 GMT using straight a.m. but answering s.s.b. . . . MP1s QBF and QDA like c.w. near 14,050 kc., 1700-1800 GMT. Neighbor MP4DAH, we hear, is none other than ex-5A3BC. . . . UA3CA keeps in touch with son JTICA via 20. . . . With Kurias Murius dust still settling, W4BPD estimates his Afghanistan (YA1A) QSO collection at about 3000. Gus did leisurely work from VS9s AAA and HAA before returning to AC3PT and vicinity. . . . VU2MD recently generated a bunch of Indian novice licenses for future DX availability. . . . Kas 2AB (W4CJD/7), 2UJ (KM6CY), 2FZ (W9PZO), 2GF (K0YDE), 2KM (W4HLWG), 2RJ (W9VCH), 2RS (W5EBC), 2WH (K2IRT), 7DF (K3PNJ) and 7GD (W2KEQ) are fresh FEARL recruits or renewals, while president KA2RC (W0BJJ) rotates back to Massachusetts. . . . Yanks in Japan have a 14,100-kc. c.w. net going with KA2YA as NCS at 1900 GMT. . . . A new Worked-All-KA2-Districts certification will be inaugurated by FEARL this year.

OCEANIA — KX6BK, now K5COU, reminisces of Kwajalein DX days: "I worked 103 countries with 50 to 90 watts of c.w. and various antennas. Ninety per cent of

OH5TK, accompanied by OH5s VF and VD, shown sunning on rooftop, spent two weeks in the Alands last August and QSOd 2800 stations in 80 countries. A 200-watt 813 rig, Eddystone 640 receiver, phased beam and other skywires collected 1600 W/Ks. This year the lads, each just 17, hope to repeat the DXcursion with s.s.b. facilities. (Photos via W2GT and K3CU1)



KX6BK work was on 20 meters, including some s.s.b. activity, from March through August, 1963. . . . K1KSH, now operating from Papua as K1KSH/VK9, says friend K5GBS (of VP3RS, last year) is also using Gary's station, having brought along a KWM-2 for s.s.b. use. Operation should continue through the end of this month, with 160-meter work in prospect, according to W1ECH. . . . Ex-K4GJ obtained his 1931 call, W2BTO, and now signs W2BTO/KH6 on 21-, 14- and 7-Mc. c.w. Turk hears that VR2EH is returning to ZL31J after eighteen months of 50-watt Suva sport. "Openings here in Hawaii seem more frequent lately but conditions are unpredictable and subject to change without warning." . . . Pacific addenda courtesy club journalists: VK9s DR MB MV and ND infest Christmas Isle but favor local chatter. . . . YS4PS offers Malaysia on 14,080 kc. at 1300-1500 GMT. VS4RS, now QRV with single-sideband on 14,120 and 14,160 kc., is mentioned in connection with W4BPD and upcoming VS5 temptations. . . . VK5KO and K1KSH/VK9 pep up 160 c.w. on Thursdays at 1000 GMT. . . . VR2BZ goes back to New Zealand regretting missed ZM7 opportunities, while ZL3DX proposes more rare probes with his KWM-2.

EUROPE — PA0s LV PN VB LOU OI SAN FLX JUL LI and CHN tallied high c.w. scores in that order in VERON's 1963 PACC DX Contest. W410S and VE2IL made off with U. S. and Canadian radiotelegraph honors. The sparse phone turnout saw PA0s HSI SCH JCL and DJS wind up 1-2-3-4 for the home team. PA0LOU declares, "Due to poor response to the phone section of this contest it is now planned to have both c.w. and phone activity on the same week end, the last week end of April, 1964. Every effort will be made to activate as many PA0 participants as possible." As you may recall, propagation conditions were particularly atrocious in last year's PACC affair — . . . OK1CG, recent winner of Oakland Radio Club's coveted WACC, is 54 years young and a ham since 1935. Jindrich homebrews his transmitters, receivers and antennas. OK1CG has a ric for each of five bands with common v.f.o., power supply and skywires, the latter comprising a U.S.A.-directed collinear array, an 8JK and ground-planes for 14 and 21 Mc. His regular receiver is a 4-tube but, when the going gets tough, he turns it into an 18-tube de luxe sniffer. SV1AT describes a lively time at SV1SV, exhibit station installed at Marathon for the 11th International Boy Scout Jamboree. "We worked single-sideband and some c.w. in a tent for ten days. Plenty of dust and hot weather, but we were constantly and pleasantly surprised by visits from foreign Boy Scout amateurs. SV1SV, manned by SV1s AD AM AN AP AR AS AT and AV, contacted seventy countries." . . . SP5ARH, whose address appears in the "Where" rubric, is a young lad interested in corresponding with North American amateurs. . . . Jess (K6QQB), Jim and Dick manipulate the buttons of DL5AU with a flock of gear on 10 through 80 meters, voice, code and printer. A three-element beam, ground-plane and lower-frequency dipoles are especially effective in contests. . . . The 100-watt of E11KD/mm makes plenty of noise along *L'etro Emperor's* western Atlantic and Caribbean runs. . . . ZB2A enjoys a revival on 21,051 kc. at 1500 GMT or so. . . . IT1ZKY and other Mediterranean DXers are bent on lessening Tunisia's scarcity.

SOUTH AMERICA — Ex-VP3GT files distress traffic from VP4LA: "I recently transferred to Tobago and had just modernized my technical library for amateur classes, and my ham equipment to give the boys QSOs as VP4LA. Before I could get started, however, Hurricane Flora struck this island creating havoc with housing, personal effects and crops. The roof of my building, like most others in the area, was completely blown off. I sincerely thank those who sent us food and clothing. It will be quite some time before we're able to build a new Tobago from the ruins. It grieves me very much to have to write you on this subject but, having lost all of my technical literature and equipment, I am in dire need of radio books or magazines and radio apparatus." . . . YL YV1HK lists (1) confusing homebrew phonetics, (2) tendencies to rag-chew, (3)

lack of duplicate-QSO preventing checksheets, and (4) unsynchronized clocks among shortcomings commonly demonstrated by W/K/VE contest participants. . . . K7QXG finds that many c.w. PYs concentrate just below the U.S. Novice band on 21 Mc. "Lots of other DX in the 15-meter Novice range but one has to dig for it." . . . CE0ZL, wielded by W4QVJ of FDXC, satisfied more than a thousand Juan Fernandez hunters in late October. Despite harassment by foul weather, heavy seas, spotty propagation and a gasoline shortage Ed ticked off 650 c.w. and 549 s.s.b. QSOs with fifty countries on 14 and 21 Mc. CE0ZF was thereabouts but prefers rag-chewing with buddies on 40-meter a.m. . . . Further analyzing their 1961 Malpelo operation, FDXC discloses that 79 DX hogs accounted for 260 contacts with HK0TU. Most repeaters apparently are DXhibitionists who can't resist impressing competitors with their mighty signals and techniques, and many of these weirdoes do not even apply for QSLs. . . . Southern slauts spotted in club periodicals: G3RFH may manipulate a 7- and 14-Mc. 40-watt from South Sandwich next month with a volcanic research party as VP8HF. . . . CE0AD likes to work Europe on 7025-7050 kc., 0200 GMT, but WA2WBH of LIDXA may pitch faster Easter eggs this month. . . . VP8QG yanks South Orkneys switches in favor of G3LET.

HEREABOUTS — VP1RP, who has worked DX as G3AYL, ZL1AKL, VE3AEC and VE3AEC/W9, finds himself the only sidebender in British Honduras. . . . According to W4OPM, VP6WD is back at his dial after surgery in London. . . . "KL7CYH runs on batteries," remarks W6YKS. "He charges them in the daytime and works 80 c.w. at night." . . . K9ULY, a veteran "How's" contributor, gets an occasional DX shot from W2RGY at West Point. "The outfit here is a DXer's dream — all sorts of high-powered gear and an all-band antenna farm on a 90-foot bluff overlooking the Hudson. Terrific! Vic somehow manages to perform as vice-president of the Cadet Radio Club while handling the U.S. Military Academy's well-known arduous curriculum. . . . Another of Lesvesie's helpers goes QRL with WA0BBIW's departure from South Dakota for a Navy tour. Gary's only a few QSLs shy of 1XCX. . . . W2QIHL, while appreciating the thumbnail sketch and photo in September's column, wants to emphasize that he is grateful for the generous assistance given by many of the kilowatt-and-beam gang. . . . XE1VT, a familiar contest call in W/K/VE logs, is most active on 14-Mc. c.w. around 1300 GMT. "I'm building the HBR-1J receiver from QST and then will construct a better TVI-proof rig for greater DX coverage." Werner needs a 100-ke. crystal, so if you have a spare and happen to fly down Mexico City way, XE1VT may swap you a chocolate-wated quetzal or something for it. . . . K1JAA, former chief op at McMurdo Sound's KCHUSV, was seriously injured in an auto crash, along with his XYL, while visiting W1APA in late October. Apparently it's a lot safer in antarctic wilds than on civilization's fancy highways. . . . Localists through club channels: K5JLQ now owns *Vasme III*, famed DXpeditionary vehicle of VP2VB/mm. . . . Anguilla, prime Caribbean item, was visited by VE8RG, VP9s AX BN L and W2TTH signing such calls as VP2s KA KI KT and KX in late 1963. . . . New NEDXA officials are K2UYG, pres.; WA2OJD, recip; and W2TFR, secy-treas. . . . W4s UVV IMI AZK BJ and CKB lead the FDXC pack with 311, 302, 295, 287 and 287 countries worked, while W4ANE, K4s HEF CWW AJ and W4NIS head the phone flock with 281, 253, 252, 234 and 234. . . . KP4s AXK BAJ BJM, WA0s MWG and OET are new DXCFP members. . . . QST fictional favorite W6ISQ is hurried to discover a power substation under construction a block or so from his QTH. FB line regulation, Jack. . . . W4BJ of FDXC periodically joins NCDXC's W6TI (W6WX) with transmissious of DX bulletins on 20's low edge. . . . W4RWM, FDXC's consulting RTTY specialist, records current printer activity by DLs 3IR 3JM, F9RY/FC, FG7XZ, HB9KU, HZ1AB, PA0s AA XN, VKs 2EG 3KF, XE1YJ, YV5AW, ZLs 1WB 2SN and ZS6UR.

QST

YL news and views

CONDUCTED BY JEAN PEACOR,* K11JV

Ring Out the Old — Ring In the New

WITH resolutions all resolved, soldering guns adding the finishing touches to building projects which resulted from holiday gifts, new keyers completely mastered, or new beams all properly rotating atop their towers, it's time to look ahead to another new year. 1964 marks many important anniversaries in the world of amateur radio, and one word, "excitement," best describes what is to come.

ARRL will celebrate its 50th anniversary; YLRL will celebrate its 25th anniversary. Many YL groups and radio clubs will be paying tribute to similar occasions.

Reminiscing goes almost hand in hand at such times, as it's impossible to celebrate such dates without thinking back to all that has gone before. Your own contributions and progress as a radio operator is at your fingertips in your log records. Did you ever wish that you could keep a diary? Just reread your radio logs and you have one. Do you remember how the first pages of recorded activity at your station showed more unanswered CQs than anything else? Then there was your first solid QSO — complete with RST, name and QTH. Remember the excitement? If you read on, so many stations logged will bring back pleasant memories; a new state, first YL, first DX, first one who said you had a good fist, and the first who mentioned your fist wasn't so — ! Yes, reminiscing can recall many things.

But, having rung out the old, what will be the new? Reviewing the old is only half the story, and now YLs have an exciting year to look for-

* YL Editor, QST: Please send all news notes to K11JV's home address: 139 Cooley St., Springfield, Mass.



Ginny Powell, K11CI, is the newly elected WRONE President for 1964. She and Doc, W1BWM, and their four children live in Damariscotta, Maine.

ward to. Toni Chapman, K8PXX, has originated a slogan — MIGRATE TO THE BUCKEYE STATE IN 1964! From now until June, YLs will hear this slogan repeated many times with the hope that you can all be in Ohio for the 5th International Convention of YLRL where the Buckeye Belles will be the hostess club. Columbus, Ohio, will be the scene of this gala event to be held June 19, 20 and 21, 1964.

The recently announced tentative format follows: Friday, June 19 — arrive when you please, get settled and meet the YLs. All meals are on your own. The Hospitality Room of the Nationwide Inn will be open, which will provide a complete radio station from 2-through 80-meter c.w., a.m. and s.s.b. (RTTY, if possible). It is a large room where displays of various sorts will be shown and any you can offer will be welcome.

Saturday, June 20 at 9:30 A.M. — YLRL Forum conducted by YLRL President, K11ZT; 1:00 P.M. — YL Luncheon; and 7:00 P.M. — Banquet for YLs and OMs, interesting program.

A complete YL ticket is \$10.00; or, Registration \$2.50, YL Luncheon \$2.50 and Banquet \$5.00. A complete OM's ticket is \$5.00. Marge Farinet, K8ITF, with the help of the Dayton YLs, is completing the coverlet which will be composed of squares donated by different YL Clubs.

Personalized items will be another convention feature. In order for the committee to complete these properly, early registrations will be most helpful. Tickets may be obtained from K8UKM, Elizabeth Isham, 474 Darbyhurst Road, Columbus 14, Ohio. Upon receipt of your tickets, you will receive a card for room reservations at the Nationwide Inn. This can be used for making your reservation directly with the Nationwide Inn, U.S. 40 at Georgetown Road, Columbus, Ohio, if you would like to be in the section allotted for convention YLs.

General Chairman, K8MZT, Shirley, and Co-Chairman, W8LGY, Ruth, extend an invitation to all YLs. Let's hope we can all MIGRATE TO THE BUCKEYE STATE IN 1964!

September Howdy Days Results

Barbara Houston, K5YIB, was the first place winner for Howdy Days with a score of 90 points. Runners-up were: K4RNS, WA8AJR, K8LHF, K7ADI, and W3TSC.

All logs received were from YLRL members. The high score from a non-YLRL member would have

received a year's membership to YLRL but could not be presented. Band conditions were very poor which resulted in poor participation. Better luck next year gals!

OMs Only

What — Buckeye Belle-OM Party.

When — February 4 through February 6, 1964.

Where — All bands, any and all modes.

Why — To promote Buckeye Belle certificate achievement for OMs.

Procedure — OMs call "CQ Buckeye Belles." Buckeye Belles call "CQ from Buckeye Belles."

OM logs show — Station worked and handle, Buckeye Belle number, QSO number, date and time (GMT).

Buckeye Belle logs show — Station worked and handle, QTH, QSO number, date and time (GMT).

Score — 1 point per contact.

Awards — To the OM and to the Buckeye Belle with greatest number of contacts.

Send signed copy of logs to K8VMV, Jean Posey, 2864 Sherwood Drive, Aurora, Ohio, postmarked no later than Feb. 29, 1964.

Atlantic Division Convention

The warm hospitality of the Waylars at the recent Atlantic Division Convention, held Labor Day week end, will long be remembered by all the YLs attending. It was held at the Sheraton Park Hotel in Washington, D.C., under perfect weather conditions.

Under the fine organization of YL Program Co-Chairmen, Ethel Smith, K4LMB, and Claire Bardon, W4TVT, the YL activities were lively. The hospitality room proved to be ideal for getting acquainted, making the bridge, canasta and bingo games that followed even more fun. A ceramic demonstration and hair styling show fascinated many. An informal YL forum was conducted by Claire, W4TVT, Liz Zandonini, W3CDQ, and K1IJV. Fran, W3AKB, directed a code-speed copying contest that attracted a number of c.w. enthusiasts and created some smoking pencils.

The hard work in preparation for this convention was appreciated by all attending YLs, as their smiling faces showed. From beginning to end it was a gala event.



Some of the YLs attending the Atlantic Division Convention in Washington, D.C. In the photo at left are (from l. to r.) Liz, W3CDQ; K1IJV; Fran, W3AKB; and Ethel, K4LMB. In the photo at the right are, back row (l. to r.), Edith, W3AAU; Florence, WB2WYE; Vi, 1963 Waylarc Pres., K4EAM; Ruth, WA4FEY; Eleanor, K3TNL. Front row (l. to r.), Claire, newly elected Waylarc Pres., W4TVT; Shirley, W3VNN; Ethel, K4LMB.



Most DXers will recognize the name Vera YL, who operates as UAØKSS from Irkutsk, Siberia. A remarkably fast and efficient c.w. operator, Vera handles pile-ups with great ease (photo courtesy of W8IV).

Club News

The Rhode Island YLs announce recent election results as follows: Pres., Elinor Turner, K1DCW, 1754 Main St., West Warwick, R.I.; V.P., Theresa Thibeault, K1VXZ; Secy., Betty Tunniciiff, K1QJE, 6 Spring St., West Warwick, R.I.; Treas., Florence Wolstenholm, K1DWH. The club sponsors a R.I. YL certificate which is issued to anyone sending proof of contact with 10 YLs in Rhode Island to the secretary.

The 1964 officers of WRONE were announced at their fall meeting as follows: Pres., Ginny Powell, K1LCI; V.P., Ruth Barber, K1HIF; Secy.-Treas., Mary McLam, K1ICW; Hospitality, Chata Swenson, W1RLQ; Net-Membership, Leona Peacor, W1YPII.

Coming Events

YL/OM Contest for which complete rules will appear in the February column.

Yls Only Party, sponsored by the Buckeye Belles. See the February column for rules.

QST





Correspondence From Members -

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

THE LEAGUE PROGRAM

(See also page 31 this issue)

☐ Congratulations to the Executive Committee for having acted promptly and forcefully in filing the Petition for Rulemaking on incentive licensing. The commentary in the pages of *QST* demonstrates two things: that the proposal is urgently needed, and that it will be painful to a certain number of people. The Amateur Radio Service owes a debt of gratitude, and perhaps ultimately its continued existence, to the courageous action of the League in this matter, and be assured, gentlemen, that some day it will be recognized as such by all amateurs. . . . — *WB2HBV*.

☐ I was surprised and shocked to learn of the full content of the proposal made by the Board to the FCC. I do agree that the Amateur Extra Class operator should be justly rewarded for his efforts. There are many ways to do this. The Board as well as the ARRL is supposed to represent the amateur radio service. Can you honestly call your proposal representative of the majority of the amateurs; I think not. I have been doing a lot of talking as well as reading of the mail on the ham bands and a major part of the amateurs that I have talked to and heard in QSO do not support you in your proposal. Of course, I also do not support you. Remember! Don't bite the hand that feeds you! — *W6GJZK*.

☐ I want to commend you on the petition you sent to the Federal Communications Commission. It took courage for our directors to take a stand that they knew would help all amateurs in the years to come. . . . — *W51JQ*.

☐ Congratulations! I see you have put forth your idiotic scheme to abolish HAMS, and put yourselves out of a job (I hope). For your information, I owe you birds NOTHING, and from this date on, this is exactly what you will get from me! . . . For my part, I am not the least bit interested in becoming a first class, extra class, petty class or any other damn class. I am far too busy with other things to worry about this, for the bit of humming I do. The fact that I am an instrumentation engineer indicates that I can pass the silly test, but why bother?? — *W1LHV*.

☐ The ARRL is to be congratulated for proposing a program designed to upgrade our status by changes in the amateur license structure. As the need approaches (and it is approaching) we might thus demonstrate to those who would degrade or eliminate us that we are better qualified and deserving of our portion of the radio spectrum.

In the minds of many, the concepts of democratic rights, privileges and equality of opportunity have somehow become equated to a "something for nothing" philosophy. To those of us in society who wish to enjoy privileges and rights, falls an obligation directly proportioned to the benefit re-

ceived through the utilization of that right. That the cost or price of that obligation is increasing should come as no surprise. Like it or not, with a fixed supply of goods (frequencies), and an increasing demand (more amateurs) the increased cost (upgraded license) is a logical consequence. The individual amateur is still free to decide for himself whether he thinks the value (benefit) is worth the price. He is denied nothing.

I hope we soon quit haggling over the price (for which, I repeat, we are responsible by our very number) and concern ourselves more with the serious problem of preserving the "goods." It is to that end I think all amateurs should presently unite behind the Board's recent proposal. — *W0TRF*.

☐ What are your cornballs trying to do? Advance amateur radio? The heck you are, you nuts are going to set a fine hobby back ten years. There will no longer be a General Class but an Advanced Novice. You elods keep sticking your nose into these things and people will have to pass examinations on color television transmission, pulse, and build an f.m. transmitter in front of an examiner in five minutes before he can run 40,000 Mcs. (crystal-controlled, naturally). If this idiotic bill on incentive licensing does pass, what do you propose to do, just shut everyone off twenty meters except a few brains? A monkey could score 100% on the advanced amateur status symbol test. No doubt that is how 75% of the present advanced amateur status symbol license holders got theirs. What's it supposed to prove? Is the FCC going to give you a \$1.00 kick-back on every \$4.00 they collect on license fees? — *W4DKM*.

☐ You are to be commended on your stand for incentive licensing. Most people will do only what they have to and as long as amateur licenses are as easy to get as they are today, complete with all privileges, we will have "citizen band" type hams who know nothing about what they are doing. — *K8KIR*.

☐ . . . Until now I have been of the impression that the ARRL existed to support amateur radio as a hobby and to support and represent its members. Certainly it has no right to set standards of performances or judge those amateur radio enthusiasts who can devote only a limited amount of time to their hobby. — *W18AUM*.

☐ If the bands are crowded then we like them crowded because it gives us something to complain about. Most of the hams whom I have talked with are *against* this proposal because they don't want so radical a change. They are in the hobby for fun and not to keep up to a certain intelligence level on radio theory. They maintain their stations and operating procedures in good order and they use modern concepts in the design and construction of their home brew equipment. None of them are going to be great researchers in the radio field, none expect to be. They want undistorted fun — *F.U.N.*, that

is what they are in this hobby for and by jiminy that is what you have to see that they get . . . *K9MDM*.

☐ . . . I am very proud of my new ARRL membership and strongly support your courageous stand for the gradual improvement of the amateur fraternity by means of raising technical standards. In these days of store-bought equipment and hams operating kilowatt rigs without any interest in what's inside those pretty boxes, I believe it's about time we re-examined the basic purpose behind our getting these frequencies in the first place . . . — *W2MQP*.

☐ I am not surprised to read the flurry of protests against your stand on incentive licensing. The protests are a logical result. Americans have been taught to idolize mediocrity. To aspire to anything higher than "average" is undemocratic. The critic's logic leads him to believe that the requirements for obtaining a license should be so simple that the most untrained and untechnical minded individual who may decide he would like to be an amateur radio operator can qualify. Anyone who possesses more than this mediocre amount of knowledge should be granted no more privilege since this violates some perverted rule of equality.

There can be no progress in any human endeavor unless the standards are held high — indeed just a bit beyond easy reach. And the incentive system in any endeavor will always bring forward the individuals who are willing and eager to achieve . . . — *K2OFM*.

☐ . . . I joined ARRL with the intent of being a member of a group to work for the best of all. It is clearly shown that this is not the association's purpose in mind. Consequently, I choose to have NO part of what ARRL is presently attempting to do. This is no longer a league to encourage amateurs to be good amateurs but to make technicians out of us laymen . . . — *W10GGG*.

☐ In view of the terrible injustice imposed upon me and my fellow amateurs based on the League's recent incentive proposals, I hereby cancel all affiliations with the ARRL including my subscription to *QST*. This is to become effective immediately. — *K2SKP*.

☐ It is with special pleasure that I renew my ARRL membership this year. There have been squawks and cancelled subscriptions from some of the brethren who oppose incentive licensing and insist on their right to remain ignorant and to contribute nothing to amateur radio. But I feel that a return to a realistic, reasonable incentive licensing system is long overdue. I felt strongly in 1951 that FCC was wrong in dropping the requirement for an Advanced Class ticket to operate phone on the major bands. Since that time, the operating and technical caliber of the typical ham has become definitely poorer. Something has to be done, not just because of the ITU conference coming up, but for the long-range good of all of amateur radio. Your proposals for re-establishing the incentive-licensing system are a welcome and necessary step. — *W6IAQ*.

☐ Your so-called incentive licensing plan sounds as ignorant as some of its proponents. It will mean the eventual loss of virtually all operating privileges to older members of the fraternity (who aren't likely to crack the books at their ages). Two-letter calls will be calling you three-letter names. Boot-

legging would be bound to increase — particularly on proposed "prestige bands," such as 20 meters. TVI complaints should abound as many amateurs would be forced to higher frequencies.

While the increasing popularity of amateur radio as a hobby has created band congestion and other concomitant problems, this hasn't happened overnight. Drastic and expedient tactics will not provide the sensible long-range answer that all amateurs are interested in providing. I suppose we should consider ourselves fortunate that our profound "representatives" are not our statesmen, or surely we'd be at war today. Some of them are living proof that it doesn't take too much gray matter to get a high-grade license. As far as ARRL membership is concerned — phooey! — *K9PYF*.

☐ . . . I haven't heard one good reason against the changes, just lame excuses and dire prophecies of doom. Don't the opponents realize that unless we show that we're interested in more than taking up part of the spectrum, we'll eventually be relegated to the status of Citizen Banders? In this case not only are hams losers, but so is everyone who might have been helped by the operation of some ham. . . . — *WB2DUB*.

☐ Am back in the ARRL fold after many years "outside-looking-in." From what I hear there are a few rocking the boat so figured maybe a little more ballast will help. History does repeat itself. We heard the same gripes in the thirties over the same issues. If there was an error in judgment it was in waiting so long before making a move on this license business. — *W0EQN*.

☐ . . . Those who want to make use of the radio bands as a soapbox for their personal prejudices, disrespect for their fellow operators, and criticism of the agencies trying honestly to help them, must be reminded that we operate solely at the pleasure of our government which might at any time eliminate amateur radio as soon as it sees that such action would be in the best interests of its services and international relations. There is nothing whatever sacrosanct about the status of amateur radio. The old timers know that changes can, did, and will take place. Enclosed is my check for renewal of membership, which will compensate for some sorehead who ran home with his marbles because he refused to see that you were trying to help him win the game. — *W4JOH*.

☐ Thank goodness somebody cares enough to keep some of us hams informed, and to try to tell us we aren't in as good a position we think we are. If some of those people who complain so bitterly about "the ARRL trying to make all hams electronic engineers" aren't clued in in time, we may wake up one morning and find that we can't seem to get anything but commercial broadcasting stations on our receivers. — *W40JX*.

☐ . . . I believe your official actions of late to be reflecting only the self-interest of the current Board of Directors and in flagrant disregard of the rank and file of radio amateurs. Rest assured that your dereliction has not gone unnoticed as you will discover should one of your executives take the trouble to listen to those bands which he professes to represent. — *K0IBU*.

☐ . . . Hearing fellow amateurs making absolute fools of themselves on the air in protest has left no

question in my mind as to whether this is the right thing or not. . . . — *K1NTR*.

¶ . . . In view of your recent tactics involving incentive licensing, I am not going to renew. The money for your magazine now is going to go to Wayne Green, the man who really knows what the majority wants and acts accordingly, not as he pleases . . . — *W2HGC*.

¶ I must congratulate *QST*'s courageous decision to request a return to incentive licensing for amateur radio. You will, of course, be besieged by the wails and strenuous objections of many amateurs who have become accustomed to operating amateur radio "the easy way". Also, the many commercial interests will bring much pressure to bear because they may see a reduction in the bonanza they have found of late brought on by the present licensing situation. I would anticipate that certain of the other magazines, claiming to be published in the interests of amateur radio, will seize upon this opportunity to proclaim themselves as the voice of the hosts of amateur operators who feel that they are outraged by the requirement to prove themselves worthy of a license . . . — *W2ATS*.

¶ . . . I worked hard for my General license and don't think I can work any harder for an Extra Class or any other proposal you may have. I say leave well enough alone . . . — *WB2FCL*.

¶ . . . I can only feel disgust for my fellow General Class amateurs who heap abuse upon the League for suggesting the incentive licensing. Their anger stems from the fact that they face the loss of privileges I have mentioned. But they fail to see that their individual loss is balanced by a collective gain — the improvement of the state of our wonderful hobby. The loss is temporary if one is interested enough in his hobby to learn the basics of its workings and motivated to reach the higher level license. The gain is lasting, and quite probably essential for the preservation of amateur radio as we know it. Or should I go a step more and say amateur radio as it should be? . . . — *W3UUM*.

¶ . . . I've never been an ARRL member before but my eyes have been opened by your proposal. Please make me a member and start *QST* with December issue. — *W0HIO*.

¶ . . . ARRL — Devoted entirely to the destruction of amateur radio. To hell with the ARRL. — *W4NUN*.

¶ . . . Any organization that makes the recommendations to the FCC that you made *without first polling its members* does not deserve to be perpetuated. I have underlined one of your greatest objections . . . — *W4ZVNL*.

¶ It is my conviction that the action by the ARRL relative to incentive licensing is much too far reaching to have been submitted to the FCC without a survey of the League membership. The attitude of ARRL, in which it claims in its petition to speak for 80,000 amateurs but yet states that this action is too important to submit to the membership, is unacceptable to me, independent of whether I agree or disagree . . . — *K3K5J*.

¶ . . . I believe that there should have been a referendum by the members as to what they want

done in the future as far as the licenses are concerned. The directors are nothing more than a board of directors of a corporation and should not make any decision which has such widespread disapproval of the stockholders, which every member is . . . — *K1EBZ*.

¶ Wouldn't it be terrible if:

Every member of a town council had to canvass each voter in his district before he cast his vote at the council table?

Every time a legislator had to stand up and be counted, he also had to poll the entire electorate before he voted yea or nay on every issue?

Every time a member of a corporate Board of Directors was called upon to make a decision at a directors' meeting he felt his judgment was not for the best interest of the stockholders unless he also polled the shareholders?

These folks elected to our legislative branch of government are governed by the same general rules as the members of any Board of Directors of a corporation, or a superintendent of a Sunday school class. These officers are placed there not to represent you in the sense that they vote your will, even if they ever could get a majority opinion. They are placed there to do your thinking for you at the Board of Directors' table. They are informed of all of the ins and outs of the situation and they are the ones who are much better able to express a considered, intelligent opinion by voting than the average stockholder who is mostly liable to be quite uninformed and emotional in his thinking.

Webster, in his Twentieth Century Dictionary, says that the word "represent" means, among other things, "to be an agent for, or substitute for, to speak for." The directors of the ARRL are elected to represent YOU, to act for YOU and to speak for YOU in their deliberations and in their decisions. They shall substitute their judgment for yours. Their informed, considered judgment is much more liable to be for the best interest of the hams than perhaps any emotional tirade I might deliver against what they propose to do. If any of us does not agree with the directorate then we have the God-given right all Americans have to yell to high heaven that we are being robbed, threatened to expel every one of the directors — and by golly, we can do just that at the next election. I, for one, am happy that a few vociferous objectors who demand having things done their way or else, did not influence the decision of the Board. If a majority of our Board believe that incentive licensing will be for the best interest of the fraternity and our country, then we should go along with them. They were put on the Board to make these decisions. They were put there to use their mature and considered judgment, and I, for one, believe that like our Congress in Washington, when it expresses its opinion, it is up to all of us to put our shoulders to the wheel and pull like hell. And why not let those emotional folks run off and join up with some other organization if they wish? They will find out that they will meet the same problem of representation soon enough and then want to run right back into ARRL again. Emotion is no panacea for thinking. — *W3BU*.

¶ . . . In the controversy over incentive licensing, the ARRL has been called many unbecoming names, among them, undemocratic and socialistic. Obviously, these invectives are authored by the ignorant and impulsive. In any democratic organi-

(Continued on page 162)



Operating News



F. E. HANDY, WIBDI, Communications Mgr.
GEORGE HART, WINJM, Natl. Emerg. Coordinator
ELLEN WHITE, WIYYM, Ass't. Comm. Mgr.

ROBERT L. WHITE, WIWPO, DXCC Awards
LILLIAN M. SALTER, WIZJE, Administrative Aide

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A Club Program for '64. To be successful and meaningful in the eyes of its members, every club must be up and doing things, and have objective programs and leadership. Club officers in many of ARRL's 1350 affiliated clubs often consult our club annual (bulletin) for ideas. This report each February includes all we can find out about individual club plans and progress. With the new year approaching and clubs writing for suggestions, let us pass along some high spots on the activities of the Rockaway (N.Y.) Amateur Radio Club (WA2TAQ, President).

Last fall the club reviewed its projects and long term objectives. We commend its *Ten Point Program*. This covered the following ground:

1. To achieve 100% ARRL membership.
2. To initiate an Instruction Program, to upgrade all classes of licensees.
3. To announce on-the-air discussion groups on 10 and 2 meters to supplement the club's educational program.
4. To assist new amateurs by (a) setting the example in member-operating practice, and (b) offering tactful friendly operating suggestions over the air to help others.
5. Re-establishing the Rockaway ARC Emergency Net on 29.566 Mc.
6. To promote "ten" "six" and "two" for local contacts to relieve band crowding elsewhere, and step up band utilization where needed on these and v.h.f. bands.

7. To use *only* minimum power needed for a QSO, no crosstown kw. contacting.
8. Listen first before transmitting. Work together with nearby amateurs, sharing operating time and, or technique, to minimize or avoid overloading receivers, particularly super-regens.
9. To encourage collective teamwork, utilizing members, committees and officers together to stimulate more activity and interest in RARC.
10. To *accept into membership only those who will work with and for the club* . . . with an eye to greater goals such as the emergency equipped trailer, perhaps someday a clubhouse of our own.

This club's educational programs are already in full swing. "Spurious Radiations," the club's bulletin, reports (1) a two-meter AREC net going, and operations improving with each weekly drill. (2) A 7-Mc. club code practice program underway, directed by W2YBU. (3) Plans for the club auction, the event the club was arranging currently to bring a needed 10% to the club treasury. That Instruction Program is one we would single out from the ten points. To help Novices and Technicians and every class of member and prospective member to work for his "next upward" kind of FCC amateur license should, we think, be the constant aim for every live club. Are you a club member or a club

MEET THE SCMs

Neat and orderly are the words that describe NNJ SCM W2CVW. Ed is active on phone and c.w. from 160-2 with a Valiant, KWM-2 and Gonset Communicator III and holds numerous operating achievement awards. At the left is part of the W2CVW library, an old GE long-wave BC receiver, SX-71 and RAL super-regen. Another part of the shack shows further awards, QSL files, Boehme keyer and Wheatstone loops hanging on the wall.



officer? How about *your* club's '64 program? May we suggest these "ten points" as suited for some review and discussion at your very next meeting.

The club's ability to better serve the needs of its members and the whole community can not only increase the know-how of individual members. It can be the way to build a stronger club, to get more members, and through *organization* to get more respect and recognition for the Amateur Service and amateur radio. (Please refer to page 87 of November '63, *QST*. There's more on Club Membership Potentials, data on getting our help on FCC exam standards, outlined Suggestions for a Radio Course, and the availability of the book *Licensing Classes* to bona fide amateur radio club instructors.)

Reminders: Start a New Number Sheet; Use Those Precedences. January one each year is the time when every amateur who handles formal traffic starts his new consecutive series of message identifying numbers. That is, he assigns the next number coming up from a list as he files or originates a message, other than one transferred from another originator after radio handlings.

Every good amateur in traffic work should see that *every* message originated on amateur circuits in '64 is given a *precedence* too. This clearly specifies the order of handling, a matter that becomes important in disaster or emergency situations. The R for routine, P for priority or E for emergency (always spelled out) always follows the number in sending and receiving traffic. Messages without precedence shown are 'routine.' No operator should make any change in a text or a precedence designation. The thought we wish to convey here is that precedences should appear *all* the time, and be shown on *every* message, not just on 30% of our traffic. Our nets as well as ARRLC are dedicated to Public Service. *Accurate* handling is the first responsibility of every communicator. Speed in handling and *reliability* in delivery are essential also. This is to ask that one of the three precedences be shown on all messages. This is a matter of making it a habit to use all the tools of the skilled communicator daily, so there will be no mistakes or misunderstandings in actual emergency.

Expanded WIAW Schedule. Have you run across that extra period of WIAW code-practice yet? See page 103 for our c.w. frequencies. The early run seems to have caught the fancy of lots of operators, judging from the bouquets sent from all over. We still have the 0230-0320 GMT 5- to 35-w.p.m. runs. Our signals change in strength from season to season so it's worthwhile to check each one of the frequencies we send on from time to time. This permits you to copy the frequency you get best at your location.

This 'extra' is a daily tape-sent bonus run at 10 13 and 15 w.p.m. To try for it warm up your receiver for the 0030-0100 GMT period. This is just ahead of our customary early evening 0100 GMT OBS bulletin. (That 18 w.p.m. run can be checked, if fills are needed, when we re-run the

RESULTS, SEPTEMBER FREQUENCY MEASURING TEST

The September 12, 1963 FMT, open to all amateurs, brought entries from 269 participants who made a total of 988 measurements. Of these, 110 ARRL Official Observers submitted 369, and 159 Non-OOs made 619 readings. All taking part have received individual reports of their readings. The standings accredited to the more precise in each group appear below; all listed show ability of the highest order in Frequency Measurement. February *QST* will announce details on the next ARRL FMT.

Observers	Parts/ Million	Non- Observers	Parts Million
W4JUY	.03	W1PLJ	0
W5FMO	.1	W1WW	0
W0VBK	.2	WA4NKM	.1
W1VW	.2	W2FMU	.1
W9GFF	.5	W8CUJ	.1
K6MZN	.6	K4MEL	.2
W6GQA	.7	W2RIJ	.3
W1TFS	1.4	W8LZY	.5
W3BFF	1.4	W0YMG	.5
W2PZL	2.2	W7ZHA	.9
W1ZCO	2.3	W8APY	1.1
W2AIQ	2.5	W6CDF	1.2
W5EM	3.4	K3RZC	1.3
W4NTO	3.7	R. Ireland	1.7
W4MKT	4.5	K5RWB	1.9
W4LVV	4.5	W3AHZ	2.1

same text, just four hours later.

The V.H.F. SS, Jan. 4-5. Can you work at 50 Mc. and in the higher frequency bands? Then this is *your* contest. You will find the rules fully detailed starting on page 28 of December *QST*. It's a chance for you to look for some new states and ARRL Sections. Give your v.h.f. antennas and station a real workout. Your results large or small will be welcomed.

CD Parties. All ARRL official-station and leadership appointees who can do so take a full part in the enjoyable four-times-per-year CD Parties, choosing phone or c.w. as appropriate to their interest. Speaking of results we looked back over the year to pick out some highs. The finalized scores that seemed most outstanding were as follows:

Phone: K2QDT (WNY) 39,600.....October
K5MDX (Miss.) 28,750.....January
C.W.: W9EWC (K9ELT opr.) (Wis.) 228,820

July

K4ZYI (Ga.) 213,730.....January

Now this appointee group is dedicated to try to set an example of the best in amateur operating. Its members holding "service to others" appointments from SCMs are responsible for our radio bulletin and Official Observer service for all amateurs, also in a very large measure for the net participation and public service as rendered by ORS, OPS and OES under EC-RM-PAM leaders. The quarterly operating get-togethers (CD Parties) have the station testing qualities of the Sweepstakes without the high pressure. We normally list all the scores reported from this CD-Party activity when the scores are over 5,000 points (phone) or 100,000 (c.w.). In the latest (October '63) activity it was notable

that there were 27 of each, c.w. and phone, turning in such reports of results!

Novices, Attention; Round-Up Activity Coming Feb. 1-16. We mention this a month in advance since it is looked forward to by so many Novices. This is a once a year opportunity to see how the "first station" is getting out, also a way to build operator proficiency and roll up contacts far and near. Points for each participating Novice station are accumulated in fifteen days of on the air activity. The rules for the competition appear elsewhere in *QST* for this month. The League welcomes a station-worked list and points scored (by Novice QSOs) from everybody taking part. Novices in all parts of the U. S. will compete for top honors. There's nothing to exchange but the QSO number and the Section. Novices can contact either non-Novices or other Novices to exchange this information and rack up points. Total listening and logging time cannot be over 40 hours. This is in a full half month of contest, so this doesn't interfere with home, school or business requirements. A "CQ NR" starts off the activity and keeps it going. There's a little bonus or credit for holding a Code Proficiency award. The extra points may mean the difference between coming in first or second in your Section. Try 80- 40- 15- and 2-meter bands as these are open and report your results to us, whatever you do.

—F. E. H.

BRIEFS

Please add the following to the list of Club Councils and Federations appearing in December *QST*:

Manitoba Assn. of ARC's, Gordon F. Cimmer VE4CF, Sec'y, Treas., 88 Sunset Blvd., St. Vital, Winnipeg 8, Man.


Ohio Council of ARC's, E. E. D'angelo, K8DJM, Sec'y., 3134 Ontario St., Columbus, Ohio 43224.

—

In addition to the listing last month, we're pleased to welcome the Palmetto Amateur Radio Club, Inc., of Columbia, S.C. to the ranks of clubs consisting 100% of League members.

—

The latest in the line of "errors by Murphy," aided by a staple, is an omission from the DX Competition c.w. results in the October issue. CE2CR's log was received and should be added to the listing as 33,902-46-249-A-21. Our apologies OAI.



Have you qualified at 35 w.p.m.? If you haven't reached that goal as yet perhaps you'll want to start on the way up and make the grade in '64. Full details appear under Code Proficiency Program each issue, Operating News.

OCTOBER CD PARTIES

Wow! Activity was great in the October CD Parties with 27 reporting over 100K c.w. and the same amount topping the 5K phone figure. The phone claimed scores are eye-opening, the best we've seen in the past two years. W9AQW, K9ELT at W9YT and K5OCX topped minimum figures on both modes in what many consider a top operating event. As an example of how well things went; K1WJD predicted he'd come in fourth and that about 17 or 18 would break 100K c.w.. WCUCØ's xyl held off the stork till 2 hours past the end of the party (a girl!), K5MDX broke 21K phone in just 7 hours of operating time and K2QDT's antenna work paid off to the tune of well over 30K phone.

The following high-claimed CD Party scores show claimed score, number of QSOs and sections. Final results will appear in the January '64 *CD Bulletin*.

C.W.	PHONE
W9EWC ¹ 208,320-651-64	K2DQT 39,600-180-44
W9AQW 181,675-555-65	W1FJJ 31,775-149-41
K1WJD 175,455-550-63	W9EFP 24,940-112-43
K5OCX 167,310-501-66	W9AQW 22,225-123-35
W3GRS 146,740-500-58	K5MDX 21,400-107-40
K4VYF 139,025-402-67	W1JYH 17,940- 86-46
W9YT ² 137,800-446-61	W4LK 17,640- 98-36
W8CUC/Ø 136,000-420-64	W9YT ² 16,095- 81-37
W6WX 132,615-414-63	K3MINT 15,750- 85-35
W1SWX 132,300-413-62	K9MIAN 14,880- 93-32
W3TMZ ³ 130,200-413-62	KØJQI 14,250- 92-30
K9DHN 129,675-450-57	W2ZVW 13,050- 82-30
W2MTA 129,015-416-61	W4ELB 12,000- 72-32
K4LPW 127,200-417-60	W4ZM 11,935- 70-31
W4DVT 126,170-400-62	K9WIE 10,665- 75-27
W8ENO 124,440-402-61	K3RPH 10,585- 73-29
W2WLN 114,570-397-57	W8ANØ 10,260- 70-27
W9AUM 113,280-379-59	W1NJL/1 9,240- 60-28
W9QOC 111,300-366-60	K9IVG 9,100- 63-28
K7CHH 110,330-368-59	K1CAU/6 8,320- 48-32
K4PQL 107,160-371-57	W2IYB 7,590- 65-22
K7NHV 105,225-339-61	W3TMZ ³ 7,420- 46-28
W1TS 104,780-331-62	K5OCX 7,130- 56-23
W4MXU 102,955-342-59	W4JUL 5,865- 44-23
W8AEB 102,955-344-59	W4WBC 5,750- 41-25
K9WIE 102,315-355-57	K9GEL 5,175- 41-23
K2EIU/5 100,300-334-59	KØRSA ⁴ 5,880- 40-28

¹ KØRCF, opr. ² K9ELT, opr. ³ W9SZR, opr. ⁴ KØRSA, WAØAYL, oprs.

October CD Party participants need little introduction to this pair of operators. On the left is E. Mass. ORS W1FJJ with 31,775 claimed phone points (that's right—over 30K) and on the right, showing fine activity in both parties, W9AQW—OO/OES, Indiana.



AMATEUR RADIO PUBLIC SERVICE CORPS

The principle of liaison is a most important one in establishing an emergency communications facility which reaches from your own neighborhood to all parts of the nation. There is a tendency among many AREC groups to consider themselves adequate to handle any emergency situation when in fact the only ones they can cover, with doubtful adequacy at that, are those concerned only with their own local-coverage area. Plans for extension of service to cover other areas, or to provide long-haul contacts, are left to chance, a blithe assumption that this can be easily arranged if it becomes necessary.

In the recent SET, it became obvious, as we expected, that a great many AREC groups have no NTS connection and that some of them do not know how to get one or even, in isolated cases, what NTS is all about or that it even exists. Further than that, some of our message-handling practices and procedures leave much to be desired from the standpoint of practical efficiency.

The AREC is to a large extent a message-handling facility, and all its stations should be staffed with operators who are fully conversant with this phase of amateur operating. If this is not now the case in your own group, then a training program is indicated. True, at the local level some of the communication is of a "command" nature, with one disaster official talking directly to another over an amateur facility. In an emergency situation afield, it is not always practical, and sometimes not even possible, to "write it down." Nevertheless, the value of recorded communication should not be minimized to the extent that there is scarcely any, as it often is. Especially by voice, there is too often a tendency to forget such details as message form and proper authentication, too much word-of-mouth spreading of rumors, exaggerations, estimates by those not qualified to estimate, requests by those not authorized to requisition. Where informality is absolutely necessary, let us be informal; but where the formalities can be observed, as in most cases, let's observe them.

ARRL message handling procedures are discussed in detail in the League's publication, *Operating an Amateur Radio Station*. The organization and operation of the National Traffic System is explained in detail in our printed circular known as CD-24, and NTS nets are included in the annual net directory (CD-50). In CD-24, note particularly the section on "local" nets and on "Operation in Emergencies." All any amateur need do is read this material carefully, then proceed to put it to practice in his regular public service operating. You won't be able properly to handle a message just by reading how to do it. You have to actually do it, not just once a year or once an emergency, but regularly, once a week or more often.

Your value as a Public Service Corps operator is a measure of your skill and your versatility, in operating, building, experimenting and technical know-how, and in station equipment. To whatever extent you are restricted by lack of any of these qualities, to that extent is your value lessened. Everything adds up, everything helps. We have scant sympathy for those who complain bitterly that they do not have privileges other amateurs have, when the reason they do not have them is simple lack of qualification. This same thinking applies to your AREC organization. A topnotch group will have well-qualified personnel in every phase of amateur operating; it will have some good c.w. operators, some experienced v.h.f. hands, some "can do" technical wizards, some knowledgeable traffic handlers, some operators with a background of emergency-operating experience, some who know people in the community and can promote things. A group that is lacking in any of these, and other qualities essential for success, need not sit around hoping that someone like that will come along. Every amateur may not have all the qualifications, but in most cases there are quite a few who are capable of acquiring them. All that is required is a little time and a lot of effort.

Local nets may conduct regular liaison with regular NTS nets at section level. Some of these are on phone, some on c.w., but in most cases they are interconnected, so it really doesn't matter where your liaison occurs. Usually, they operate either on 75-meter phone or 80-meter c.w.;

only in the smaller sections is v.h.f. practical, although much preferable to 75-meter phone where it is. If your local AREC net sets up the regular contact with the section-level NTS net, it can then itself be considered a part of the ARRL National Traffic System and utilize its facilities for medium and long-haul traffic, in normal times and during emergencies.

The concept of the Amateur Radio Public Service Corps envisages the interdependence of our facilities. If your group is not now officially connected with NTS, start now to find out how to make this connection. — WINJ.M.

While assisting the Highland Park Community Council of Ledyard, Conn. maintain discipline at a teenage block party on Aug. 23, the Norwich area AREC took part in an emergency operation involving an automobile accident. On his way to the scene of the party, K1SRF came upon the accident and immediately contacted K1LMS, in whose car a town policeman was riding. They reported to the scene immediately and the policeman took charge, establishing road blocks and directing traffic. Meanwhile, the fire department was summoned because of gasoline on the highway, and K1PGT assisted with communications for the firemen. The fire chief was also summoned with the aid of amateur radio. — K1SRF, Asst. EC, Norwich, Conn.

Shortly after dark on Sept. 12 a light plane was reported crashed near Bryan, Texas, in a severe thunderstorm. K5KAZ fired up on the local net frequency of 28.875 kc., while K5ZXL was dispatched to the local TV station to assist in getting reports, as the telephone there was dead because of the storm. Mobile K5s EPH and KNE tried to join the search party at the airfield, but soon found that travel was impossible because of the heavy rainfall. K5WIC/mobile with K5JFP was sent to locate several "swamp buggy" vehicles, which shortly arrived. One of them was equipped with a 10-meter transceiver and the immediate area was searched, without success. With the dawn, aircraft joined the search and spotted the wreckage, which was reported to be the mobile swamp buggy. All three

A.R.R.L. ACTIVITIES CALENDAR

(Dates shown are per GMT)

Jan. 3: CP Qualifying Run — W6OWP
 Jan. 4-5: V.H.F. Sweepstakes
 Jan. 11-13: CD Party (c.w.)
 Jan. 17: CP Qualifying Run — W1AW
 Jan. 18-20: CD Party (phone)
 Feb. 8-9: DX Competition (phone)
 Feb. 1-16: Novice Roundup
 Feb. 6: CP Qualifying Run — W6OWP
 Feb. 11: Frequency Measuring Test
 Feb. 22-23: DX Competition (c.w.)
 Feb. 15: CP Qualifying Run — W1AW
 Mar. 14-15: DX Competition (phone)
 Mar. 28-29: DX Competition (c.w.)
 June 13-14: V.H.F. QSO Party
 June 27-28: Field Day

OTHER ACTIVITIES

The following lists date, name, sponsor, and page reference of QST issue in which more details appear.

Jan. 18-19, 25-26: Tenth Annual VEI Contest, New Brunswick Amateur Radio Assn. (p. 116, this issue.)
 Jan. 25-26, Feb. 29-Mar. 1: The French Contest, REF (p. 88, this issue.)
 Feb. 8-10: NYC-LI QSO Party, So. Shore Amateur Wireless Assn. (next month).
 Feb. 15-16: Vermont QSO Party, Central Vermont ARC (next month).

occupants of the plane had been killed instantly upon impact. Throughout the entire operation, amateurs were plagued with QRN and rain static. — *K5ZXL, Asst. EC Brazos County, Texas.*

Amateurs in Panama City, Tallahassee and Jacksonville, Fla., served as the only communications link for the U.S. Weather Bureau and Flight Weather Service in those cities for four hours on Sept. 28, when torrential rains washed out telephone and microwave circuits. WA4MFC and WA4FIJ were contacted by SEC W4MLE and proceeded to contact the other ARPS stations in Panama City. WA4MFC then drove to Tyndall AFB, Tallahassee, where he was joined by WA4MIT/mobile and a secondary circuit was established on 10 meters because of the skip on 75. Using both bands, contact was maintained with Jacksonville and Tallahassee Weather Bureaus. K4CNY also established contact with Miami in case of need. Others taking part in the operation included *K4YPI, W4DKT, GAA GDC, W448 MMU FJF NRP, W4NY8 OPT OVX.* — *W44FJF.*

On or about Oct. 2, a number of amateurs in the Washington, D.C. area were instrumental in supplying, as a result of an emergency call originating on MARS circuits, a quantity of rare-type blood for an emergency operation which probably saved a man's life. Stations taking part, operating in both MARS and amateur circuits, were the following: *K38 WAG RXR PXI WDA VFG CNM WBJ USE, W38 VJ OHI ISN USA TBH, W4WDB and W8UBK.* As a result of the amateurs' efforts, almost twice the amount of blood needed was supplied, and a long list of volunteer donors for this rare type of blood was obtained by University Hospital in Baltimore. — *W38CP, Vice Director, ARRL.*

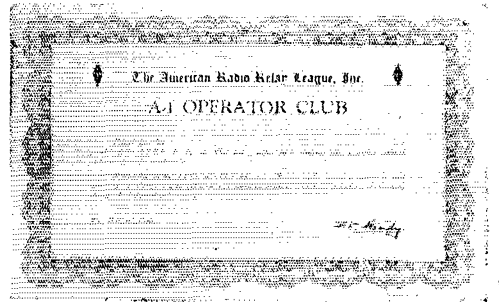
Two Maine emergencies occurred within a week of each other in October. On Oct. 7, WITCF was contacted by the Fort Kent c.d. director to set up communication between Fort Kent and Burntland Stream in the upper Allagash River. A 13-year-old boy had become lost the previous Sunday. WITCF mobilized to the end of the woods road at Michaud Farm and maintained contact from that point on 75 meters with Fort Kent. A radio Jeep and portable radio pack completed the link to the Burntland Stream area where the search was being conducted. The boy was found and the search suspended. Other amateurs taking part included *K1KXQ, W18 CPS and NRE.*

On October 14, a Fort Kent light plane ferrying a group of hunters disappeared in the Quebec wilderness north of the St. Lawrence. On Oct. 15, radio contact was made between WITCF, K1Y1W and Quebec amateurs (not identified) to relay progress of the plane search and the condition of the plane passengers when and if found, for the benefit of family, relatives and friends. The plane was found submerged in a small lake late on Oct. 15; all passengers survived. — *WITCF.*

On Oct. 30, Nicaraguan amateur station YN3KM made an urgent plea to the Intercontinental Sideband Network on 20 meters for anti-rabies serum for treatment of two little girls who had been bitten by what appeared to be a rabid dog. No such serum was available in Nicaragua. W8SZS, a Michigan doctor, finally obtained some of the serum after an exhaustive and detailed search, and put it on a plane for Houston, where it stayed over night awaiting the next flight to Nicaragua. Meanwhile, YN3KM was again contacted and advised to meet the plane. On Nov. 2, W8SZS was advised that the serum had been administered and the chances for the girls' recovery were excellent.

On Nov. 10, the AREC of Milwaukee County, Wis. was notified that its assistance would be needed in the search for an 11-year-old boy, missing from his home since the previous Thursday. Four mobiles reported immediately to the Sixth District police station to furnish communications coordination between Explorer and Boy Scout search parties and the police. However, the boy was found before the search could get under way and the amateurs were dismissed with the sincere thanks of police officials. — *K9KJT, EC Milwaukee County, Wis.*

We received *thirty-five* SEC reports for September activities, representing a total of 16,357 AREC members. This is,



The A-1 Operator Club promotes a high calibre of operating. Membership is never solicited, but is obtained through nomination by 2 operators who already belong. Does your keying, voice procedures, copying ability, judgement and courtesy qualify you?

seven reports down from last September's record 42 reports, but only about 500 fewer AREC members are represented than a year ago. Eight sections reported over a thousand AREC members: Southern Texas (1100), Ohio (1346), Michigan (1226), Washington (1069), Indiana (1296), Eastern Florida (1391), New York City—Long Island (1310) and Eastern Pennsylvania (1059). Other sections heard from for September: E. Mass., Del., Ont., Mo., Ariz., Nevada, Maine, Alberta, N. C., Ala., Minn., Va., Tenn., Ore., Colo., Okla., Utah, W. Pa., S. Dak. S. C. V., N. N. J., B. C., R. I., Mont., Ga., Los A., Iowa.

RACES News

Over a decade ago, a dedicated amateur named Vincent T. Kenney, W2BGO, became Amateur Radio Coordinator for the New York State Civil Defense Council, and undertook to establish the Northeastern States Civil Defense Amateur Radio Alliance, an organization composed of radio officers of ten northeastern states and representatives of several interested government agencies and ARRL. With "Vin" Kenney serving as chairman, this organization subsequently was expanded to form the United States Civil Defense Amateur Radio Alliance (USCDARA), and gained a measure of recognition from the federal civil defense agency.

Vin Kenney is still the New York State c.d. radio officer, and his booklet entitled "Radio Officer's Guide" has just been reprinted. Through personal contact with W2BGO, we have just acquired a hundred copies of this publication, which we shall be glad to mail out to interested ROs and would-be ROs or c.d. directors upon request, while the supply lasts.



TRAFFIC TOPIX

There has been a lot of talk about phonetics in phone nets, and which set of phonetics should we use, and should ARRL change its standard phonetic list to agree with the ICAO list. At the present time there are three standard phonetic lists used in phone traffic handling: the ICAO (Alpha, Bravo, Charlie, etc.), the JANAP (Able, Baker, Charlie, etc.) and the ARRL (Adam, Baker, Charlie, etc.) In addition, many phone stations, especially those working DX, use place names, usually country names, for phonetic equivalents.

The above three standard alphabets are listed roughly in order of the frequency of their use on the amateur bands, although there could be some question about which of the first two should come first. There is no doubt that the standard ARRL alphabet is used less frequently than any other, thus the frequent cries that the League should adopt the ICAO alphabet, the most "modern" of the remaining two in current usage. The arguments, the exhortations go on interminably and inconclusively, as though it is a matter of the greatest import.

The purpose of phonetic equivalents is to make yourself understood. As long as you accomplish this, it really makes little difference whether you use ICAO, JANAP, ARRL, or one of your own devising. The psychology of effective

phonetic equivalents has received much discussion. During World War II an armed forces committee spent months on the subject, but it all boils down to one ultimate objective — *make yourself understood!* If you are speaking to a person whose native language is English, "Q for Kaybee" doesn't help; "queen" is a great deal more understandable.

Go down all three lists and you will find that strictly from a standpoint of understandability in English, some are perhaps preferable to others, but as long as the copying station knows the letter you are giving the phonetic equivalent of, which one you use really makes little difference. Some of our letters (O, for example), really need no phonetic equivalent at all. As for the others, it makes little difference to understandability if you give the phonetics for WINJMI, for example, as November Juliett Mike, Nan Jig Mike, Nancy John Mary, Nine Jumping Monkeys or No Joking Matter. All the hassling about which phonetic alphabet should be used is a tempest in a teapot. We have more important things to worry about. — WINJMI.

.....

We knew it would happen. Someone noticed that in the ARPSC Bulletin we indicated that the HX handling instructions prosign came between the precedence and the station of origin, while in the example given in November QST it was placed between the station of origin and the check. This is one of those inconsistencies which come from our not being sure ourselves where it should go. But there should be a standard, so let's put the handling instructions, when used, between the station of origin and the check, as illustrated in Nov. QST, page 90. This seems better than the other way, because it means there won't be two new prosigns (precedence and handling instructions) following each other in message preambles.

One other thing, a minor detail: we have noticed, on the air, that c.w. stations send the precedence designations as though they are part of the message number. They aren't. The precedence is a separate part of the preamble and should be sent separately.

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October Net Reports. Listing in this column is available to all non-NTS nets which care to report their figures. Report number of sessions per month, total number of check-ins, and the total message handlings completed during net sessions that month.

Net	Sessions	Check-ins	Traffic
Northeast Area Barnyard	27	804	4
Early Bird Transcon	--	31	21
75-Meter Interstate S.S.B.			
7200 Traffic	47	1803	880
Eight Ball Traffic	46	303	96
20-Meter Interstate S.S.B.			

.....

National Traffic System. We have now completed the tracing of five of the twelve SET "test emergency" messages which we "planted" with twelve NECs throughout the country. Data on their handling show us many things about our procedures and the personal idiosyncrasies which so often lead to inaccuracies and misunderstandings. Let's consider the details on one such message.

.....

Test Message #1 (an arbitrary designation used for this analysis only) was originated by a midwestern SEC who did not give us a copy of the message exactly as sent, as we asked him, but said he sent it exactly as instructed. He did not tell us what number or filing time he gave it, so we cannot know if these were correctly received by the first relaying station. However, he did say he sent it to Relay A on Oct. 6 at 1300 CST, which we presume works out to be 1900Z, unless his local time was "daylight" (he didn't tell us that, either). Relay A, another midwesterner, says he received it at 1905Z. If the originator originated it exactly as instructed, Relay A sure goofed it up, because it had a precedence of "P TEST EMERGENCY," a filing time of 1900 GMT, the year added to the date, a superfluous word added to the address, two words combined into one in the text, an S dropped off another word, still another word misspelled, a superfluous word added to the text to make the check okay, and several superfluous words added to the signature. Of course, we don't know how much of this was whose error, and since the originator didn't supply us with a copy of the message as he allegedly sent it, we are even more in the dark. However, the copy of the message at Relay A had the above discrepancies after only one relay. This relay took place in a local emergency net.

Relay A sent the message to Relay B, also a midwestern station, in a local net (probably not the same one) at 2116Z, which means Relay A held the message exactly two hours, 11 minutes. As received by Relay B, the message now has a precedence of "priority test," thus finally losing all semblance of an emergency precedence. The station of origin was dropped. The filing time now becomes 1300 CST, and the year is dropped from the date. The superfluous word in the address is gone, along with another word which was *not* superfluous. Two complete words were dropped from the text (the two which Relay A had combined into one), the missing S was restored to the word on which it had been dropped by Relay A, the misspelling was corrected, the superfluous word at the end was dropped, and *everything* was dropped from the signature except the sender's last

BRASS POUNDERS LEAGUE

Winners of BPL Certificate for October Traffic:

Call	Orig.	Recd.	Rel.	Del.	Total
K6BPL	81	2022	1835	187	4125
W3CUL	216	1201	1131	62	2610
W9JJOZ	37	1185	1182	3	2407
W1LGG	190	921	845	27	2013
K9K7B	23	806	776	30	1635
W68SY	37	721	687	140	1488
K00NK	107	667	624	19	1317
W7BA	8	700	683	16	1407
W9IDA	20	667	616	7	1310
K1WVK	51	490	475	9	1025
W4JHL	33	517	408	16	974
W3IVS	8	375	347	12	732
W1PEX	36	453	410	35	931
W4KIS	21	397	371	26	815
W8SCA	26	388	366	2	802
W1WJK	11	396	311	290	798
W4BMC	143	334	257	28	782
K4VFF	433	316	295	21	755
K1NEF	8	346	328	0	680
W8UPH	8	339	274	59	680
W4DLA	27	320	318	4	669
K7IVD	45	310	297	10	662
W7VX	25	342	294	2	658
W3VR	6	299	290	3	656
W2MTA	34	311	287	19	651
W4ZJY	18	385	233	4	640
K1WVK	42	284	261	38	625
W4JHL	18	301	300	1	620
K4POA	45	288	280	13	586
K8SMT	41	288	232	24	585
W49CCP	44	261	218	41	564
W4FUB	14	276	253	16	569
K4DKH	13	270	260	10	563
K4ARP	29	262	210	32	553
W1EMG	19	270	232	8	552
K7CTP	44	295	123	81	543
W4BHRG	21	263	252	5	541
W9DJG	53	248	207	12	540
W3CHT	53	261	213	11	538
W1FNC	101	229	202	5	517
W4DVT	11	259	261	3	531
W8SCT	29	252	250	2	533
K4DSO	1	263	263	0	527
K9MVO	20	247	244	12	523
W3BAE	78	233	139	69	517
W44BGW	78	225	125	19	505
W42BLV	24	248	210	20	502
Late Reports:					
W7DZX (Sept.)	177	355	311	18	692
W1WVZ (July)	177	243	169	72	661

More-Than-One-Operator Stations

Call	Orig.	Recd.	Rel.	Del.	Total
W6YDK	1772	1901	1851	50	5574
KR6MD	74	557	524	33	1188
KR6GF	320	339	228	109	1096
KR6DI	115	268	258	10	651
W4GOU	97	228	8	234	567
KR6CP	501	0	0	0	501

BPL for 100 or more originations-plus-deliveries

K3GJD 258	W41YT 158	K4YBN 112
W2EW 255	W4ZWN 154	W6ZBJ 106
W7APS 221	K6TJW 141	W4JCF 104
W9NZZ 207	W4JYB 139	K3QOO 104
W4YE 201	W46YO 138	W2OE 103
W4BYG 193	W5DTR 134	W42PVW 102
W6CEZ 191	W4RHA 125	K3LEF 102
K91NR 165	K4SHJ 123	K4CDZ 102
K6GZ 164	W48DGE 119	K6SXX 102
K4PNY 160	K8GOU 113	K2SPG 101

More-Than-One-Operator Stations

KR6MB 378	KR6MH 272	W4SHG 123
	W1AW 228	

BPL medallions (see Aug. 1954 QST, p. 64) have been awarded to the following amateurs since last month's listing: K1QDC, W42VLC, W5PPE, W9PHR/5, K9ZLA, K0FPC.

The BPL is open to all amateurs in the United States, Canada, and U. S. Possessions who report to their SCAM a message total of 500 or more or 100 or more originations plus deliveries for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

name. Relay B sent this version of the message to Relay C the following day at 0135Z, on the Central Area Net, having held it exactly three hours and 55 minutes; total time so far, six hours, six minutes.

Relay C, an eastern station, claims he received the message from Relay B on the Eastern Area Net on Oct. 7, but is unable to give us the time. The precedence has now become "P test," the station of origin has been restored, the whole address has been abbreviated to a single call sign, the S previously dropped from the word by Relay A and restored by Relay B is now dropped again, and the signature (what's left of it) is now misspelled. Although Relay C doesn't indicate time handled as part of his servicing data, he indicated that the message was relayed to the delivering station the same date it was received.

The delivering station's copy of the message looks exactly like Relay C's copy except for the signature, which is now correctly spelled. The message was received at the delivering station, close enough to headquarters to simulate delivery, on Oct. 7 at 2355Z, a total elapsed time of 28 hours, 55 minutes, or slightly over two days.

We have no way of knowing, in this case, the exact extent of garbling, although we know it was considerable. We do not know, for example, if the message was originated exactly as instructed because the originator did not comply with our request to send a copy, and we also are not certain of the original number or filing time. The precedence which should have been "test emergency," came through as "P" test. The check, as received, was incorrect, because two words were dropped between Relay A and Relay B, and apparently none of the subsequent relayers ever counted the words in the test to show a correction. The address, originally "National Emergency Coordinator ARRL, Newington, Conn." came through as simply WINJMJ, having been shortened for convenience when it got close to home. Two words had been unceremoniously deleted from the text between Relay A and Relay B, and one word kept changing between singular and plural, finally being delivered singular, incorrect. The signature, which originally should have been a name and call, went through several stages and finally arrived with the name spelled correctly, but the call dropped between Relay A and Relay B.

Interesting? It's only the beginning. There are many lessons to be learned from this series of blunders and many others, some even worse, which can be used to improve our message handling procedures. We have been handling our traffic by the seat of our pants too long. It's about time we started tightening up. Next month we'll give you an example of a test message which made the journey in much better time when it fell into the hands of more careful relayers. -- WINJMJ.

October reports:

Net	Ses- sions	Traffic	Rate	Aver- age	Represen- tation (%)
1RN	64	781	.308	12.2	73.4
2RN	73	657	.537	16.5	99.7
3RN	62	801	.407	12.9	97.8
4RN	60	1507	.525	25.1	92.8
RN5	68	1354	.630	19.9	94.5
RN6	62	798	.211	12.8	92.2
RN7	70	447	.228	66.3	60.0
SRN	71	607	.265	8.6	92.6
9RN	58	461	.438	8.0	61.2
TEN	58	562	.497	9.6	59.6
ECN	31	155	.201	5.0	88.2 ¹
TWN	39	355	.350	9.1	61.5 ¹
EAN	31	2676	.974	68.8	99.5
CAN	37	1741	1.003	47.0	100.0
PAN	37	1434	.734	38.8	98.2
Sections ²	1202	7504		6.2	
TCC Eastern	116 ³	715			
TCC Central	111 ³	1178			
TCC Pacific	94 ³	1051			
Summary	2023	24784	CAN	10.8	CAN
Record	2016	24482	.928	12.3	100.0

¹ Region net representation based on one session or less per day. Others are based on two sessions or more per day.

² Section nets reporting 45: BUN (Utah); NCSN & NCN (N.C.); SCN (S.C.); SCN (Calif.); NJ6-2, NJN, NJPTN, NJNN (N.J.); BN (Ohio); SCVSN (Calif.); CN (Conn.); NTTN (Texas); MDDS & MDD (Md.-Del.-D.C.); GBN & OFN (Ont.); AENT, AENS, AENP, AENP Morn, AENO,

AENM, AENJ, AEND & AENB (Ala.); WIN (Wis.); ILN (Ill.); KSSN (Pa.); MSPN Eve, MSPN Noon & MSN (Minn.); Tenn. Phone, Tenn. CW, Tenn. SSB & E, Tenn. Phone; Ark. Emerg. Fone & OZK; W. Fla. Phone; OQN (Ont.-Que.); NEB (Nebr.); SGN (Me.); VSN & VSNB (Va.); RISP (R.I.).

³ TCC functions performed, not counted as net sessions.

Thanks to the extra load of traffic and net sessions brought on by the Simulated Emergency Test, all previous records except over-all average per session tumbled in October. NTS reporting on the SET was somewhat sketchy in this, the first year of official NTS participation, mostly because of inadequate instructions to the field from the headquarters. The lessons learned were most valuable, however, and the caliber of operators in NTS nets is such that we are confident of an improvement next year so vast that it almost defies conception. Just wait and see!

Some of the above NTS data includes SET sessions and traffic and some does not. W1BVR reports two extra sessions for SET and records the best representation on IRN for several months. The 2RN report includes 15 special SET sessions. W3UE says 3RN continues to show substantial stability, with caliber of operators dedicated to public service at an all time high. W4DDY was awarded a special certificate attesting his many years of service to IRN, at the 4RN traffic meeting in October; 4RN certificates have been awarded to W4s EJP and EJQ. W4ZJY records the best RN5 representation since 1960 and awards RN5 certificates to K4s BSK WOP, W4s KAT MXP USM, WA4EXA, K5s GTN OKR, W46s AVO EKA. WB6BBO notes that RN6 slipped a little, probably because of SET dilution, but is confident of a better showing in November. Saskatchewan, as far as NTS is concerned, is a "vast wasteland"; no representation in RN7 for three years. The 9RN report does not include SET traffic; W9QLW has dropped the 9RN session at 0200Z because of lack of participation ECN had VOICK QNI four times in October, the first time a VO station has ever participated as Maritime representative. EAN's rate and average took a nosedive because of two extra-long SET sessions, but look at that traffic total! CAN is all primed for "Ole Man Skip" this winter with RN5 operators ready to take the brunt of NCSing and QNBing. K4AKP/6 is getting into the swing as PAN manager; area net certificates have been awarded to WA6BRG and VE7BJV, and it's "full speed ahead, maximum effort" from here on out.

Transcontinental Corps. Because of inconsistencies in TCC reporting, it's hard to come up with a really meaningful batch of statistics for TCC this month. The Corps performed admirably during the SET, although much of the traffic was handled on a "hustle shuttle" basis with little thought for prearranged schedules tied in with definite area net sessions, themselves largely on a continuous basis. However, here are the data as the TCC directors sent them in:

Area	Functions	% Suc- cessful	Traffic	Out-of-Net Traffic
Eastern	116	62.9	2268	715
Central	111	89.2	2099	1178
Pacific	92	71.0	2102	1051
Summary	351	73.6	6469	2944

The TCC roster: Central Area (W4ZJY, Dir.) — W4ZJY, WA4AVM, W5PPE, K9s INF DHN ZLA, W9s AKV CXY DYG JOZ VAY, W9s FPC BDR LGG SCA, Pacific Area (W7DZX, Dir.) — K4AKP/6, K6s GID DYX, W6s EOT HC, W46s BRG ROF, W7s DZX WST/6, K0s EDH EDK.

DXCC NOTES

Announcement is hereby made of one addition to the ARRL Countries List. The addition is VS9H . . . Kuria Muria Islands. The Kuria Muria Islands are located in the Arabian Sea off the southwest coast of Oman. These islands are British territory administratively attached to Aden. The separation of the Kuria Muria Islands is in accordance with Point 3 of the criteria as shown in the July, 1963 issue of *QST*. Confirmations for Kuria Muria credit may be made starting March 1, 1964. Confirmations received for Kuria Muria credit before March 1, 1964 will be returned without credit.



DX CENTURY CLUB AWARDS



Honor Roll

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total DXCC credits given, including deleted countries. Positions in cases of ties are determined by date of receipt. All totals shown represent submissions received from October 1, through October 31, 1963.

W1FH.....306/332	W2TQC.....304/323	W8JBI.....303/322	W97ZM.....301/325	W0QDF.....299/316
W2AGW.....306/330	K2GFO.....304/325	W6GPB.....303/324	LU6DJX.....301/324	W4ML.....299/319
W6CUO.....306/331	W5ADZ.....304/326	W6EBG.....303/328	W2VZ.....301/324	W5FA.....298/324
4X4DK.....306/324	W9HJZ.....304/324	W8KML.....303/324	W3EGR.....301/318	W6CVY.....299/317
W8BRA.....306/329	W4SD.....304/325	W4OCW.....303/320	W5ABY.....301/318	G3AAM.....198/322
W3GHD.....306/330	W9LNM.....304/327	W1RIB.....303/327	OE1ER.....301/323	W4AIT.....298/321
KV4AA.....306/330	W2LPE.....304/325	CF3AG.....303/327	W5KC.....301/324	W1ZV.....298/315
W4DOH.....305/329	K3IUPG.....304/328	HB9J.....302/326	W2ZX.....301/320	K2BZT.....298/315
WY2CK.....305/328	W8MPW.....304/322	W1JYH.....302/325	D3JL.....301/317	W7BNW.....298/322
W1GK.....305/330	W3KT.....303/327	W8EWS.....302/326	W3JTC.....301/324	K6EVR.....298/315
W9NDA.....305/329	W8DMD.....303/325	W1GLX.....302/325	W2BOK.....301/318	W2ZGB.....298/314
W7PHO.....305/323	W2HMJ.....303/323	W2BXA.....302/326	W2LV.....301/320	W0BFB.....298/317
W7GUV.....305/328	W7GBW.....303/327	W6AM.....302/327	D1JHZ.....301/319	W2QKM.....298/316
W8UAS.....305/326	W5MMK.....303/324	W3JNN.....302/326	K2DCA.....300/317	W2FXN.....298/312
W9RBI.....305/330	W0DU.....303/325	K6ENX.....300/317	K4LNM.....298/312	W4LNM.....298/312
W8JIN.....305/330	W2JT.....303/327	W4TM.....302/324	W0ELA.....300/323	W7AC.....297/321
W8KIA.....305/329	W5ASG.....303/322	W0AIW.....302/325	G3FKM.....300/318	W4GXB.....297/318
W8BF.....305/326	G4CP.....303/327	G2PL.....302/325	W8DAW.....299/322	W1HZ.....297/315
CX2CO.....305/326	W6YY.....303/323	W3LMA.....301/323	W9AMU.....299/316	W2SUC.....297/314
W9YFV.....304/328	W8LKH.....303/323	W8BKP.....301/323	W5CKY.....299/318	W05YK.....297/314
W1ME.....304/327				W4VPD.....297/314

Radiotelephone

W3RIS.....306/331	W9RBI.....305/328	W8GZ.....304/327	V04ERR.....301/323	PY4TK.....300/317
PY2CK.....305/328	CX2CO.....305/326	W1FH.....303/324	W2ZX.....301/320	W4DOH.....299/320
W7PHO.....305/323	W8BF.....304/325	W6YY.....302/322	W3JNN.....300/321	W8POO.....298/315
4X4DK.....305/323		W8KML.....302/323		W0AIW.....297/318

New Members

From October 1, through October 31, 1963 DXCC Certificates and Endorsements based on contacts with 100- or more countries have been issued by the ARRL Communications Department to the Amateurs listed below.

W2HTL.....300	K1AWP.....122	K1BGI.....109	KP4BJD.....103	SI6BH.....101	W9FJX.....100
G3NUG.....270	ON5DG.....122	VE3AE.....109	K3EUR.....102	UC2KAR.....101	K9JJB.....100
W5LBY.....180	K5SCT.....107	4A8LU.....130	K3VY.....102	W4ZDV.....100	W0PQ.....100
W6JWD.....180	HT1D.....118	UA3SL.....106	J47RS.....102	K4USA.....100	E3AEN.....100
G3GAD.....151	IJ1IJ.....112	W6TGF.....105	OH1HM.....102	W4VHK.....100	H43KGC.....100
KC6BK.....135	DL6EP.....112	W4C0H.....104	W9YZD.....101	K5HRH.....100	HW3AO.....100
K5RWB.....126	SM5CUP.....111	OK2KJU.....104	DJ4VK.....101	W4GAL.....100	UA3FL.....100
VE3AU.....124	W2IOT.....110	W8BNA.....103	OZ3LL.....101	W6OHL.....100	UA3NG.....100

Radiotelephone

KC6BK.....127	K0UKN.....114	K6OBL.....105	ILCF.....104	W4ZFG.....100	W8YCP.....100
K5KMK.....121	W2BCNA.....113	UA1MU.....105	DJ5VJ.....102	W4ZMX.....100	K9JJB.....100
K5SUGJ.....118	VU2PP.....109	9G1EP.....105	VE3CTX.....101	K8GOP.....100	

Endorsements

SM5LL.....312	W9TKV.....270	IT1AGA.....219	W3PH.....181	P40NR.....154	K1NHR.....131
W3EVV.....311	W46AMZ.....262	W2MJ.....217	K6EXO.....181	W2CFZ.....153	W3IC.....131
W4BYU.....311	W4MS.....262	K6HGC.....216	KV4CT.....181	K9JPL.....153	W4VWV.....131
W89EU.....310	W0FLA.....260	W9QI.....216	W8QI.....180	W4ZV.....152	OH1SB.....130
W2YTH.....310	W2QJ.....260	W1KSE.....213	K8VUD.....180	K4VFO.....152	V3BGB.....131
W3RNP.....310	W2ZVR.....260	W1CUX.....212	LA5S.....180	W6TMX.....152	W2RJSJ.....130
W4PTL.....310	W4AVY.....260	W5CK.....210	W44DCP.....178	W2LJF.....152	K3COT.....130
W9FKC.....310	W4HUE.....260	W9LJU.....210	OE1FT.....178	K3MNV.....151	W4GFGY.....130
W9WHM.....310	W20RX.....254	DJ5VJ.....210	K1MTH.....174	W4KRG.....151	K4AJJ.....130
W0PCL.....309	W4C0R.....254	W4C0R.....210	W4C0R.....174	W4C0R.....151	OH1SB.....130
W4AZK.....302	W2PDB.....250	W0MAF.....207	W42IRK.....173	HB9AAF.....151	K1RFY.....125
W7ADS.....301	W6LQG.....250	K4LIQ.....203	K8ANX.....172	K21QP.....150	W8NPF.....125
K5BGH.....300	W9EHV.....250	DJ3BB.....202	ZL1ARY.....171	W3GMZ.....150	K0ECK.....125
W6UOV.....300	I1UA.....249	HB9TT.....202	W2GHK.....170	W8QFE.....150	P38M.....125
KH6CD.....300	W2GDJ.....244	W2GKZ.....201	K5GQP.....170	W9RDI.....150	W460BT.....121
W8CRF.....300	ZF4J.....242	K3HQJ.....200	W8QOV.....170	K0WKE.....150	W1VYM.....123
W4DHz.....298	K2JGG.....241	W3MSR.....200	K8ZPK.....170	HB9YL.....150	W2FVJ.....123
W3LMO.....295	K1M0D.....240	W5VA.....200	VE7PU.....170	W1MXX.....149	K2HOE.....122
K4PDV.....292	K3DCP.....240	W6JKJ.....200	K1IMP.....167	JA1BN.....146	K4PNY.....122
W2CTN.....291	W6PHF.....240	VE3AGC.....200	DJ2CM.....167	JA1CA.....145	C3XCB.....122
K4RPK.....291	K8KAE.....240	LJ3TW.....194	OB8KI.....163	OH1VA.....145	W2KAL.....121
W2TI.....290	W7HDL.....233	W2BUC.....193	OH2PS.....163	K4GRD.....144	K3C0NN.....121
W6ANN.....290	K4LTA.....232	SM3AZL.....193	K4DSV.....162	K6POC.....142	W1PYM.....120
PA8LOU.....290	SM5KV.....232	W1BPV.....192	W6WLY.....161	W2FKH.....141	W0PAH.....120
VE3RE.....289	W3YZL.....231	W6HVN.....192	P8SC.....161	F9EP.....141	VE2HCK.....120
W3KVQ.....288	W8KSR.....230	HB9GK.....192	K2KBI.....160	K1MLD.....140	K0UR.....119
F8BS.....286	W9QI.....230	W4QI.....190	W4QI.....160	W4QI.....140	K4DTB/6.....117
W5HZ.....284	W46DU.....229	F8SK.....190	W46HR.....160	K8YCM.....140	W46KMF.....115
W6MVL.....281	W5PMK.....228	W3DJZ.....186	K86COB.....159	F9BB.....140	W42POY.....114
W0BSK.....281	K4TWK.....224	K9WTS.....184	W9OD.....159	K3AMI.....139	K9CZV.....114
W0M0X.....280	K8QJH.....222	DJ5GC.....183	DLTKS.....159	W48VJ.....138	HWKZT.....113
DL3BK.....273	W8JTY.....221	OH1SB.....183	K5ST.....158	G4PC.....132	W4KAZ.....113
W7BTH.....272	HB9DX.....221	K1ANV.....182	K6TWU.....154	K1IGO.....131	K6NCG.....110
W2FAR.....271					

Radiotelephone

G26AM.....320	HC7E.....250	W1MMV.....214	W0MAF.....187	F2MO.....160	W46LDV.....140
W3PL.....302	I1UA.....248	HCQD.....211	W3DJZ.....183	K4DSV.....159	W2CFZ.....134
W8UAR.....300	W0CVU.....242	K2JG.....210	W1HR.....182	W1GUX.....153	V22DA.....132
W3EGR.....292	W4MS.....241	W8CUO.....210	W8JXY.....182	SP9RF.....152	W2BZN.....132
W2LV.....284	W0PGI.....241	V3VAG.....210	VE2VY.....182	W2GHK.....151	W5LFB.....130
K4HEP.....280	W9JYI.....236	V3SAS.....210	W6KLC.....180	P8SC.....151	W4BRL.....125
SM5LL.....280	W4VZU.....233	W8ALI.....205	G4JV.....179	K2PAO.....150	W2WLDV.....120
G3NUG.....268	W2QKJ.....232	W2YTH.....201	K6ENX.....175	V3DV.....150	K4PNY.....120
W8WT.....260	W4UWC.....232	W4BBL.....201	K9WKE.....145	W9BKE.....150	V86EK.....120
W6RCD.....253	W3V8U.....231	W30BD.....200	K1ANV.....143	K1ANV.....143	K1LMD.....119
W8END.....251	W2BOK.....230	W8M0X.....200	W1SQA.....168	W4N7J.....142	W4PLL.....114
YSVAJK.....251	W4BTV.....222	G3HHL.....191	DL3BK.....168	K9JJB.....141	W2FXA.....114
CT1PK.....250	KP4CK.....215	W4HUE.....190	W6MRJ.....162	W1VFP.....140	K48BH.....110

NATIONAL CALLING AND EMERGENCY FREQUENCIES (KC.)

3550	3875	710	7250
14,050	14,225	21,050	21,400
28,100	29,640	50,550	145,350

During periods of communications emergency these channels will be monitored for emergency traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement between amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; phone — 3765, 14,160, 28,250 kc.

SUGGESTED OPERATING FREQUENCIES

RTTY 3620, 7040 14,090 21,090 kc.
WIDE BAND FM 52.525 146.94

GMT CONVERSION

To convert to local times subtract the following hours
ADST -3, AST -4, EDST -4, EST -5, CDST -5, CST -6, MDST -6, NST -7, PDST -7,
PST -8, Hawaii -10, Central Alaska -10.

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 Nov. 20 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on 1805, 3555, 7080, 14,100, 21,075, 28,080, 50,900 and 145,800 kc. The next qualifying run from W60WP only will be transmitted Nov. 1 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 Nov. 20 becomes 2130 EST Nov. 19.

Any person can apply. Neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 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.

Daily tape-sent code practice transmissions are available on an expanded basis this season. These start at 0030 and 0230 GMT and are sent simultaneously on all c.w.-listed W1AW frequencies, with about 10 minutes practice given at each speed: 5, 7½, 10 and 13 w.p.m. on Sun, Mon, Wed, Fri. (GMT date) from 0230-0320 — 15, 20, 25, 30, 35 w.p.m. on Tues, Thurs, Sat. (days in GMT) from 0230-0320 — 10, 13 and 15 w.p.m. daily from 0330-0100 GMT.

To make the practice more beneficial the order of words in each line of the text is sometimes sent reversed. 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 list by sending in step with W1AW 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 Nov. QST
Jan. 3:	<i>It Seems to Us</i> p. 9
Jan. 7:	<i>The ARRL's Official Observers</i> , p. 20
Jan. 13:	<i>Crystal Control on 10,000 Mc.</i> , p. 28
Jan. 16:	<i>Antennas and Feeders</i> , p. 36
Jan. 21:	<i>R.F. Chokers for the V.H.F. Bands</i> , p. 41

Date	Subject of Practice Text from <i>Understanding Amateur Radio</i> , First Edition
Jan. 27:	Polarity, p. 15
Jan. 29:	Ground Potential, p. 16
Jan. 31:	Direct Current, p. 16

W1AW SCHEDULES

(December 1963)

Operating Visiting Hours

Monday through Friday: 3 p.m.—3 a.m. EST.
Saturday: 7 p.m.—2:30 a.m. EST.
Sunday: 3 p.m.—10:30 p.m. EST.

The ARRL Maxim Memorial Station welcomes visitors. The station address is 225 Main St., Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent on request. The station will be closed Jan. 1, New Year's Day.

Operating Frequencies

C.w.: 1805 3555 7080 14,100 21,075 28,080 50,700 145,800.
Voice: 1820 3945 7255 14,280 21,330 29,000 50,700 145,300.

Frequencies may vary slightly from round figures given; they are to assist in finding the W1AW signal, not for exact calibrating purposes.

Official Bulletins

Bulletins containing latest information on matters of general amateur interest are transmitted on the above frequencies according to the following schedule in GMT:
C.w.: Mon. through Sat., 0100; Tues. through Sun. 0500.
Voice: Mon. through Sat., 0200; Tues. through Sun., 0430.
Caution: Note that in the U. S. and Canada bulletin hours usually fall on the evening of the previous day by local time.

W1AW CONTACT SCHEDULE

Would you like to work W1AW? W1AW welcomes calls from any amateur station in accordance with the following schedule:

GMT	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0120-0200 ¹	7080	3555	7080	3555 ²	7080
0210-0230 ¹	3945	50.7 Mc.	145.8 Mc.	3945	3945
0330-0430	3555	3945	7080	1820	3555
0440-0500 ¹	3945	14,280	3945	14,280	3945
0520-0600 ¹	3555 ²	7255*	3555	7080 ²	3945
0600-0700	14,280	14,100	3555	14,100	.....
0700-0800	7255*	3945	7080	3945	7255*
2000-2100	14,280	21 28 Mc. ³	14,100	.....	.....
2100-2200	14,280	21 28 Mc. ³	14,100	21 28 Mc. ³	21,330	.....
2200-2300	14,100	14,280	21,075 ²	14,280	14,100	.....
2330-2400	7255*	.....	7080	.....	7255 ²	.....

¹ General-contact period on stated frequency begins immediately following transmission of Official Bulletin which begins at 0200 and 0430 on phone and at 0100 and 0500 on c.w. Starting time is approximate.

² W1AW will first listen for Novices before checking the rest of the band for other contacts.

³ Operation will be conducted on either 21,075, 21,330, 28,080 or 29,000 kc.

* Operation may be on s.s.b. as announced at the beginning of the period.

Station Staff: W1QIS, W1WPR, K1MET.

• 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

EASTERN PENNSYLVANIA—SCM, Allen R. Breiner, W3ZRQ—SEC: W3DUI. RM: W3EML. PAM: K3CAH. V.H.F. PAMs: W3SAO, W3SGL. The EPA C.W. Net meets nightly on 3610 kc. at 2330 GMT. It held 37 sessions with a QNI of 431 and QTC of 430, close to one apiece. W3RV has rejoined the traffic force again. W3BNR left for W8-Land. K3SPS assisted in operating the United Nations Week station. K3UN. W3ADE handled the Harrisburg traffic during the recent SET. K3PWW, K3PTO, K3MHD, K3OMP, K3MTE, K3RZM, KN3ZTO and K3JHF are training for engineers at WHHS-F.M. K3HTZ is attending Muhlenberg. K3YQJ has been frequenting the EPA C.W. Net. K3KTH has been appointed NCS for 3RN. EAN certificates were issued to W3EML and K3MVO. K3NDW handled all SET traffic for the SEC and will attend Penn. State University. Each Sun. for 15 years W3ORJ and W2POC have held a regular sked on 3680 kc. The 6-meter antenna for K3SEY is eleven elements on a 54-ft. boom, not twenty elements. (Sorry, we goofed.) New Gear Dept.: To K3QCB a Drake TR-3. K3ZDK a Drake 2-B. K3MAW a 2-meter 84-element beam. W3ABT an HT-32B and an 75S-3. K3LKB a Marauder and an SX-117. K3SPW an HT-37. K3YOU an SX-117. K3UCX is s.s.b. on 6 meters. K3TLY installed a 20-meter quad for K3LEF and K3KNR. Newly-licensed KN3WVU is on with an HQ-110 and a T-60. K3YUG converted his Novice ticket to General class. K3FLT is the new call of the Milton ARC. K3FIY is the call of the Overbrook High school ARC. The Overbrook School for the Blind is K3ZJU. W3AHZ, Montgomery County EC, reports a successful SET. The Philadelphia County AREC-SET involved three actual emergency conditions, plus one of the most successful SETs in this area in more than ten years. Hats off to EC W3ELI and his AREC officials. New officers of the Delmont ARC are K3BHQ, pres.; W3EFY, secv.; K3JJO, treas. My thanks and appreciation to all for your very fine cooperation in the past. Here's wishing each and every one a Happy and Prosperous '64. Traffic: W3CUL 2610, W3EML 974, W3IVS 972, W3VR 656, K3MVO 523, K3RHU 204, K3MGE 166, W3ELI 122, K3JEF 106, K3NDW 106, K3CAH 100, W3ABT 81, W3JKN 62, K3KTH 62, K3ARR 46, K3LTI 46, K3YQJ 41, K3HNP 37, K3JSX 36, W3ZRQ 32, W3VAP 31, W3QDW 30, K3HTZ 26, W3AHZ 24, K3OMP 22, K3JHF 20, K3ZDK 16, W3OY 15, W3ADE 13, W3LXN 13, K3SME 12, K3SPS 12, W3PDI 11, W3BNR 9, W3BUR 9, W3RFF 7, W3LCO 7, K3RFH 6, W3EEN 3, K3EMA 2, K3YUG 1.

MARYLAND-DISTRICT OF COLUMBIA—SCM, Andrew H. Abraham, W3JZY—SEC: W3CVE. RM: K3JYZ. W3TN (for the MDD Traffic Net which meets on 3649 kc. daily at 0000Z) and W3ZNV (for the MDDS (slow) Traffic Net on 28.1 Mc. at 0130Z daily). PAM: W3EQK. The MEPN meets on 3920 kc. A.W.F. at 2300Z and on Sat. and Sun. at 1800Z. W3AQF copies the bulletins direct and puts them on the air locally on v.h.f. K3APM operated continuously during the SET. W3CDQ has a new HQ-170A receiver. K3CEZ is the Greenbelt Amateur Radio Assn. station. This club meets each Sat. at 2000 EST at the Prince Georges County Red Cross Chapter House, 4112 Hamilton St., Hyattsville, Md. W3CJT, Washington, D.C. EC had six stations on his AREC net for the SET. W3ECP had only fifteen minutes notice to take part in a 55-minute discussion on amateur radio on the "FOCUS" program on radio WTOP in place of the regularly-scheduled program. W4EXM/3 is going to operate on the lower frequencies as 20 is dead in the evenings. K3CJD made the BPL and is active in the MDDC AREC Hurricane Alert Net. W3KHA will be in Texas for awhile before returning to this section. W3HB enjoyed a fine contact with his son W1JSM, in Mass., and also contacted North Carolina on 2 meters during the opening on Oct. 26. W3IWI has his 2-meter gear working into an eight-element beam. K3LLR is

all set for winter operating. W3MCG says the 40-meter beam still is up. K3NCM reports that the 75-meter band is opening up fine. W3OHF has his 20-meter quad all tuned up on the nose now. K3PEJ is working on a transistorized keyer and is trouble-shooting for the school amateur radio club. K3QDD reports Montgomery Blair H.S. ARC is reactivated; K3RHJ is president. K3QOO is Asst. EC for Washington, D.C. and made the BPL. K3SMT had a good time in the CD Party. He made the BPL. W3TFA worked several stations in North Carolina during the opening on 2 meters. K3THF was appointed Charles County EC and took part in the SET. W3TN has been traveling, handling traffic and getting the RM reports in on time. Dave reports 47 stations to QNI the MDD this month. K3URZ is a new ORS. W3ZNV is looking for traffic on MDDS. W3GOO is awaiting his HX-30 s.s.b. transmitter. Traffic: (Oct.) K3SMT 885, K3GJD 393, K3QOO 249, K3APM 199, W3TN 143, K3CEZ 136, W3PQ 121, W3QCV 95, K3URZ 58, K3OSX 46, K3THF 42, W3OHI 41, W3ECP 36, K3QDD 36, W3ATQ 32, K3GZK 31, K3WBJ 31, W3EOP 27, W3MCG 21, W3AHQ 18, K3LLR 17, K3NCM 11, K3ORW 7, K3SGO 4, K3RGB 2. (Sept.) K3APM 132, K3QDD 29.

DELAWARE—SCM, M.F. Nelson, K3GKF—PAM: K3LEC. RM: W3EEB. DEPN meets Sat. on 3905 kc. at 1830 local time. DSMN meets Tue. on 50.4 Mc. at 2100 local time. Renewals: K3AZH as OES. W3EJU as OO. K3AZH and W3CFA as OPSS. W3EEB as ORS. The Delaware ARC visited the Philadelphia Air Defense Center and club members enjoyed a tour of the operations room and the electronics center. The First State ARC had guest ex-CO7MD, now a Delaware resident, speak on Cuban amateur radio. W3EEB reports EAN is having trouble with poor conditions because of aurora. Novice KN3YHR is the first to send in a traffic report and says he is eagerly waiting to get his General Class license so that he can join the ORS ranks in MDD. K3LEC went to Boston for a medical checkup. Traffic: W3EEB 137, K3OWS 112, W3EKO 29, K3GKF 9, KN3YHR 4, W3CFA 2.

SOUTHERN NEW JERSEY—SCM, Herbert C. Brooks, K2BG—SEC: K2ARY. PAM: W2ZI. RM: WA2VAT. K2JKA and K2PQD, Gloucester County Radio Club, have started a club project of making up kits for 6 meters to sell to club members. K2GHZ and WA2VEE have new towers. WA2BLV, Somerdale, the new NJN Manager, is eligible to receive the BPL medalion. W2ZVV, Beverly, has a new transmitter. WA2WLN, Linwood, has a new three-element beam. NJJ, Phone & Tfe. Net totals for Oct.: 31 sessions, QNI 516, traffic 112. W2ZI, net mgr., visited the newly rededicated old Marconi station CC/MCC/WCC at So. Wellcet (Cape Cod) built in 1901. K2RXB, Margate, still is convalescing after a recent illness. W2UAE, Trenton, is active on 2-meter RTTY. K2JKA, Gloucester County EC, reports the following took part in the AREC activity, assisting the West Deptford Police Dept. on Oct. 29, 30 and 31: WA2KGD, K2PQD, W2LWV, WA2IAZ, WA2SFY, WB2DTE, WA2EPR, WA2WVF, WA2RGI, W2YNR, WA2KWM and K2QGE. WA2WVF, a recently-appointed OO, supplies the area with Official Bulletin news via RTTY. WB2AY, Haddonfield, has now added 14 meters to the many bands he works. K2QJL, Burlington, reports on activities of the Burlington Radio Amateur Intercomm. Net and the Burlington Amateur Radio Soc. in the Southern Counties area WB2FS, WB2JAC and K2JOX passed the General Class exams. SJRA's Gadget Nite winners were K3JXC, a vidicon camera, and WA2EAB, a transistorized preamplifier for 432 Mr. W2JAV, Hammonton, gave a very fine talk at the SJRA's October meeting describing RTTY equipment and its uses. Traffic: WA2BLV 502, W2ZVV 265, WA2VAT 178, W2ERG 139, WA2WLN 45, W2ZI 32, W2MMD 27, K2RXB 17, WA2KAP 10.

WESTERN NEW YORK—SCM, Charles T. Hansen, K2HUK—SEC: W2ICZ. RMs: W2RUF, W2EZB, W2FEB. PAM: W2PVI. NYS C.W. meets on 3670 kc. at 1900. ESS on 3590 kc. at 1800. NYSPTEN on 3925 kc. at 1800. NYS C.D. on 3610.5 and 3993 kc. (s.s.b.) at 0900 Sun. and 7102.5 kc. at 1930 Wed., TCPN 2nd call area on 3970 kc. at 1900. IPN on 3980 kc. at 1600. 2RN, on 3690 kc. at 0045 and 2345 GMT. Happy New Year! Let's all resolve to improve our operating habits and find more ways to be of service to our community through amateur radio. BPL goes to W2OE. Congratulations! W2EZB announces that EAN certificates for '63-'64 go

(Continued on page 110)

FORTY YEARS AGO

GSJTP ACROSS THE ATLANTIC OCEAN

"**F**ORTY YEARS AGO! . . . In a few days forty years will have passed since we established the first short wave trans-atlantic contact! How time flies! I remember those exciting experiments as if they had taken place yesterday. I suppose you do, too. That cable you sent saying 'copied solid congratulations.' How happy it made me! And two days later, when you had tuned your transmitter on 100 meters, our two-way contact! It lasted until daybreak in Nice. That was the great demonstration of what short waves could do. How widely they have been used since then!" Those are the words of Leon Deloy, ex f8AB, now residing in Monaco, written to Fred Schnell, W4CF, ex 9AH, ex AIMO, ex JXW, ex W9UZ, commemorating their historic first trans-atlantic two-way communication November 27, 1923.

FRED, W4CF, describes the event in a personal communication. "I walked into my office and sitting in my chair was Leon Deloy in September, 1923. He came to attend the ARRL Convention in Chicago. At this time we were talking about 100 meters. We are going to get across on 100 meters.

"**A**T THE TIME Grebe had a receiver that would go to 80 meters . . . first showing it at the Convention. Deloy took one with him when he returned to Nice, France, his home. He came to Hartford and we put our ducks in order. He left New York in early October; agreeing to listen on his way home. I was to transmit on about 100 meters . . . it actually was 112. Four days out of New York, nearly 1600 miles, he reported, via commercial radio, an increase in signals.

"**O**NCE BACK IN FRANCE he obtained a license, f8AB, the only amateur in all of France. It took Leon about a month to get a transmitter going and he cabled he would transmit November 25th at 0900 EST. His 25 cycle note was heard while he was tuning up and I copied him solid. He sent the code word GSJTP to be sure there was no error. The next night he sent two messages, both of which I copied solid. He said his receiver would be in operation the next night. A note in my log of the 26th says, 'I'll work him 2-way sure.'

"**O**N NOVEMBER 27, 1923, we worked each other 2-way for nearly four hours. John Reinartz, 1XAM, also worked f8AB that evening. That was it! Night after night we exchanged messages directed to officials of France and the U.S. In less than a month amateurs in England, Italy, and Holland were recorded in IMO's log."

FORTY YEARS AFTER this historic communication, Fred wrote Leon Deloy "It was so nice of you to write, Leon, and I hope I shall hear from you again and I'm sure we can communicate without too much difficulty. There is much QRM, what with 260,000 U.S. amateurs, but we could get through ok."

HALLICRAFTERS takes this opportunity to salute these three experimental wireless operators and the contribution all of them have made to the art of communications.

W. J. HALLIGAN, W9AC

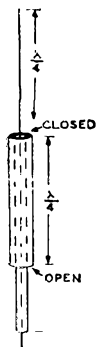
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Everything you need is furnished, including mounting clamps and brackets. One 52 ohm coaxial feedline is used for both receiving and transmitting. The feedline is not furnished.

The coaxial antenna design prevents radiation from the bottom half of the antenna, effectively lowering the radiation angle, so that local and skip contacts are made more readily. An example of the effective ground range of coaxial antennas: 30 watts, antenna height 30 feet, on six meters, will cover an area of 243 square miles on ground coverage alone.

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10-15-20 Tribander.....	59.95

NOTE: Specify frequency; otherwise band center

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CASE HISTORY #71

"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them, too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success—i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some of the lower bands." J. A., New Mexico.

CASE HISTORY #146

"I have had very good luck with mine (my V80) feeding it with a Johnson Adventurer; works fine on all bands." B. I., Nebraska.

CASE HISTORY #555

"Being an owner of your V80 vertical I would like to let you know of the excellent results I am getting with it, both working the DX and the local stations on the lower bands. It certainly is an excellent antenna system." F. H. Jr., New York.

CASE HISTORY #84

"A few months ago I purchased your V40 vertical and have achieved outstanding results on the air." K. G. B., North Carolina.

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73.
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Station Activities

(Continued from page 104)

to WA2KQG and K2RYH. NYS C.W. Net held 16 sessions for the SFT. Endorsements: W2OAV as EC Wayne Co., K2IMI as OHS, W2RQF as OPS, W2OMV gave a talk and 2-meter demonstration to the Clyde PTA. WB2EWR is faculty advisor for the Clyde School RC. The club call is K2ZWS. W2KTG is now in Plattsburg on 40-meter phone and c.w. VE3CRU and VE3-FUN visited Buffalo with 2-meter motor-scooter mobile using a Heath tower and "Big Wheel." K2SPY and WA2ZBF both operated from hospital beds during recent illnesses. Chemung Co. AREC, aided by the Elmira ARA, set up and furnished communications for the 30th annual National Soaring Competition at Harris Hill. Sixteen operators maintained two stations. K2-DNN spoke at the Elmira ARA on nets and traffic. As usual the "V.H.F. Roundup" sponsored by the Syracuse V.H.F. Club was very well organized and attended by over 500 hams. W2EE now has a 750-watt mobile. From looking at the correspondence and talking to various groups it is evident that much more emphasis is being put on AREC and RACES activities. Part of it is through the tireless efforts of many amateurs who have given many hours over the years and the other half is an increased awareness on the part of public officials who are now realizing that our organization and knowledge are helpful assets to their community. Does your town have an AREC or RACES plan? Traffic: (Oct.) W2OE 497, WA2KQG 462, W2EZB 202, W2RUF 191, W2FEB 121, WA2TBS 108, W2THE 38, K2TAM 35, K2KTK 34, K2RYH 25, K2DQ 21, K2H0H 13, K2DNN 9, K2AYQ 6, WA2RLV 6, WB2PFG 5, WA2GLA 4, W2EAW 3, K2PBU 3. (Sept.) W2EZB 239.

WESTERN PENNSYLVANIA—SCM, Anthony J. Mroczka, W3UHN—SEC, W3LIV. RMs: W3KUN, K3-OOU and W3XUG. The WPA Traffic Net meets Mon. through Fri. at 2400 GMT on 3585 kc. The Keystone Slow Speed Net (KSSN) meets 2330 GMT Mon. through Fri. on 3585 kc. Congratulations to K3DKH on making the BPL K3DCG and K3COT now possess HT-37s. The Cumberland Valley ARC reports via Valley QRM: The club call, W3GFW, has been changed to W3ACH in memory of Hal Mercer, a former member and club founder; club mobile, participated in the recent Cumbrial Palsy Fund Drive. The Conemaugh Valley ARC recently toured WA3C-AM-FM-TV. Up Erie way: K3-SBU is running a DX-100; K3JFB is attending the U. of Michigan. The Etna RC reports via Oscillator: New officers are K3JZQ, pres.; K3GWX, vice-pres.; K3LKP, treas.; W3OVM, secy.; K3EBA, act. mgr. K3OJF lost his tower and beam in a recent storm. W3LHN and W3UHP have new Cheyennes. W3GSI has a new crank-up tower. K3VPI has a new Communicator III. The Nittany ARC reports through QST de K3HKK; K3-GLX and W3POP are now in Germany and their new calls are DL4DO and DJ0JZ, respectively. The Coke Center RC reports: K3VHP now has her General Class license; K3BTF conducts the club's code and theory classes. The Hoehrshe RC reports via Hamateur News: The club's recent SET drill was well attended under the supervision of W3LIV and W3ISZ; K3QFK crippled his leg while working on his beam on the roof of his house; K3VFF is working 40-meter c.w.; W3VPL is building a Heath Sixer. The South County YIMCA RC (K3HUC) recently remodeled its meeting place. Officers are K3SCS, pres.; K3SKE, vice-pres.; J. Fisher, secy.; treas.; K3ZVE, trustee. K3RTG has a new transceiver on 10 meters. W3CVA and K3GBX are working regular skeds on 20. Congratulations to W3-KUN on his perfect attendance on WPA for the month of October. Traffic: (Oct.) K3DKH 553, K3NZB 324, W3KGN 161, K3OOU 146, W3NEM 125, K3PYS 63, K3OWN 60, W3MFB 57, K3SDT 57, K3PIE 32, W3IYT 23, W3SMV 20, K3TEZ 17, W3UHN 10, K3COT 5, W3OEO 5, K3AKR 2, W3SBX 1. (Sept.) K3SMR 6.

CENTRAL DIVISION

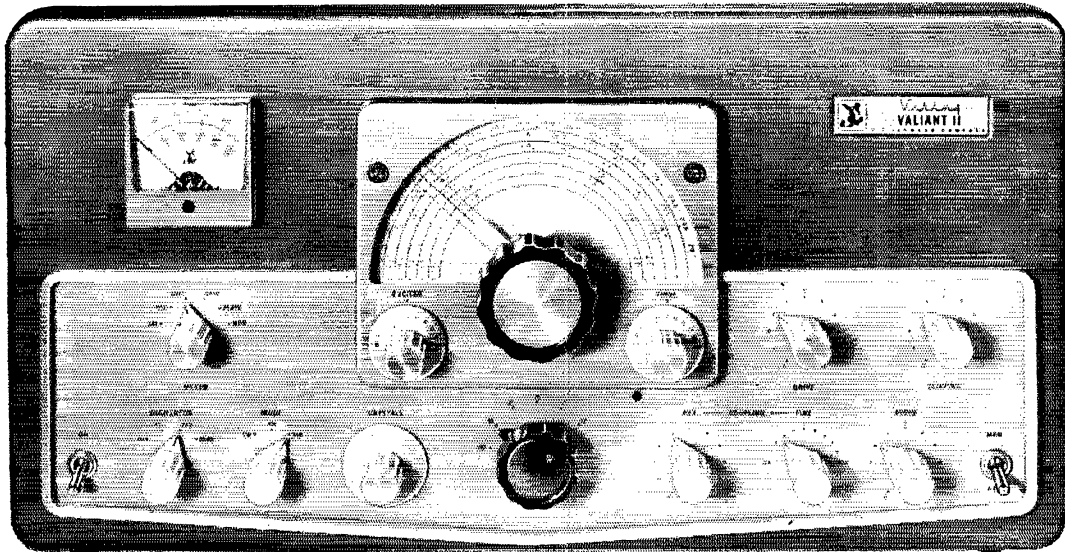
ILLINOIS—SCM, Edmond A. Metzger, W9PRN—Asst. SCM: Grace V. Ryden, W9GME. SEC: W9RYU, RM: W9UR, PAM: W9VWJ. Cook County EC: W9-HPG. Section net: ILN, 3515 kc. Mon. through Sat. at 1900 CST. New officers of the North Shore Amateur Radio Club are WA9FUO and WA9DAU. W9YMZ spent a few hours visiting ARRL Headquarters as the guest of W1ECH. From reports received, the SET was well participated in by the gang of this section. W9YTO, K9VVL, W9KCR, W9QKE, K9KZV, K9HYZ, K9DMQ, W9HPG, W9GFF, W9AB1, W9FEP, K9ZNZ, W9VYB, W9TGN, W9REC, W9JUV, K9OS0, K9JTD and W9MIN participated in the latest ARRL Frequency Measuring Test. Amateurs interested in Astrophysical Activities, please contact Lee M. Finkel, WA9EBT. The Teletype Employees Amateur Radio Club was approved for ARRL affiliation by the League's Executive Committee. The Central Illinois Radio Club (Bloomington) cooperated with the local Police Department Halloween

Eve with mobile operation in checking vandalism and other types of mischief. Wedding bells sounded for K9IKX. The new president of the York Community High Radio Club is K9FRN. The club's new station call is WA9IHK. Many Illinois amateurs journeyed to the St. Louis Amateur Radio Club's Ham Meeting and Rally held in Mosley Electronics Auditorium and heard a very fine forum of speakers, including Midwest Director W9NWX, Fri. Nov. 15. The Elgin Radio Society (W9IKW) provided communications for the Palentine, Ill., Polio Sunday Drive. W9ULS is the new net manager of the Interstate Sideband Net. WA9IFB has received his General Class license. WA9BQC is a new 1st-class phone licensee. WA9AET's new QTH will be Bremmenhau, Germany, and he may be reached c/o Lt. Ginn, 21st Med. Detachment, APO 60, New York, N.Y. Ex-9UE, after 35 years absence from the bands, is back on with the call W9WB. Anyone interested in the QRP ARC (international) can obtain application blanks from W9DHO, W9INA, K9JIM and K9RA were elected as Northwest Amateur Radio Club officers. K9EIV received his all-cw. WAS award. WA9AEN has a new three-element beam for 6 meters. New calls heard: WA9KBJ and WA9KBF, WA9ESO, WA9APM, WA9KBJ, WA9KBF and WA9FVD are working on 1296-Mc. equipment. The traffic count for the North Central Phone Net was 579 messages, ILN was 102, the Interstate Sideband net was 569 and the Chicago Area Traffic Net was 54. New appointees are K9VSI as OBS; K9RUK as OO; W9HLS/K4KRW as ORS. K9FNB is mobile 6 meters. W9LNQ has gone s.s.b. and brought his DXCC up to 200. Traffic: K9KZF 1635, W9IDA 1310, WA9CCP 564, WA9KV 362, WA9AFJ 272, W9HLS 193, W9KJ 84, K9OZAL 75, W9UR 58, K3CZY 35, W9JFN 30, WA9-HSZ 16, KORAS 16, W9DBO 12, W9PRN 12, K9FNB 4, K9DRS 2, W9LNQ 1.

INDIANA—SCM, Ernest L. Nichols, W9YYX—Asst. SCM: Donald Holt, W9WFH. SEC: W9SNQ. PAMs: K9CRS, K9KTL, K9GLL. RMs: W9TT, W9JOZ, K9-DHN. Net skeds (all times in GMT): IFN, 1330 daily and 2300 M-F on 3910 kc. ISN (s.s.b.), 0030 daily on 3920 kc. QIN (training), 1700 M-W-F on 3745 kc. QIN, daily at 0000 and RFN, at 1200 Sun. on 3656 kc. New appointments: K9GEL as OPS, W9SWM as ORS and OO Class IV. Newly-elected officers of the IARC are K9BSL, chairman; W9SNJ, vice-chairman; K9VUE, treas.; K9BGF, secy.; W9DKR and W9QYQ, directors. The Hoosier Illies ARC Hamfest drew a very large crowd. The All States ARC of Valparaiso Technical Institute is active using the call W9SAL. K9LYK has new shack, rig and antenna. The new QTH of K9UDU is Arcadia. Many Indiana hams were honored with a visit by Mohamed, SUKH, one of the few amateurs in Egypt. 1964 officers of the Tri-State ARS are W9RDJ, pres.; W9OVH, vice-pres.; W9DGA, treas.; W9CDA, secy.; W9GFS, K9JSK, K9PAR and K9STX, directors. QIN honor roll: K9VHY, WA9ECX, K9INE, W9EJW, K9KTL, WA9FEE, K9DHN and WA9ELY. Those making BPL: W9JOZ and W9NZZ. Amateur radio exists as a hobby because of the service it renders. Oct. net reports: IFN 239, ISN 864, QIN 181, RFN 18, Hoosier V.H.F. 120, 9RN 461, Indiana represented 72 per cent. Traffic: (Oct.) W9JOZ 2407, W9VAY 401, K9DHN 370, W9NZZ 323, K9JZA 290, W9QLW 244, W9SNQ 178, K9KTL 160, K9RWQ 158, WA9FCX 111, W9RUF 89, K9CRS 77, WA9BFF 75, W9FWH 69, W9AUM 68, K9-ZLB 54, WA9ELY 51, K9QXI 47, W9TT 47, WA9BFB 43, W9RTH 31, W9OYQ 30, W9DGA 25, WA9BGI 24, W9YYX 23, W9BTT 22, K9VHY 20, W9DOK 16, K9GEL 14, W9OG 14, K4WET 13, K9BSL 12, W9EJW 12, K9LKL 11, W9CC 10, K9PVS 9, W9BTP 5, W9DZC 5, WA9EBR 1, WN9HUP 1. (Sept.) WA9EBR 1.

WISCONSIN—SCM, Kenneth A. Ebnetter, K9GSC—SEC: W9BCC. RMs: W9KQB and WA9AKE. PAMs: W9NRP, K9IMR and W9NGT. Nets: WIN on 3535 kc. daily at 0045Z; WTN, on 3710 kc. Tue. through Sat. at 0130Z; BEN, on 3950 kc. daily at 2400Z; WSN, on 3985 kc. daily at 2315Z; SWRN, on 50.4 Mc. Mon. through Sat. at 0300Z. New appointees: W9NRP as ORS and W9KCR as OO Class I. Renewed appointments: W9AXS and K9MIF as ECS; W9RQM as OPS, ORS and OES. Net certificates went to K9LYX and WA9FOM for WSNB and W9FXA and W9KNR for WIN. W9WTD is working with a transistor transmitter on 2 meters. K9GDF led the Wisconsin OOs for Oct. with 39 notices sent. We regret to report that W9IDL has become a Silent Key. The Milwaukee County AREC helped with the UWM Homecoming Parade and a Boy Scout hike. FMT results: W9DKW 7.0 p.p.m., W9VSO 16.9 p.p.m., W9GFL 22.6 p.p.m., W9RKP 28.1 p.p.m., K9EYV 95.0 p.p.m. Net reports received: WIN, 150 offered and 118 cleared by 289 check-ins; WSNB, 737 and 664 by 1220. BPL certificates for Oct. traffic went to W9DVG and K9IMR. W9YT has a new s.s.b. exciter in the works and has 40 members for this year. All operators are invited to drop in on our newest net, the Wisconsin Training (Continued on page 112)

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(Continued from page 110)

Net, "WTN." Don't forget to send in your logs for the Wisconsin QSO Party, if you haven't already done so. More news from Wisconsin stations for this column will be welcomed. Traffic: (Oct.) W9DYG 540, K9EMR 465, W9CXY 407, W9AOW 266, K9GSC 64, WA9BWD 55, W9KQB 45, K9DJY 31, W9NRP 23, W9MWQ 24, K9GDF 15, W9YT 12, WA9EDZ 10, WA9FOM 9, W9UEB 8, W9OTL 6, K9FHI 4, W9FXA 4. (Sept.) W9CBE 49, W9KQB 37.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Harold A. Wengel, W0-HVA—SEC: W0CAQ, PAM: K0TYY, W0TUP is back in our midst. Welcome back, Arlen. Other than that there is nothing to report. Last month there was nothing at all. If you do not send in reports I, in turn, cannot send in any. Maybe North Dakota hams don't need an SCM. How about it? The North Dakota 75-Meter Fone Net has an incomplete report of 14 sessions with a total of 263 check-ins with a maximum of 23 and a minimum of 8, and handled a total of 22 formal and 23 informal pieces of traffic with one relay. Traffic: (Oct.) K0ITP 161, W0CZL 24, K0FRP 23, WA0AAD 22, WA0CZS 10, WA0DAR 4, W0GQD 2. (Sept.) K0ITP 88.

SOUTH DAKOTA—SCM, J. W. Sikorski, W0RRN—SEC: W0SCT. The Radio Research Club, Inc., Brookings, became ARRL-affiliated recently. It's a new daughter for W0CUC. He also has a new Tribander up 40 feet and four elements on 6 meters. 50 feet high, is building a 6-meter s.s.b. transverter and had an error of only 36.1 parts per million in the Sept. FMT. W0SMV built an s.s.b. oscillator and product detector for the HRO-50. He reports a DX record of 252/232. Sioux Falls ARC has a new roster of members, provided by K0ALU and printed by K0DYR. K0ESC is recovering from an emergency appendectomy. W0CUC has been appointed OBS and ORS. W0NVP has been appointed EC for Pennington County. W0SCT made the BPL. New calls in Sioux Falls: W0NHTB and W0NHSB. W0RSP/AF0RSP is AF MARS director for South Dakota, with WA0CWW/AF0C0CW as associate director. W0FKE has a new SR-150. Traffic: W0SCT 533, W0DVL 425, W0DVB 277, K0GYS 224, K0VYV 94, K0BMQ 34, WA0AOY 29, WA0CW 29, K0TXW 29, K0AIE 27, W0CUC 18, WA0ARZ 16, W0DIY 16, K0ZBJ 31, K0YJF 10, W0IGG 8, WA0FUV 7, K0ZMA 4, W0DQK 3, W0EQV 3, WA0GAIH 3, W0APL 2, K0HQD 2, K0K0Y 2, W0N0FPR 1, W0HHD 1, K0TAM 1, K0TWT 1, W0WUU 1.

MINNESOTA—SCM, Mrs. Helen Meidrich, W0OPX—Asst. SCM: Emerson Meidrich, W0RIQ, SEC: K0KQK, RMs: K0ZRD, K0IJU, PAMs: W0YHR, K0VJ, MISS PAM: W0HEN. The S.S.B. Net meets M-F on 3812 kc. at 0045Z and 3805 at 1630Z; M/N (slow speed c.w. net), M-Sat, 3595 kc. at 0100Z; MSN (c.w.), M-S, 3595 kc. at 0030Z; MSPN (phone net), 1805Z on 3820 kc.; MSPN (evening sessions), at 2330Z on 3820 kc. This net has been successful in avoiding much of the long skip QRAM by changing time to 5:30 p.m. Appointments issued are WA0BKA as EC; WA0ARA as OBS; K0FLT, W0KYQ, WA0ARA as OPS; K0ZZR as OO. Renewals: W0HEN, W0B0U, W0OPX as OPS; W0RQJ as ORS. The Southeastern Minnesota Piconet has been reactivated with K0XJB, net mgr.; K0JFV, asst. mgr.; Duane Fruechte, secy.-treas. Sixteen members of the RARC helped to handle collections on the Cancer Telethon using eight 6-meter units. OBS WA0CQG has received his General Class license and has a new v.t.o. on 6 and 2. OBS W0HPS is building a Top Notch converter and crystal oven control plus 1 kw. on 145,024 kc. for 2100 hours sked with W4HJQ. ORS K0RCF needs Asia for 160-meter WAC, worked W5KSO on long-path 7 Mc. and continues observations of sporadic E propagation. WA0BEC, WA0ALH, WA0DGW, K0CKT and W0TIV took part in the recent FMT. The Mankato State College ARC has a Valiant, Ranger II, HQ-129X, S20-R and BC-348 and antennas for 160-10 meters. Operators are K0PAD, W0GNO, WA0FAM, K0IUZ, WA0AGV and WA0DGHW. ORS K0JFJ teaches code to a class of 19 at Rochester John Marshall High School. WA0FFU has a Knight Star Roamer, T-60 and inverted "V" on 75 meters. OBS/ORS W0KJZ enjoys her c.w. transmissions, was visited by K0JFJ and W9PML and reports that K0GPL is in Anker Hospital. Congrats to WA0BYO, a BPL'er. Traffic: (Oct.) WA0BYO 227, WA0ARA 224, K0IJU 160, W0HEN 139, W0OPX 114, W0CIV 86, W0RIQ 84, K0ZRD 77, W0KJZ 58, WA0DHW 48, W0BEX 42, WA0DGW 37, K0VJF 37, W0KYG 35, W0BIO 34, WA0CQG 34, K0ZK 31, WA0EDN 30, W0YHR 28, K0JFJ 26, W0N0ES 25, K0JYJ 23, W0ATO 22, K0SRK 22, K0FLT 21, W0RQJ 20, WA0FIK 16, WA0DXP 15, W0DXY 15, W0MXC 14, W0ALW 13, W0GCR 10, K0SXQ 9, WA0ASV 6.

K0FTB, W0KNR 8, W0THY 6, K0ICG 5, K0LWK 5, K0RCF 5, WA0CPW 4, WA0FCJ 4, K0FWC 4, W0FD 3, K0JFV 3, W0LIG 3, K0ZRC 3. (Sept.) K0JFV 12.

DELTA DIVISION

ARKANSAS—SCM, Curtis R. Williams, W5DTR—SEC: W9PHR/5, PAM: K5SGG, RM: K5TYW. Arkansas QNI RN5 was 100 per cent for September. A new General at Paragould is WA5CSJ. Don't miss the 1964 Razorback Hamfest. Net reports for Oct.

Net	Freq.	Time	Days	Ses- sions	QTC	QNI	Aver- age
AEFN	3885	1200Z	M-Sat.	27	125	138	42
OZK	3790	0100Z	Daily	31	109	271	9

Several OESs and one or two Official Observers are needed. Amateur radio exists because it qualifies as a service. The Amateur Radio Emergency Corps needs you. Join now and support this Amateur Radio Public Service Corps organization. A radiogram or postal card will bring you the AREC registration form. All appointees: Monthly station activity reports are essential to keep your appointment. ECs should submit, in addition, Form 5 to the SEC before the first of the month. Appointments of those not complying will be cancelled. All Novices who would like to take part in an 80-meter Novice net, please contact your SCM (address page 6). A new Novice at Pine Bluff is WN5IGL. Traffic: W9PHR/5 430, W5DTR 301, K5TYW 211, WA5AVO 195, W4HPL 79, K5SGG 78, K5GKQ 25, WA5EKA 22, K5VSW 17, WA5BBS 9, WA5AMM 6, W5FML 6, WA5CSJ 4, WA5AC 2.

LOUISIANA—SCM, Thomas J. Morgavi, W5FMO—Please check the expiration date of your ARRL appointment and mail the certificate to your SCM before the expiration date. The September Frequency Measuring Test results of Official Observers were gratifying: W5FMO .1 p.p.m., W5EAM 3.4 p.p.m., K5TJG 7.4 p.p.m., W5CME 10.3 p.p.m., W5IQH 22.6 p.p.m. Anyone interested in pursuing this line of activity should contact the SCM. K5ELM has a new NCX-3, K5WOD has acquired a DX-3-5, K5QNK has added a Tri-band beam to his gear. W5CEZ is getting tired of RTTY and will stick to c.w. for record communications. K5FQN is enjoying long skip on 75 meters. W5BTK has 291 continued and 293 worked on DXCC. While galavanting around the world, K5KQG had an eyeball QSO with TG6PB. The Michoud Project has brought together Chrysler, Boeing, Mason-Rust, NASA and other concerns in the New Orleans area, which has resulted in the formation of the Space Team Amateur Radio Association, K5LX is pres.; W5ERR, vice-pres.; W5MAR, prog. dir. The association is run by a Board of Directors leaving the meeting, usually a dinner-technical talk affair, for personal contact and exchange of information. Meetings are held the first Wed. of each month except in the vacation months of July and August. I will not be available for nomination as SCM in 1964. Clubs and groups should start now looking for possible candidates. Traffic: W5CFZ 336, K5OKR 65, K5QXV 22, K5FQN 16, W5EA 14, K5TJG 10.

MISSISSIPPI—SCM, S. H. Hairston, W5EMM—The Mississippi S.S.B. Net meets on 3800 kc. at 1800 CST Mon. through Fri. W9MFL/5 is putting out a big signal from Biloxi. WA5II has a new HT-37 and an SX-101 and in less than a month worked enough stations to qualify for WAS. W5WZ, W5JDF, WA5CAC, K5AFO are doing wonderful jobs with the section nets. K5PIV did well in the FMT. It was good to see W5LJS, W5ERF, K5QBU, W5SPK, K5SYG, K7UDS/5, W5QSA, W5JR, W5T00, K5CIT/5 and many others on the Coast. W5WZ has been going great guns: 4 hours, 33 stations, 34 sections, all U.S. districts and 3 Canadian. Congrats to K5ANE/5 on being elected pres. of the Ole Miss, Amateur Radio Club. WA5CAC really has been going strong on the Miss. C.W. Net. W5CUII, K5PYS, K5INV and others are conducting code and theory classes for a good group in Meridian. Also clubs in Columbus, Biloxi and Kessler, with the Air Force participating, are conducting classes. W5MIF is doing a good job as secy. of the Magnolia Net. Traffic: W5JDF 164, W5WZ 131, K5AFO 23, WA5GK 12, K5IHO 11, W5EMM 10, K5MWR 9, WA5FII 8, K5MIF 1, K5PPI 1.

TENNESSEE—SCM, David C. Gorgio, W40GC—SEC: W4WBK, RM: W4ZJY, PAMs: WA4AIS, K4WWQ, W4RMI. New appointments: K4CPC as Knox Co. EC, WA4GOL as Bradley Co. EC, K4YKA as OO, WA4IUM as OBS, K4HRY as OPS, Shelby Co. EC K4FZJ reports 30 operators and 8 mobiles handled 172 messages in Operation Mercy with very favorable publicity from radio, newspapers and TV. The ARRL SET was an outstanding success with 18 out of 22 ECs participating. Oct. nets:

Net	Freq.	Time	Days	Ses- sions	QTC	QNI	Aver- age
ETPN	3980	0840E	M-Fri.	23	58	375	25
TPN	3980	0545C	Daily	31	186	1066	34
TSSN	3980	1830C	M-Sat.	27	77	326	31
TN	3635	1900C	M-Sat.	27	98	160	6

(Continued on page 114)

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Frequency range (megacycles): 3.5 to 4.0, 7.0 to 7.5, 14.0 to 14.5, 21.0 to 21.5, 28.0 to 28.5, 28.5 to 29.0, 29.0 to 29.5, 29.5 to 30. **Intermediate frequency:** 3.395 megacycles. **Frequency stability:** 100 cps after warmup. **Visual dial accuracy:** Within 200 cps on all bands. **Electrical dial accuracy:** Within 400 cps on all bands. **Backlash:** No more than 50 cps. **Sensitivity:** Less than 1 microvolt for 15 db signal plus noise-to-noise ratio for SSB operation. **Modes of operation:** Switch selected: LSB, USB, CW, AM. **Selectivity: SSB:** 2.1 kc at 6 db down, 5.0 kc at 60 db down (crystal filter supplied). **AM:** 3.75 kc at 6 db down, 10 kc at 60 db down (crystal filter available as accessory). **CW:** 400 cps at 6 db down, 2.5 kc at 60 db down (crystal filter available as accessory). **Spurious response:** Image and IF rejection better than 50 db. Internal spurious signals below equivalent antenna input of 1 microvolt. **Audio response: SSB:** 350 to 2450 cps nominal at 6 db. **AM:** 200 to 3500 cps nominal at 6 db. **CW:** 800 to 1200 cps nominal at 6 db. **Antenna input impedance:** 50 ohms nominal. **Muting:** Open external ground at Mute socket. **Crystal calibrator:** 100 kc crystal, $\pm .005\%$. **Front panel controls:** Main tuning dial; function switch; mode switch; AGC switch; band switch; AF gain control; RF gain control; pre-selector; phone jack. **Rear apron connections:** Accessory power plug; HF antenna; VHF #1 antenna; VHF #2 antenna; mute; spare; anti-trip; 500

ohm; 8 ohm speaker; line cord socket; heterodyne oscillator output; LMO output; BFO output; VHF converter switch. **Tube complement:** (1) 6BZ6 RF amplifier; (1) 6AU6 Heterodyne mixer; (1) 6AB4 Heterodyne oscillator; (1) 6AU6 LM osc.; (1) 6AU6 LMO mixer; (2) 6BA6 IF amplifier; (1) 6AU6 Crystal calibrator; (1) 6HF8 1st audio, audio output; (1) 6AS11 Product detector, BFO, BFO, amplifier. **Power supply:** Transformer operated with silicon diode rectifiers. **Power requirements:** 120 volts AC, 50/60 cps, 50 watts. **Dimensions:** 14 $\frac{1}{2}$ " W x 6 $\frac{1}{2}$ " H x 13 $\frac{1}{2}$ " D.

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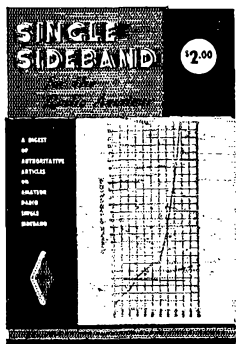
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WA4HX checked in 45 stations on the 6-meter alert during the ARRL SET. Maury ARC has started a 2-meter net on 145.35 Mc. Mon. and Fri. nights, per W4GGM. The Old Timers Club of Chattanooga has obtained the call W4PL for its club rig in memory of Ben White. With deep regret we report W4LEB as Silent Key. Your SCM requests that each radio club in the state act on the proposed State Council of Radio Clubs proposed constitution and by-laws at the earliest opportunity. Our aim is to weld the amateurs in Tennessee into an effective organization regarding opinion on various amateur proposals and activities. Our statewide emergency plan should reach you about this time, filling a long-time need for organized emergency operations on a partial or entire section wide basis. Traffic: W4ZJY 640, W4PQP 347, W4MXP 182, W4KAT 164, W4OGG 161, WA4HX 115, W4FX 83, WA4AWG 77, W4WBK 64, W4RMJ 61, K4OUK 57, WA4HRG 52, K4JNG 52, K4WVQ 48, WA4IHG 46, W4OQG 46, K4JIG 43, W4TJZ 35, WA4IUM 33, WA4KOG 33, WA4GLS 31, K4ULT 30, W4CVG 28, K4VOP 25, K4HOZ 24, W4JVM 21, K4CMZ 22, K4CH 20, K4CPC 20, WA4GBA 20, W44BUP 17, W4FLW 16, K4HRY 16, K4ENA 14, W4HPN 13, K4UMW 12, W4TVV 11, W4VTS 11, W4CAT 10, W4VNU 9, K4LTA 7, W4YAU 7, WA4AJK 5, K4RQP 5, W4UO 5, W4LAX 4, W4LLJ 4, K4PZT 4, W4VJW 4, WA4AVX 3, K4PPN 2.

GREAT LAKES DIVISION

KENTUCKY—SCM, Mrs. Patricia C. Schafer, K4QIO —PAMs: W4SZB, W4BEJ, W4USE, RM: W4CDA, RM (KNN): WA4APU, K4CSH is the call given to the station at the Red Cross Bldg. as a memorial to Al Hall, W4LJN, at Manual High School, is being readied for operation again. K4ZQR has an Invader 2000 on the air. The KYN had a get-together dinner in Lexington Oct. 26. W4CDA is moving across town. K4ISB hopes he made top score in the WAVE Contest. W4ADI is building a 50-Mc. s.s.b. rig and rebuilding a 2-meter transmitter. The EMKPN is quite proud of its QNI record. For the past 4 months K4NLY and K4NHV have been 100 per cent in attendance. For the past 3 months WA4APU and W4BEJ have done the same. In Sept. the KYN held 31 sessions with 59 QNI and 188 QTC. For Sept. the MKPN reports 31 sessions, 470 QNI and 40 QTC. For Oct. the EMKPN held 23 sessions, 352 QNI and 45 QTC. The KPN reports 23 sessions, 138 QTC with 782 QNI. The MKPN reports 30 sessions, 509 QNI and 57 QTC for Oct. WA4LCH checked into 9RN 32 times in October. W4BYG is making up a master traffic plan for Ky. W4NOA, Jefferson County EC, and W4USE, Radio Officer of RACES, with the help of many stations in Ky., sent SET messages to various mayors and county judges in Ky. Traffic: (Oct.) W4BVG 482, K4QCQ 233, WA4LCH 180, W4BZ 139, W4USE 58, K4NYO 50, K4HOE 43, W4KJP 43, W4BEJ 38, K4QIO 33, WA4AGH 28, W4SZB 25, K4YDO 25, K4ZQR 23, W4EON 22, K4NHV 20, WA4APU 18, K4ZTQ 17, W4GFN 16, K4LOA 16, K4TOZ 16, W4YVI 14, K4KWQ 12, K4SWL 12, W4BTA 11, W4QCD 11, W4KKG 10, W4ADH 8, K4NLY 7, W4AENH 6, W4KQI 6, W4CTZ 4, W4JUI 1. (Sept.) W4SZB 14, K4ZQI 14. (Aug.) W4CDA 47, K4ZIQ 4.

MICHIGAN—SCM, Ralph P. Thetreau, W8FX—SEC: W8LOX, RMs: W8EVI, K8QLL, W8FWQ, K8KMQ, PAMs: W8CQU, K8LQA, V.H.F. PAM: W8WPT. Appointments: W8QFP and W8UCQ as ECs; W8ELW, W8FWQ, W8AUD, K8PYW and W8LHB as OBSs; W8DSW and W8AHV as OBSs; W8JUU as OBS; W8AHV as OPS. New officers—Grand Rapids ARA: K8LLR, pres.; K8DCS, vice-pres.; W8DOC, secy. K8HQT, treas.; W8AXA and W8IHM, board. Kent RC: W8ALV, pres.; W8IWF, vice-pres.; W8DFP, secy.; K8GGQ, treas.; K8CCT, K8TXH and K8ZLT, K8IWI, W8OAT, W8RUU, board. Lake Huron RC: K8RRB, pres.; K8EFG, secy.-treas.; K8JJX, board. Calhoun ARC: W8AKK, pres.; W8PPX, vice-pres.; K8UCY, secy.; W8EEK, treas. Saginaw V.H.F. Club: W8EY, pres.; W8NFC, vice-pres.; K8AQA, secy.-treas.; K8NTE, prog. Western Mich. Univ. ARC: K8SIQ, pres.; K8KKV, vice-pres.; K8LTM, secy.; K8EXF, treas.; K8NHC, act. mgr. Wayne State Univ. RC: W8GTL, pres.; K8JOF, vice-pres.; K8DCP, treas.; K8AIS, secy. W8UA is being reactivated with a 1-kw. transmitter for each band. The following are eligible for OO appointment by reason of the Sept. FMIT: W8ARR, W8AYY, W8CX8, K8HGA, W8LZY, K8QLL, W8QMI, W8TBZ and W8UCI. Have any of you time for this important job? EAN certificates were issued to W8ELW, K8KMQ, K8NJW and W8QFO. New traffic reporters: W8ARK, W8ARJ, K3DCB/8 and W8HYR-78. W8ASV, W8SQP and K8ZKH have a new SR-150. K8LOY also is DL4CQ. W8TIJ has a new SR-150 and W8WWT a new NCX-3. W8RTV now is W8EYO, St. Joe area. K8JJC has an KWM-2 and is building an amplifier for it. W8ECD has a Ranger and an RME-8900 going. K8NHC is trying to get a KWM-2 and a kw. linear for Western Mich. University. The S.W. Mich. 2-Meter Net meets each Mon. at 0100 GMT on 145.26 Mc. with W8CVQ as NCS. The Mich.-Ohio-Penna. Sidewind-

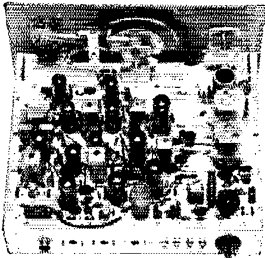
(Continued on page 116)

PICK A BAND . . .

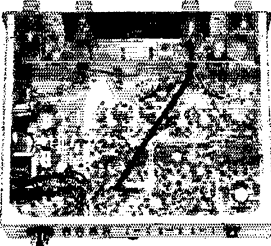


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SPECIFICATIONS—RF input: 200 watts PEP. **Sideband generation:** Crystal lattice bandpass filter method. **Stability:** 200 cps per hour after warm-up. **Carrier & unwanted sideband suppression:** 45 db. **Frequency coverage:** HW-12, 3.8-4.0 mc; HW-22, 7.2-7.3 mc; HW-32, 14.2-24.35 mc. **Receiver sensitivity:** 1 uv for 15 db S + N/N ratio. **Receiver selectivity:** 2.7 kc @ 6 db, 6.0 kc @ 50 db. **Output:** 50 ohm fixed (unbalanced). **Operation:** HW-12 & HW-22, LSB; HW-32, USB. **Audio output:** 1 watt @ 8 ohms. **Mike input:** Hi-Z. **Panel controls:** Frequency, final tune, function (OFF-PTT-VOX-TUNE), RF gain, AF gain, (pull for crystal calibrator), VOX gain, meter, Front panel screwdriver adjust for S-meter and VOX delay. **Rear panel controls:** Mike gain, tune level, final bias. **Tube complement:** Fourteen tube heterodyne circuit; (3) 6EAB's mic. amp., VOX relay amp., IF amp., RF amp., Rcvr. mixer; (5) 6AU6's, VFO, VOX amp., IF amp., Xmtr. mixer; (1) 6BE6, VFO isolator (HW-12), Het. Osc. and mixer (HW-22 & HW-32); (1) 12BY7, Driver; (1) 12AU7, Xtal osc. product det.; (1) 6EBE, Audio amp. and output; (2) 6GE5 RF output. **Power requirements:** 800 VDC @ 250 MA peak, 250 VDC @ 100 MA, —125 VDC @ 5 MA, 12 VAC or VDC @ 3.75 amperes. **Cabinet dimensions:** 6¼" H x 12" W x 9¾" D.



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A Word from Ward . . .



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There was once a wise man, by the name of Ken Hubbard, who had a unique theory in economics.

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With all due respects to Mr. Hubbard, I'd like to suggest a more realistic way to give your dollars more mileage:

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Featuring an 8-band output, all modes of transmission—CW, AM, SSB—a plate input of 144 watts, a full, built-in voice control system, rugged, heavy duty de luxe construction, and many other extras, the HT-32B is among the top transmitters in existence today.

Drop me a card and let me send you a catalog sheet on it. You'll be amazed at how easy it is to save money—by spending it!

Sincerely,

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ers (s.s.b.) Net meets at 1500 GMT each Sun. on 50.106 Mc. with WA8DOJ as NCS. W8PT is running a race for the best "antenna farm" with W8EMD. W8WV is working on "Advanced." Please submit all time reports in GMT—I learned it, so can you. Traffic: (Oct.) K8GOU 341, W8ELW 310, K8NJW 260, K8KMQ 252, WA8DNZ 237, W8QFO 235, K8HLR 169, W8BEZ 100, K8BYX 93, W8LOX 92, K8QLL 92, K8TIG 89, K8WVM 86, W8IBB 79, WA8ASV 75, W8RTN 74, WA8ARK 56, W8HKT 56, VE3CYG/W8 54, W8FN 47, W8UA 40, K3DCB/8 39, K8PKU 35, K8TFE 35, WA8ARJ 34, K8JED 25, WA8ENO 22, W8IJJ 20, W8EMD 19, W8TBP 13, K8VDA 13, W8AUD 10, W8HK 8, W8ZLK 8, W8WV 7, W8YAN 7, WA8HYR/8 6, W8EPI 5, K8GJD 3, W8NVW 3. (Sept.) W8IBB 128, WA8EIQ 2.

OHIO—SCM. Wilson E. Weckel, W8AL—Asst. SCM: W8DAE, SEC: W8HNP, RMs: W8RZX, W8DAE and K8LGB, PAMs: W8VZ, K8BAP and K8UBK. Correction: It was K8ZVZ and WA8AFY who had received their General Class licenses and not K8ZWE and WA8EFL as mentioned in last month's column. K8VWN has a new Johnson Courier linear. A new radio club has been organized in Akron called the Rubber City Sweepstakes Hotshots RC and its officers are W8OYL, pres.; K8HGT, vice-pres.; W8DQG, vice-pres.; W8EXI, secy.-treas.; W8LHV and W8VQI, trustees. K8VGL is in college. K8ONQ vacationed in Penna. and N.J. W8ALW sent news concerning the recent Cincinnati Hamfest. About 1900 attended, the NCX-3 was won by W4MQ, the SX-117 by Sandy Mendelsohn, of Dayton, and the code speed copying contest by W8MIO at 58.6 w.p.m. An Eastern Area Net certificate was issued to W8CHT for the 1962/63 season. The Seneca RC toured the AT&T microwave relay center at Bogart, Dayton ARA's *R-F Carrier* states that W8EY gave an interesting talk and blackboard demonstration on Devices. V.H.F. High Banders' *The High Banders Log* reports an auction was held. K8BBSO and K8TFL have a new Drake 2-B and WA8DON has a new baby. Springfield RC's *Q-5 Tells* us the club elected W8DCJ, pres.; WA8AEY, vice-pres.; W8KKU, secy.; W8AEW, treas. Thirty attended the club's annual banquet and heard W8HBJ speak on vertical antennas. WA5-DHR/8 is the new editor of *Q-5*. K8UQV is on RTTY. Parma RC's *P.R.C. Bulletin* informs us an auction and a wiener roast were held and the code and theory classes started out with twenty-five signed up. The Eastshore V.H.F. RC participated in the Halloween patrol for Willowick. Babcock & Wilcox RCs 1964 officers are W8-EUL, pres.; K8CDN, treas.; W8WVC, secy. Findlay RC's *W8PT News* advises us of a new amateur, WN8KIT. South East ARC's *Ham Fax* tells us Mr. Henderson, of Bell Telephone Labs, spoke on lasers. Columbus ARA's *Carascope* states that color-sound movies of the 1963 Indianapolis 500 were shown. K8CEN and K8QAD received the Worked All Ohio Counties of CARA and fire destroyed W8NUH's shack and equipment. Massillon ARC's *MARC Newsheet* informs us a talk on Telstar and Space Communications was presented by Ohio Bell and K8EKG is operating Fort Knox station K4WBG week ends. Toledo's *Ham Shack Gossip* names K8JWR as its Ham of the Month and advises that W8MBL, *Ham Shack Gossip* editor isn't feeling up to par and is going to take a well-earned rest. Warren ARA's *Q-Match* says the club toured the Warren Telephone Co. plant, W8SFG moved to Texas and WA8JQP received his General Class license. Six Meter Nomads' *The Amateur Extra* states that K8YMG received his Tech. Class license. WA-8AJZ received a certificate for placing first in Ohio and second in the world in the HTH section of the C/HC/HTH Party. New appointees are K8LGB as RM, W8ILC as EC, W8EQE as OBS, K8YXV and WA8CNV as OBSs. W8CHT, W8DAE and W8UPH made the BPL in Oct. A bulletin was received from the Ohio Phone Net, edited by WA8BOV. Its name is *The Ohio Phone Net News Bulletin*. This is a fine little paper and we wish it lots of luck. Traffic: (Oct.) W8UPH 680, W8CHT 538, W8-DAE 517, K8LGA 321, W8RZX 241, WA8CXY 104, K8-UBK 99, K8RXD 75, WA8AJZ 72, K8LGB 63, K8PBE 58, W8OCU 43, W8MGA 40, W8GRG 37, WA8ADB 33, K8-VWN 28, K8AAG 27, K8BAP 25, W8CXM 22, W8AZF 19, K8ONQ 17, W8DQD 16, W8ETO 10, WA8CKY 9, W8AL 8, W8DIH 8, WA8EFW 7, W8NHQI 4, W8LZE 4, WA8-BZR 3, W8UID 2, W8WFG 1. (Sept.) W8CHT 105, W8-OCU 38, K8VWN 36, W8LT 11, W8RO 10, K8WVZ 7, W8ALS 3, K8ATA 2. (Aug.) W8CHT 179, W8RO 8.

HUDSON DIVISION

EASTERN NEW YORK—SCM. George W. Tracy, W2EFU—SEC: W2KGC, RMs: W2PHX and K2QJL, PAM: W2JIG. Section nets: NYS on 3670 kc, nightly at 0000 GMT; NYSPTEN on 3925 kc, nightly at 2300 GMT; ESS on 3590 kc, nightly at 2300 GMT; Emergency Coordinators on 146,550 kc, Fri. at 0015 GMT. Appointments: WA2WGS and WA2YHA as ORS, Endorsements: W2-DQV and K2GCH as ECs; WA2BAH as OBS. We welcome the Mid-Hudson V.H.F. Society as an affiliated
(Continued on page 118)

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club. We are pleased to report that both the NYC-LI and ENY sections monitor 146,178 kc. as a common frequency for ARPSC. Each EC has separate channels for local nets with liaison to NTS. October was auction month at the Schenectady Club with four auctioneers to keep things rolling. New officers of the RPI Club, W2SZ, are K2KYE, pres.; W2OSA, vice-pres.; W2EQC, equipment sup. With 32 elements on 2 meters, a new full-spaced 20-meter beam and kilowatt on the h.f. bands, W2SZ is the big voice from RPI in Troy. Power supplies were the main feature at the Westchester ARA. In New Rochelle the speaker was Art Greenberg, of QCWA, on antennas. W2HTE is organizing a statewide 2-meter net for RACES. He is ably assisted by W2LWI from ENY and K2HUK and W2UTH of WNY. W2ZBS, K2UTC, K2YXB and WA2VYS performed fine measurements in the September FMT. WB2FXB reports 10 states on 2 meters. A new HQ-170 and navistor pre-amp. is displayed at WB2GSK. WA2ZPD is heard with a new eight-element array on 2 meters. Senator Goldwater, K7UGA, will be the main speaker at the National Convention in N.Y.C. next Aug. 21-23. Watch for details. Traffic: (Oct.) WA2VYS 308, W2EFU 189, WB2PZC 131, K2S2N 105, W2SZ 60, WB2FXB 45, K2HNW 43, W2PKY 39, WB2IYB 34, W2THE 34, WA2KUL 27, WA2PUM 23, K2MPK 22, W2URP 20, WA2UBO 19, WA2HGB 18, WA2YHA 15, WA2JWL 8. (Sept.) WA2HGB 34.

NEW YORK CITY AND LONG ISLAND—Acting SCM, John S. Brandau, K2OVN—RM: W2WFL, V.H.F. PAM: W2EW. Section nets: NLI, 3630 kc. at 0015Z nightly; NYCLIPN, 3908 kc. at 2230Z nightly; V.H.F. Net, Tue.-Wed.-Thurs. on 145.8 Mc. at 0100Z and Fri. through Mon. on 146.25 Mc. at 0000Z; Mike Farad on 7238 kc. at 1700Z. I and your former SCM, W2OBU, wish you a Healthy, Happy and Prosperous New Year filled with amateur radio. Why not participate in a Public Service net? Your RM, PAM, ECs and NCs stand ready to help you become active net members. BPL certificates went to W2MTA, W2EW, WA2WEN, K2SPG and WA2PVV for the month of October for outstanding traffic scores. The Rockaway ARC (K2UHD) has an ambitious program to raise the technical and operating standards of its members. Included is 5- to 15-w.p.m. on-the-air code practice on 7180 kc. at 2200 on Fri. and Sat. Transmissions will originate from W2YBU at Woodhaven, Queens. New appointments: WA2UYQ as OBS; WA2PZD as OPS; WA2OUM and WA2TPM as OESs; K2OKE as OBS. WA2GJT is married. W2KTG moved to Plattsburg and is looking for skeds with friends from NYC-LI. W2CCSS is working FB with a two-element 40-meter beam. WA2PMW received an Ohio Cardinal Award. WA2IUQ received the W Delaware Award. WA2WGN received the Gateway to the West Award. K2SLD and WA2GAB received a letter of commendation from the Brooklyn VA Hospital for their work in constructing and teaching radio to patients at the hospital. K2CMV has a new TA 33 beam. K2UAG and W2LDC are back on 2 meters. WB2IJB is operating a Pawnee. W2BKS is using a new vertical antenna. WA2EXP is active on RTTY. WA2QUJ is building a 160-meter rig and reports the Q5 Net has been suspended until June. W2GKZ received DXCC and operates an HX-20. W2SKX now is on 10 meters. WA2UXK is on 6 meters. WA2YLL is using an SX-117 receiver. WA2TKS is active on phone. W2TUK is operating with an NCX-3. K2CMJ and K2DNY are back on the job as NCSs of the V.H.F. Traffic Net after a paint job on the shack. WA2GPT is on the job in spite of rig troubles. W2EW is now a member of the A-1 Operators Club and has received his 43rd RPL. RM W2WFL can use more outlets for NLI. Manhattan AREC needs members. Contact WA2KKK on 2 meters. On 6 and 10 meters, contact WA2MMW. Section Net certificates for excellent work on our Public Service nets are awarded to W2ROJ, DPR, EHA, FJW, GPQ, YCW, K2TVR and UPA. WA2EUF, JVG, LLG, OAX, OGU, PHV, RAQ, SVP, SVU, TMV, TXE, VLK, WB2AOV, BKS and CKR. WA2QWQ left for the Army. WA2PSL has been appointed Net Control for the Hudson #2 Net. Congratulations to W2FI and the Nassau AREC for the highest section score in the SET. All appointees should check their certificates for yearly endorsement. All station activity reports should be mailed the first or second of the month. W2ICI and W2KQD, his XYL, send regards from their new QTH. Traffic: (Oct.) W2MTA 651, W2EW 489, WA2YLK 392, WA2WGN 366, K2SPG 276, WA2PVV 241, WA2XP 217, WA2LJS 113, WA2IUQ 84, WA2YNH 82, K2KYS 76, WA2ZXR 62, WA2PMW 54, WA2PSL 53, WA2OJU 49, K2THY 44, W2GKZ 39, WA2RNP 39, WA2UYQ 36, WB2GKX 29, W2EC 22, WA2GAB 20, W2DDBQ 16, W2ZGP 16, WB2BJY 13, WA2TLW 13, WA2TKS 11, WA2YLL 11, W2TUK 10, WA2VZN 10, WB2DUD 9, WA2WAO 9, W2PF 4, WA2EFN 3, WA2TPM 2, WA2RAQ 2, WA2VKK 2. (Sept.) W2GKZ 54, K2UFT 44, WA2QJU 38.

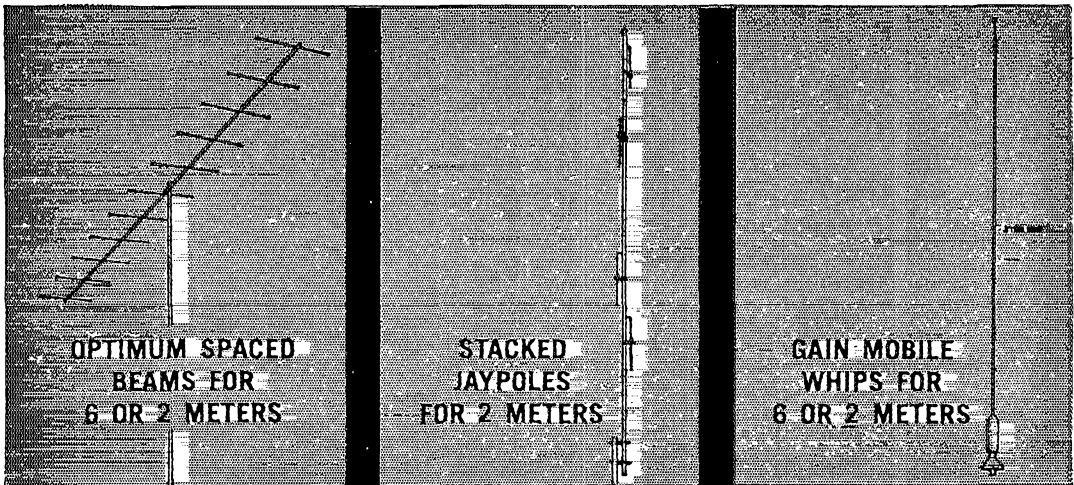
NORTHERN NEW JERSEY—SCM, Edward F. Erickson, W2CVW—NNJ Amateur Radio Public Service Corps Nets (Oct.):

(Continued on page 120)

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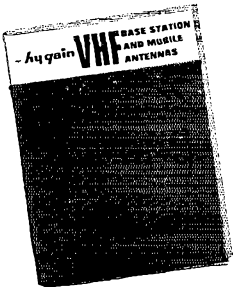


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Name	Freq.	Time	Days	QNT- QTC	Managers
NJN	3695 kc	2400Z	Dy	539-484	W2QNL- RM
NJ Phone	3900 kc	2300Z	Ex Sun.	516-112	K2SLG- PAM
NJ Phone	3900 kc	1400Z	Sun.		
NJ 6-2	51.15 mc	0400Z	T, Th, Fr	147-108	K2VNL- PAM
NJ 6-2	146.70 mc	0300Z	W, Sn		
NJNN	3725 kc	0020Z	W, F	15-10	WA2SRK- RM
16N	18 kc	0030Z	Tue.	NEW NET	WA2QPX- RM

AREC local net skeels are available from SEC K2ZFI. New appointments: WA2QPX as RM; WB2ALF as EC; W2CVW and W2PEV as OPSs; WA2MNU as OES. Louis J. Amoroso, W2LQP, has been appointed Asst. SCM. Lou will assist me in maintaining contact with appointees in the northeast corner of the section. Your SCM would like to extend Season's Greetings to all and to thank the section officials for their fine work in 1963. Let's make 1964 the best year yet for an improved amateur radio service. The South Amboy ARA puts out an excellent bulletin called *Zero-Bent*. W2QAS is club president. WA2YAY has a new HQ-170 and is active on 40, 20 and 6 meters. WB2EFG reports that he was ready for traffic in the SET despite rig trouble. Dave had a spare c.w. rig standing by. Wood-Ridge RACES/AREC held its SET/CD exercise Oct. 22. EC W2DMI reports that the net meets Thurs. at 0100 GMT on 145.680 Mc. EC WB2BCS reports 4 Asst. ECs in his AREC organization. WA2IVV, WA2PEG, WA2IVU and WA2HNE have been transferred to Chambersburg, Pa. WA2DRS, the Raritan Arsenal station, has been closed down with the demise of the post. WA2SRK has been awarded an EAN certificate. K2UKQ reports on certificates and DX. The Clifton C.D. was alerted for fire watches during the dry spell. Congrats to WB2HJW on receipt of his General Class license. Congrats to W2BVE on the receipt of a 36-w.p.m. code award. The Livingston Club is starting a 2-meter transverter project. W2BSC is on the air with resumption of the academic year. WB2DDA has an 800-ft. long wire! The Rutgers Amateur Radio Assn. pres. is K2SJC; W1MEH is vice-pres. WA2ZOW claims the highest score in the recent NJ QSO Party. K2AGJ has worked 250 YLs, 25 of them DX. Travel duty keeps ex-SCM W2NKD off the air. Another ex-SCM, W2VQR, is Radio Officer for RACES in New Jersey. Still another, WA2APY, is busy studying electrical engineering. Traffic: (Oct.) K2VNL 397, WB2ALF 308, WB2DEP 264, K2UCY 228, W2CVW 180, K2ZFI 131, WA2SRK 125, WA2CCF 122, W2DMI 90, WA2MYR 82, WA2ZKT 75, WA2WAJ 63, W2EWW 55, WB2FCT 55, K2SLG 55, WA2KVQ 54, W2BVE 26, W2PEV 5, W2PNX 23, W2TFM 22, WA2BNF 21, W2LQP 17, W2DRV 15, WN2KSG 15, W2CFB 13, K2MFX 8, WA2ZQH 8, WB2COZ 7, W2NIY 5, WA2KIY 2, WB2HBC 1, K2VVL 1. (Sept.) WB2EFG 26, WB2BCS 21, WB2DDA 18. (Aug.) WB2DDA 11.

MIDWEST DIVISION

IOWA—SCM, Dennis Burke. WONTB—SEC: KOEXN. RM: WOJGG. PAMs: KOBBL and WOLSF. New EC: WOGQ. Ronald M. Schweppe is the new Asst. SCM and will continue as SEC until his successor can be appointed; also Bertha V. Willis is the new manager for TEN. You brasspounders should get into the game and help bring TEN back to the top of the heap. Announcing Sumner Foster, WOGQ, as a new EC is like painting the lily. Sum who also is Vice-Director of the Midwest Division, always helps whenever his help is needed. As Alfred Teunyson said, "Ours is not to reason why, ours is but to do or die." This sums up Sum's philosophy toward amateur radio. Hi! KOTCZ has remarried. Congratulations, Pop, and best wishes Mrs. Kreger. W6ZII, our League President, spoke in Des Moines Oct. 25. The meeting was well attended and our proxy gave a good account of himself. Several sectional meetings have been held recently, notably one at Humboldt where the ECA of North Central Iowa invited Director Denniston, who gave an illustrated talk on his latest DXpedition to Malapos and then answered all questions on incentive licensing. Bob's stature increases with the years. 160-Meter Net: QNI 724, QTC 24 sessions 31, 75-Meter Net: QNI 798, QTC 126, sessions 27. Hamilton County: QNI 146, QTC 11, sessions 29. Traffic: WOLGG 2015, WOSCA 802, WOBDR 265, WONTB 146, WOUSL 46, KOBRE 34, WORTX 24, KOEVC 16, WOJPI 16, KOTDO 12, KOAFI 11, WOREM 11, WQYDV 10, KOIHC 8, WQNVX 8, WOFMZ 5, WQMMZ 5, WQSEE 5, KOJSK 4.

KANSAS—SCM, C. Leland Cheney. W0ALA—SEC: KOBXF. PAMs: KOEFL, W0BOR. RMs: WOGGG, WOPFG. V.H.F. PAMs: W0HAJ, K0VHP. Oct. net reports:

(Continued on page 122)

IN the course of correspondence with many hundreds of NCX-3 owners, our Customer Service people have passed out a number of hints and suggestions pertaining to mobile operation of the NCX-3 which should be of equal interest to owners of other equipment:

•••• There isn't much doubt that the higher you can mount your mobile antenna the better off you are. If you can stand the notoriety, consider the advantages of mounting your antenna on the roof — minimum interaction with other parts of the car body, maximum height, excellent ground-plane effect, practically zero directivity, and the best method yet devised for finding your car after a snowstorm. The actual installation is remarkably easy — in fact, may take less time and effort than the more conventional rear fender surgery. Our own antenna is mounted on a heavy-duty spring directly above the dome light, which, when removed, allows easy access to the necessary mounting holes. If your car doesn't have a dome light, consider access through a slit in the headlining material which may be finished off with a zipper. Before making this particular incision, make sure you can do the sewing yourself since you can only push the XYL so far. No particular strengthening of the roof was needed in our case, probably because the heavy spring mount absorbs practically all shock. The coax can be snaked between the headlining and roof to a point where it can be brought out and then down behind the dash — a good spot to shoot for is the removable trim strip between the front door and windshield. We've used this setup with great success for over a year now, with remarkably little conflict with tree branches and bridges. It is necessary to get used to the noise when contact is made with an obstacle, since to the untrained ear there is much similarity between the reverberation from the roof and the sound of a four car collision. The effect on an unsuspecting passenger is interesting.

•••• If your car is fitted with an alternator, you may save yourself some grief by checking its output voltage during charge. A spot check of '63 cars in our parking lot disclosed such voltages as high as 18 volts! The effect on a transistorized power supply (most of which are rated for nominal inputs of between 11.0 and 14.0 volts) is usually fatal. Most alternators may be adjusted by the dealer — some require factory modification.

•••• If your rig, like the NCX-3, provides VOX operation, you're missing a lot of fun and operating ease if you don't use it. The simplest approach is to home-brew a lavalier microphone with an inexpensive, light-weight mike, plastic tape, and a suitably bent wire clothes-hanger. The mike should be adjusted so that it will hang comfortably just below your mouth to allow close-talking with the VOX gain set low enough to eliminate tripping from wind and car noise.

•••• A good spot for your mobile power supply is on top of or alongside the steering column — attached with screw-type radiator hose clamps. Such clamps secure the supply as though it were welded.

•••• The easiest, fastest way to tune up your mobile antenna without a VSWR bridge is to first properly load it into a 50 ohm dummy load using the mobile power supply. Note the settings of the PA *Tune* and *Load* controls, switch to the mobile antenna, and adjust the loading coil until you can duplicate the dummy load conditions *without* touching the *Load* control. Ideally, the coax should also be matched to the very low base impedance of the antenna through a separate tapped inductor at the mount, but the additional complexity and bandswitching problems usually discourage the incorporation of this refinement.

— MIKE FERBER, W1GKX



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Net	Freq.	Time	Days	Ses- sions	QTC	QNI	Ave.
KPN	3920	1245Z	M-W-F	17	104	326	19.2
KPN	3920	1400Z	Sun.				
QKS	3610	0030Z	T-T-S-Su	27	106	157	5.8
NCSs: WOORB, WOIFR, KOEFL, for KPN; WOBXF, WOCGZ, WOQGG, WOSAF, KOYTA for QKS.							
HBF	7280	1800Z	Daily	16	82	93	

New appointments: WAOEDD as ORS. We can use more traffic operators, more OOs and more OBSs. If you know of someone for any of these appointments, get in touch with your SCM. Here we are with a brand-new year to play with. Shall we waste it or shall we put it to good use? Your SCM invites your ideas and suggestions. It might interest you to know that the recent Midwest Division Convention was successful both meeting-wise and financially. The Wichita Amateur Radio Club is to be commended for the real job it did. If you didn't get to attend, you missed the time of your life. Traffic: (Oct.) KOYTA 187, WOBYV 184, KOHGI 126, KOCHI 68, WOSAF 64, WQALA 27, WORJF 21, WOQGG 21, KOGIG 18, KOEFL 12, KODVN 10, WOIFR 9, WOBMW 8, WOFDJ 8, KOBNF 7, WAOEDD 6, KOJMF 6, WOVBO 4, WOERQ 3. (Sept.) WOBYV 310, WOQGG 44.

MISSOURI—SCM, Alfred E. Schwanke, WOTPK—SEC: WOBUL, RMs: WOUD, KOONK, PAMs: WOBUL, WOVYL, WOOMM, KOONK, WOWAP became a Silent Key Oct. 21. Mac was ORS and one of the regulars on MON. He was first licensed as W9WAP in 1941. KOHYI is the new EC for the Waynesville-Et. Wood area. WAOFLM is a new OBS on 6 meters in the K.C. area. WOOMM is recovering from an operation. Renewed appointments: WOORF and KOHYI as OPSS; WOVYJ as ORS. WAOCWY and KOVDT received MON net certificates. MON, MEN and SMN were all active in the SET. Copies of reports on EC and SET activities were received by the SCM from WQAIM and KOYTH. A new General Class license in Pleasant Hill is WAOHIT, the son of WQACV. WNOGZM is new on 2 meters from Butler. KOJWN has a 1.5-kw. emergency power plant. KODEW and WOKCG were active in the CD Party. WOKY is NCS on the 10-Meter C.D. Net in St. Louis. WAOJG brought his total DX to 46 countries. WOHVW, WODWB and WOTPK were well within the limits in the Sept. FAIT. WOUD added another radial to the antenna system. KOONK makes BPL again. Ruth wrote the music for the Wouff-Hong ceremony at the Midwest Convention. Net reports for Oct.

Net	Freq.	Time	Days	Ses- sions	QNI	QTC
MON	3,580	0100	Tu.-Sun.	27	149	104
MSN	3,715	2200	M-F			
		1300	Sat.	24	32	17
SMN	3,580	2200	Sun.	6	23	21
MEN	3,885	2400	MWF	14	354	154
PON	3,810	2100	M-F	23	184	157
MO SSB	3,963	2400	M-F			

Traffic: (Oct.) KOONK 1417, KOYTH 219, KOFFC 174, KOBWE 117, WOBUL 98, WOUD 98, WOKIK 81, WOTPK 76, WOKMJ 69, WAOCWY 34, WOVYL 24, KOMMR 15, KORW 11, WQAIM 10, WODEO 10, WAOJG 10, KOWOP 10, WOEJ 8, WORTW 8, WAOFL 4, KOHYI 2, KOVYP 2. (Sept.) KOHYI 3.

NEBRASKA—SCM, Frank Allen, WOGGP—SEC: KOTSU. Net participation seems on the upswing, but traffic still is a little slow. Central Nebr. AREC Net, WOIRZ NCS, QNI 68, QTC 1. Nebr. C.W. Net, WONYU, QNI 44, QTC 16, Nebr. Emergency Phone Net, WOEQQ, QNI 839, QTC 77; new members, KOJRH, WQMAO and WOVFT. Nebr. Storm Net, KOJXN, QNI 509, QTC 21. Western Nebr. Net, WONIK, QNI 554, QTC 34; 100 per cent check-ins KOATE, WALEE O. Morning Phone Net, QNI 502, QTC 51. Regular NCS, KOUWK is hospitalized and WOYFR, KODGW, WOEQQ, WOSCT, WOVEA, WAOBRI and WAOCEZ are helping out as NCS. Nebraska was well represented at the Midwest Division Convention in Wichita in October. New appointments: WAOBES as EC. Traffic: (Oct.) KOLIV 80, WOLOD 75, WOFIG 61, WAOBID 58, W6JCF/O 49, WALEE O 48, WAOBES 32, WOEQQ 32, KOJNF 31, KOZEO 27, WAOBYK 21, WOBKW 17, WAOAES 16, WQMAO 14, WOCDD 13, KOKJP 12, WOVFA 12, WAOBRI 9, WONIK 9, KORCP 9, KODFO 8, KOFBD 8, WOROQ 7, WOYZ 7, WOLFJ 6, KODGW 5, WAOBES 4, WOGGP 4, KOHNT 4, KOVYP 4, WAOCEZ 3, WOFBY 2, WOPQP 2, WOPHA 1. (Sept.) WOCDD 13.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Robert J. O'Neil, WIFHP—SEC: WIEKJ, RM: KIGGG, H.F. PAM: WYBH, V.H.F. PAM: WIFHP. Nets: C.N. 3640 kc. daily at 1845; C.P.N. 3880 kc. Mon.-Sat. at 1800. Sun. at 1000; CECN. Sun. at 0900 3880 kc. The CN held 31 sessions with 510 messages, average 16.45 per session, plus 179 during the 1963 SET with 28 stations in the 12 hours the

(Continued on page 124)

Unless you pay \$30⁰⁰ or more, you can't buy a microphone as good as the E-V 729...for only \$14⁷⁰*!

The E-V Model 729 ceramic cardioid microphone was designed from the start to outperform microphones selling for over twice as much. We did it by taking full advantage of the most modern design, construction techniques, and materials—and then producing the 729 in large quantities that cut cost without cutting quality. The result is a modestly priced microphone with outstanding performance for voice communications.

The biggest advantage of the 729 is its cardioid pickup pattern. When put to the test of critical VOX operation, you'll quickly note that unnecessary tripping of the control circuit is reduced. In most cases, loudspeaker volume can be substantially increased, as well, making the entire level of your operation much more pleasant and effective.

But more than improving your ease of operation, the 729 cardioid pattern also improves your signal. Voice quality is crisper, since room reflections and reverberation are not picked up from the sides and back of the microphone. If desired, you can work at up to twice the usual distance from the microphone without losing essential audio clarity. This working flexibility simply cannot be matched by an omnidirectional microphone, regardless of price.

And the 729 convenience story doesn't stop there. When you purchase the Model 729 you receive a handsome slip-in desk stand that



makes hand-held operation as easy as picking up the microphone, plus a $\frac{3}{8}$ "-27 stand adapter should you require it. The 729 shape and size make it comfortable to hold, even for long periods of time. And putting the microphone back in its base is done without groping or fumbling.

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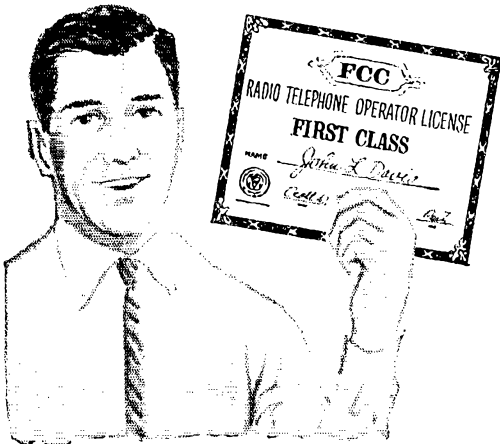
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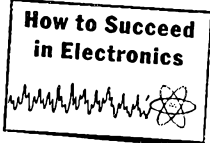
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Net was on. High QNT: K1WKK, K1ZND and K1GGG. The CPN held 31 sessions with an average of 24 stations and average traffic of 7 per meeting. Some bad conditions were noted by W1YBH and other net control stations. High QNT: W1DAV, W1LUH, K1AQE, K1LFW, K1NTR, K1OJZ, K1SRF, W1FPH, K1RTI and K1YLT. K1WKJ made BPL for traffic in October. New members are K1BTD, K1PQE and K1YLT. The CARA's new officers are K1CSB, pres.; W1VB, vice-pres.; W1MHT, secy.; W1ZKQ, treas. K1WKK made the BPL with over 1000 points in Oct. EC endorsements went to K1QAH and W1HHR. An EC application was received from K1SJK. Among the many clubs and groups holding SET as a Halloween patrol with Police was the CQRC/AREC and C.D. of Torrington. New members of the AREC are K1N1YS, K1FRC, W1N1ANB, K1YRW, K1NKY, K1QNF and K1NCA. Your calls and Forms 7 will be sent your local EC for his records and future service participation. OO, OBS and OES reports are on the uprise now that winter is upon us. Club officers of the Stamford High AREC are K1PLR, pres.; K1VMI, vice-pres. and secy.; K1PLR, treas. OES reports show good openings on V.H.T. during Oct. Late reports on the Sept. FMT show some improvement over the last test, both for accuracy and participation. W1VWP Torrington CQRC is visiting us from duties abroad and awaiting another assignment. Traffic: (Oct.) K1WKK 1023, K1WJK 625, W1AW 448, W1N1JM 394, W1EPW 322, W1BDI 157, W1RZG 144, W1OBR 118, K1DGG 104, K1JAD 102, K1GGG 96, W1CTI 95, W1HIP 83, K1ZND 74, W1MFW 53, W1A1LZ 51, W1YBH 51, K1SRF 49, K1PQS 43, K1QPN 42, K1NTR 41, K1UJY 41, W1RFJ 33, K1QPN 30, W1QY 26, W1BNS 22, K1AQE 12, K1OJZ 11, K1EIR 8, W1CHR 7, W1CUH 6, W1RRE 6, W1ADW 5, W1GEA 4. (Sept.) W1EPW 278.

MAINE—SOM, Arthur J. Brymer, W1AHM—SEC: K1DYG, PAM: K1ADY, RM: K1MZB. Traffic nets—Phone: Seagull Net, 2940 kc. 1700-1800 daily except Sun. Pinetree Net, 3596 kc. 1900 daily Mon. through Fri. First Regional Net, 3605 kc. 1815-1930 daily. Maine State C.D. Net meets Sun. at 1100 EST on 3993 kc. and Wed. at 1900 on 3530 kc. with W1BYK as NCS. The AREC Net meets Sun. at 0900 EST on 3940 kc. with K1DYG as NCS. W1QQY now is mobile with a new NCX-3. The Millinocket hams gave assistance in the hunt for the lost woman and Ranger in November. During the first snow of the season, travelers received help from W1JTT, W1AAKV, W1FSR, K1LHE, K1FPW, W1SLV and K1SUU. They were on the air all evening long. The SPARKS visited Caswell AF and were the guests of K3RLR. New hams: K1FRF, K1YQD, K1PPW, W1A1OK, W1ADY, W1APH, W1A1PQ, W1A1ATZ and K1EYT. A new club station is W1ARA, N4S Brunswick. New Novices are W1A1TG, W1A1TR, W1A1T, W1A1RI, W1A1SF, W1A1SY, W1A1OT, W1A1PB, W1A1QA, W1A1QB and W1A1AQJ. New Techs: K1YZI and K1YZJ. Congrats and good luck. Traffic reports and notes are coming in now in fine shape so let's keep up the good work. Traffic: (Oct.) K4BSS/1 126, K1GVP 55, K1DYG 43, K1IMT 35, W1YYW 24, W1AHM 17, K1VEQ 13, W1EPN 10, K1BXP 9, K1LHE 8. (Sept.) K1VEQ 8.

EASTERN MASSACHUSETTS—CM, Frank L. Baker, W1ALP—SEC: W1AOG. A new net is the Eastern Mass. Slow Speed Net on Mon., Wed. and Fri. from 6:30 to 7 P.M. on 3733 kc. If interested, write Paul Morey, K1PNE, Townsend, Mass. New appointments: K1BTR Hingham, K1QAM Mansfield, K1OPV Boston us ECs. Appointments endorsed: W1LK Medford, W1JSM Waltham, W1YYZ Randolph, W1MME Hull, W1DPO Chatham, W1DOP Revere as ECs; W1JSM and W1EJW as OESs; W1WU and K1OJQ as ORSs; W1DOP and W1MME as OPSs; W1MME as OBS. W1PLJ, K1WJD, W1OSQ, W1BGW, W1QX, K1CZX and W1PXH took part in the Sept. FMT. W1ALP held a meeting at his QTH. Those present at a meeting at W1ALP's QTH: W1s EAE, DOM, OFK, UTR, AUG and K1OCD. One subject discussed was more liaison between all of our nets to exchange traffic. K1YLT and K1PEF are on 75. W1AFP is moving to Wayland, W1WRV is there on 2. K1KZU is attending Norwich U. in Vt. The T-9 Radio Club met at W1TJP's QTH. W1RQZ now is in Whitman. W1ZNG is in the hospital after a heart attack. Heard on 2: K1TAG, K1DSW, W1NVV, K1BUT has been on 10 some. W1VAI put up a multiband antenna for 40, 20 and 10. New hams in Randolph: K1WRS, K1WLQ, W1A1KS, K1N1EQ, K1SJCJ has an HX-50. K1VIZ/VLE1 is attending St. Joseph's College in New Brunswick. K1OJQ is attending N.U. Net certificates have been issued to W1BJE, K1GYM and K1NPK in the 6-Meter Crossband Net. Eastern Area Net certificates have been issued to K1TSD and K1WJD. W1DDF has moved to N.Y. State. The Framingham Club has a new meeting place, Athenium Hall, Concord St., Saxonville. K1RPA ex-W9BNR, ex-W2OIL, in Georgetown, has applied for OO appointment. W1s PEX and EMG made the BPL. W1AUC has an antenna for 160. K1CMS has an eleven-element Telrex 6-meter Long John tower up 85 ft. WOPAN has a

(Continued on page 126)

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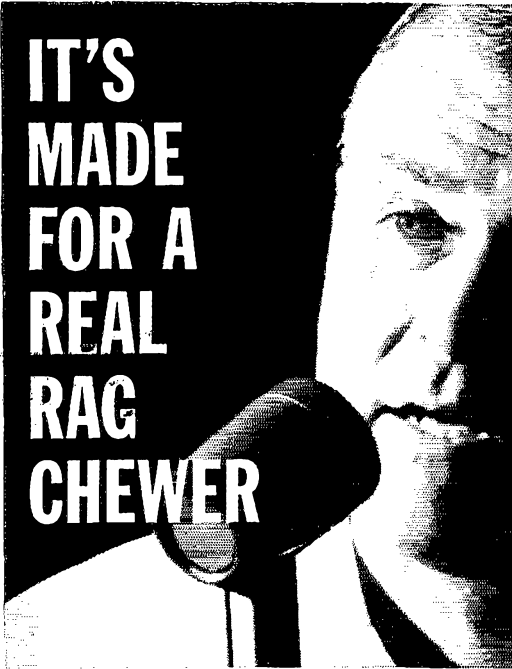
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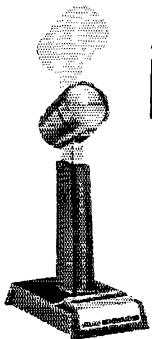
At last! A quality microphone designed *specifically* for the ham. Features galore that hams have asked for. Tops in voice punch, intelligibility. Unique convenience features to minimize operator fatigue. Great for AM & FM, unsurpassed for SSB. • "Shaped" response—cuts off sharply above 3000, below 300 cps with rising characteristic to curve; gets message through with top audio punch! • Push-to-talk bar-switch with optional locking feature to control relay and mike muting circuits. • Separate slide-switch gives choice of press-to-talk or VOX operation. • Exclusive adjustable height stand. • Rugged Shure Controlled Magnetic element (U.S. Patent 2,454,425). • Field replaceable cartridge and cable. • ARMO-DUR case and stand—can't rust, peel, crack, or dent. Write for data sheets!

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HAM MICROPHONE

only \$2550 amateur net

new three-element beam for 10. KN1FJM has a Twoer. W1MD is a member of FOC TOPS W1WU is having trouble with his rig. KN1FKQ is on 40, 80-meter c.w. K1ZBU is on several bands. K1CZO will be on 6 soon from Burlington. W1AQV has a Sixer. The QRA held a meeting with a talk by Carl Frecklin, ex-W9KWT, on Semiconductors for Ham Gear. The North Shore Radio Assn. will hold code and theory classes. The Yankee Club held a meeting with a film and talk by USNR personnel. W1AOG received many EC reports from the SET. W1YYI, Carlisle EC, and the following were very busy during recent forest fires: W1YRW, K1ODR, K1OXX, W1WET, W1VIN. The EM2MN held 23 sessions, 232 QNTs, traffic 102. The 6-Meter Cross Band Net held 23 sessions, 545 QNTs, traffic 55. K1VOK is helping out as NCS on our new EM Slow Speed Net; he worked HC2-LI on 10. Officers of the Needham HSARC are K1VAF, pres.; K1TZN, vice-pres./trustee; K1EZX, secy./treas.; K1VPJ, act. mgr.; K1ZKK, public relations. K1VPJ is studying for the General Class exam. Appointments endorsed: W1BB, W1nthrop, as EC and OO; W1HIV as OBS; W1EJZ as OO. W1NF is working lots of DX on 3.5. K1CAB, group mgr. of the Dorchester ARC, says the club is giving an award for working a certain number of members. The club meets on 28.85 Mc. at 9 A.M. Sun. Net affiliations: Eastern Mass. C.W. on 3660 kc. 2300 to 2307Z. First Region Rep. on 1st and 2nd sessions on Tue. 3605 kc. The Townsend AREC meets the 1st and 3rd Tue. of each month on 50.52 Mc. at 2400Z. The Townsend Amateur Radio Club meets the 1st Mon. of each month at the Spaulding Memorial School in the Science room. K1SGZ is in his senior year at the State teachers College in Fitchburg and is a student teacher at the North Middlesex Regional School, teaching a course in basic electronics. The Townsend RACES Net meets the first Mon. of each month coordinated with the sector 3E Net. K1PNB is RM for the Eastern Mass. Novice Net and desires to meet all Novices who are interested in learning to handle traffic on 3733 kc. Mon., Wed. and Fri. 6:30 to 7:00 p.m. Traffic: (Oct.) W1PXE 934, W1EMG 552, K1PNB 128, K1ESG 125, W1EAE 116, W1OFK 93, W1DOM 82, W1LES 81, W1ZSS 54, W1AOG 50, K1VOK 26, K1VGM 25, K1LQZ 22, W1PON 49, W1NX 18, W1VYS 15, W1AUQ 13, K1CMS 8, K1OWR 8, W1BJE 6, W1OPAN 5, K1OCD 3. (Sept.) K1BGK 27, K1YKT 25, W1AUQ 15, W1FJJ 13, KN1FJM 2.

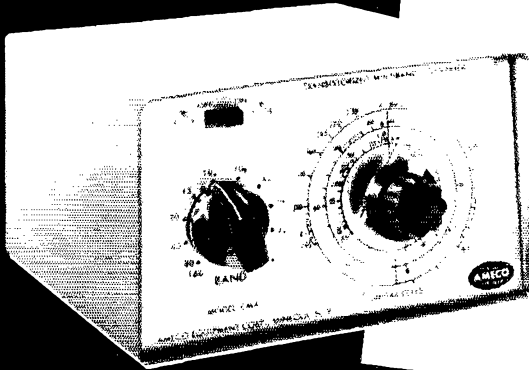
WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1BYR—SEC; W1BYS/K1APR, RM; K1IJV PAM; K1RYT. The Massachusetts Phone Net (Mon. through Fri. on 3842 kc. at 5:30 p.m.) is desperately in need of members. Can't some of you phone net get in there and help them out? The West. Mass. C.W. Net (W1MN, daily except Sun. on 3560 kc. at 7 p.m.) is going great guns with the following active in it during the month (arranged in order of activity): K1SSH, K1ZBN, K1ZVJ, W1BYR, K1IJV, K1LBB, K1YMS, W1AMI, K1VFN, W1MNG, W1DWA, K1NWF, W1ZPB, W1ZEL, W1QKX, W1BKQ, W1BYH, K1VHO, W1MND, K1CPG and W1DWW. K1JQT is on from W8ELI, a.m. and c.w. 80 through 10 meters. W1DWA and his XYL, KN1EUL, are the proud parents of a 10-lb. baby boy born Oct. 28. Congrats. K1VFN is using a homebrew electronic keyer. As reported in November *Random Scatter* (Berkshire County JRA) the Berkshire County boys sure are whacking out the DX! W1KZS, K1WZS, K1RYT and K1ZYB are looking forward to next spring to get up on Mt. Greylock again. Two meters is not too active in Berkshire County, but 6 is going strong. K1TTT is doing announcing for WSBS. W1JDB spent his vacation in Virginia. Berkshire County active in the SET were K1SIF, W1UDT, K1RYT, K1WZS, K1DJE, K1GFT, K1SBW, W1USS, W1JDB, K1JTL, W1HPA and K1CVC. K1DDB reports into the MARS Six-Meter Net. The West. Mass. C.W. Net was very active during the Oct. SET. W1BYR had sold his HX-20 s.s.b. transmitter (ain't smart enough to operate phone anyway). Traffic: W1BYR 124, K1IJV 123, K1SSII 119, K1LBB 108, K1ZBN 45, K1ZVJ 29, W1ZPB 7, K1VFN 4.

NEW HAMPSHIRE—Albert F. Haworth, W1YHL—SEC; W1TNO, RM; K1BCS, Endorsements: W1CBB, as OO and OBS, W1YHI as OPS and OBS, W1JB and W1HIQ as OPS. K1HFK received a 6-meter Cross Band Net certificate. It is with regret that we announce the resignation of our PAM, K1NXV, because of business pressure. Roger has done a fine job and thanks is extended from all. K1DWK reports a change in the Merrimack County AREC Net to the Merrimack Valley AREC Net. K1RDW and K1DXD shared NCS for October. AREC members in the Nashua area and Merrimack County took part in the SET with fine results. Present AREC members include W1BST, KN1ESJ, W1FOG, W1HIQ, K1KRP, K1LHC, K1MPK, K1NXV, K1OIZ, K1OJF, K1POX, K1RDV, W1SNI, K1VJI, K1VSS, K1VPO, W1YHE, KN1EQA, K1EFO, K1NYS, K1NZJ, K1OUG, K1SHC, W1YHF, K1AFN, K1XNP, K1ENC, K1UBO, W1YHI, K1ZBU, K1ZOM, W1ALE, W1BYS, K1DWK, W1NHO, W1RMH, K1GQE, K1OCU, K1RSC, K1RSD, W1SWX, K1VMR, KN1ZWF, KN1UZD, W1GAH, W1-

(Continued on page 128)

AMECO*Leader in Compact, Quality Ham Gear**Amazing but True...***ALL BANDS.. 2 THRU 160 METERS IN ONE CONVERTER**

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The NEW  **Model CMA**

Model CMA covers all frequencies from 1.7 to 54 Mc. and 108 to 174 Mc. The output can be fed to a standard broadcast set or any communications receiver. The CMA has better than 1 microvolt sensitivity. It can be operated from an internal battery or from the 12 volt car battery. Model CMA has an RF stage, tuned by a panel dial for best image and spurious rejection. Up to 10 crystals can be selected by the band-switch. Size — 3 $\frac{3}{4}$ " x 6" x 6 $\frac{3}{4}$ ". For more detailed information, write for special "Converter Information Sheet".

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Has 3 Nuvistors (2 RF stages & mixer) and 6J6 osc. Available in any IF output and do NOT become obsolete as their IF is easily changed to match any receiver. Average gain — 45 db. Noise figure — 2.5 db. at 50 Mc., 3.0 db. at 144 Mc., 4.0 db. at 220 Mc. Power required 100-150W. at 30 ma., 6.3V. at .84A. See PS-1 Power Supply. Model CN-50W, CN-144W or CN-220W wired. (specify IF.) \$49.95. Model CN-50K, CN-144K or CN-220K in kit form. (specify IF.) \$34.95



Model CN

ALL BAND NUVISTOR PREAMP 6 THRU 160 METERS

2 Nuvistors in cascode give noise figures of 1.5 to 3.4 db. depending on band. Weak signal performance, image and spurious rejection on all receivers are greatly improved. PCL's overall gain in excess of 20 db. Panel contains bandswitch, tuning capacitor and 3 position switch which puts unit into "OFF," "Standby" or "ON," and transfers antenna directly to receiver or through Preamp. Power required — 120 V. at 7 ma. and 6.3 V. at .27 A. can be taken from receiver or Ameco PS-1 supply. Size: 3"x5"x3".



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COMPACT 6 THRU 80 METER TRANSMITTER

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Model TX-86



CB-6

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CB 6W — wired & tested \$27.50
CB-2K — 2 meter kit, 6ES8 1st rf amp., 6U8 — 2nd rf amp/mix, 6J6 osc. \$23.95
CB-2W — wired and tested, \$33.95
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TNO further reports that some others have not sent their cards in for yearly endorsement. Check, fellows, and advise Ted.

RHODE ISLAND—SCM, John E. Johnson, K1AAV—SEC: W1YNE, PAM: W1TXL, RAM: W1BTY. Appointments: K1HZN as EC for R1BN mgr., K1SWK as EC of Pawtucket, K1TDD as EC of Woonsocket, K1LPL as EC of Providence. Endorsements: W1YNE as OO, OPS and ORS. K1NEF was awarded an Eastern Area certificate for the '63/'64 season, K1STB and K1MNZ were married in East Providence Nov. 30. K1JNJ and his NYL have a new harmonic, son, Harry 4th. W1JNJ is building a 6-meter rig to be used for the AREC and his NYL is studying for her license. K1NJT has his new 6- and 2-meter v.t.o. working. W1YRC has installed a 50-ft. tower with a TA-33 antenna. He will feed the antenna with a 20A and a Valiant combination. W1BTY is using a "Cliff Dweller" for 75 and 80 meters. W1YRC worked E14B and YU1AG on 15-meter c.w. During the recent Polio Clinic for Rhode Island, several members of the AREC provided the communications and delivered serum when it was needed. New licensees: General: W1AUL. Techs: K1s JNU, EQX, ZVY, ZKM, W1As AME, AJE, APL. Novice: W1IANX. Traffic: K1NEF 680, W1TXL 537, W1BTY 141, K1TPK 92, K1NJT 72, W1YNE 64, K1STB 27, K1SXY 20, K1RRK 10, K1UZA 6.

VERMONT—SCM, E. Reginald Murray, K1MPN—Green Mt. Net, 3855 kc, at 2230Z daily. Vt. Fone Net, 3855 kc, at 1400Z Sun. Vt. C.W. Net, 3520 kc, 0000Z daily. Vt. S.S.B., 3955 kc. Congrats to new Novices W1NAOO and W1ATK, to new Conditionals K1EPJ and K1YZK and to new Technician W1APO. K1LEM now has his General. We miss W1ZS on the Green Mt. Net. Hope he has a nice winter in Florida as W1SCY. The BARC's new trustees are W1SCJ (pres.), W1HRG, K1KSS, K1PPW, W1WFZ (treas.) K1CEG (clerk). W1LYD now is on the mend after a siege in the hospital. Your SCM wishes to thank all for voting and exercising your democratic privileges. The Vt. QSO Party will be held next Feb. 15-16. Happy New Year to all. Traffic: (Oct.) W1WFZ 73, K1BQB 44, K1LLI 32, W1ZS 17, K1WZD 13, K1SLU 11, K1MPN 9, K1YVD 9, K1LJJ 8, W1KJG 8, K1OXD 2. (Sept.) W1WFZ 43. (July) W1WFZ 661.

NORTHWESTERN DIVISION

IDAHO—SCM, Raymond V. Evans, K7HLR—Two stations in Pocatello and the Magic Valley group were the only ones, to our knowledge, that took part in the SET activities, with none connecting their activities to the NTS. Ada County civil defense is in the process of reorganization with radio gear to be located at the top of the Court House. Hams there soon will be having an antenna party W7SLY is QRL in a new QTH and presently off the air. W7EMT reports activity is picking up on the GEM Net. FARM Net manager and Net control stations are doing a good job in spite of poor band conditions. Net traffic: FARM Net 40, GEM Net 23. Traffic: W7EMT 62, W7GGV 18, K7OAB 12.

MONTANA—SCM, Walter R. Martin, W7KUH—Asst. SCM/L.F. PAM: Dr. Marvin F. Hash, W7YHS. SEC: K7AEZ, V.H.F. PAM: W7TYN, RAM: W7PIS. OOs: K7OGE, W7IDK, W7LBK, W7FIS, K7VMJ. ECs: W7FUM, W7COH, W7OIO, K7KME, K7GHK, W7EWR, W7FGB, W7SEW, W7TYN, W7WVL, K7DCH, W7LBK, K7IOA. Endorsements: W7EWR and W7LBK as ORS; W7COH and W7LBK as ECs; W7LBK and K7VMJ as OOs. W7JZW celebrated his 25th anniversary as an amateur radio operator. New officers of the Butte Amateur Radio Club are K7OCO, pres.; K7THR, vice-pres.; K7GVJ, secy.; K7NDV, treas.; K7QCY and W7CJN, trustees. New officers of the Yellowstone Radio Club are K7VSS, pres.; K7TGR, vice-pres.; K7QLP, secy.-treas.; W7LH and W7YHS, directors. New officers of the Big Sky Radio Club are K7SIL, pres.; W7FGZ, vice-pres.; K7BYB, secy.-treas.; W7UGM, K7EGJ, K7PKV, K7UON and K7SGF, directors. Mont. S.S.B. Net now meets Mon. through Fri. at 6 p.m. on 3910 kc with K7SVR as net mgr. K7NHV reports that the MSN Net (c.w.) had 50 check-ins, 12 sessions, 69 pieces of traffic handled. VHF PAM W7TYN suggests 50,200 Mc. as the 6-meter Mont. statewide frequency. The Angewanda AREC Net meets at 0900M Sun. on 145.35 Mc. W7LBK, K7JBH and W7SMY are RTTY stations in Laurle. The following RTTY MARS stations have been very successful: W7SMY, K7JBH, K7JUC, W7YZQ and W7LBK. Two Missoula stations are joining MARS RTTY, W7FIS and W7NEG. The Bozeman High School Radio Club's officers are K7WOC, pres.; K7YXU, vice-pres.; J. Brown, secy.-treas. W7EWR has joined the ORP Club. K7KLF and W7BLD gave a demonstration at the CCRC meeting. The following have been appointed to committees for the Glacier-Waterford Hamfest for 1964: K7RXO, W7BIS, W7HTZ, K7OYT, K7BIX, K7KLF and K7PFQ, W7CPCY

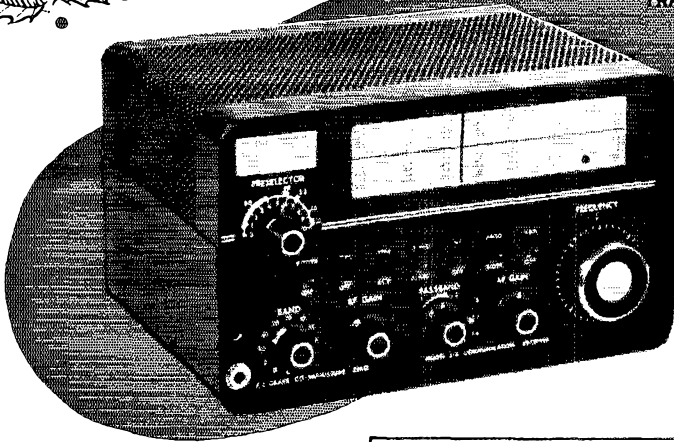
(Continued on page 130)

Christmas Gifts

that really
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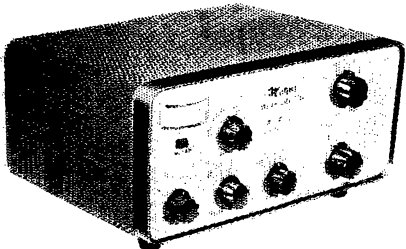
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| Jim Waits.....W8NUQ | John Hey.....W8STB |
| Tom Kennedy....K8TRK | Bob Fugate.....W8RGJ |
| Vic Blackwell...W8VST | Bob Brandt.....WA8CKE |
| Piff Smith.....W8NGU | Mike Wintzer....DJ4GA |
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SIDEBAND 140 watts Double Side Band **AM** 100 watts AM **CW** 175 watts CW

has moved to Arizona for the winter. K7CA and K7YS passed the Capt. Class exams. K7OS moved to Arizona. New calls in Billings are W7PD and K7ZGK. N7ABY, K7ASN, K7BL, K7BI, K7BY, K7EVS, W7AT, W7PML, W7IN, K7JL, K7JBY, K7CRO, K7KNT, K7ADQ, K7NKS, K7RAL, K7RNP, K7YQZ, K7YTI and W7ZLY are attending Mont. State College. K7LAT is starting new code class. W7LBK sends WAE transmitters by RAYT tube on 2415 kc. every Thurs. at 7 p.m. MST. The following took part in a recent party: W7LBN, 487 P.P.M.; W7LIS, 190; K7EVS, 174; W7ZLY, 9; W7NBY, 90. The League Radio Club holds instruction classes in the Central Grade School (Missoula) conducted by K7CJA, K7VAG and W7PB. W7YZQ received a certificate from W7RS for "Sustained Superior Performance in CW." K7ATT, K7NR has a new s.s.b. rig. W7TJA has built a three-meter rig. W7HDP and W7WYG have returned from school in Oklahoma City. W7ZKA is working on cable TV. Officers of the new Superior Club Amateur Radio Club are: W7TLE, pres.; W7OWO, vice-pres.; K7GHR, secy.-treas.; K7QGF, trustee; K7WPF, board member. Traffic: K7WVB 186, K7NTH 163, W7-COH 89, W7BKB 29, W7FIS 17, K7OZF 14, W7VYN 9, N7LAT 5, W7SNV 5, K7RIB 3, K7ELW 2, W7UIN 1, K7ALOW 1, K7PGN 1, W7GJL 1.

OREGON-S7CV, Everett H. France, W7AJN -SEC; W7WYD -HAI; W7ZEL, Ed Lipscomb; K7QID, W7-RSN, K7DEJ, K7CBI, W7DSD as OCS; W7ZEL, K7CZG, W7ZB, 58 OHS; W7GDI as OCS, W7ZEL, 70. State 50; secy-treas, 22, attendance 184, traffic 75. Bill V. Stevens is working in the Oregon State BULV awards for W7ZEL and K7WLD, and not next for the Portland Area 2-Meter Net. Reports 341 check-ins for Oroper. New chapters of Oregon are The Lower Columbia and Yamhater Valley. V.H.T. Mc-Lester Club and the QED Club, the Portland Amateur Radio Club had an interesting field tour through the Columbia River head on presenting field tour through the forest. Officers for the Novice 2-Meter Training Class, which is held in Eugene 7:30 p.m. at the OHSI Building in Portland. K7NXX is in the Utility service. K7RRE is working in the Utility service. W7DPAI 29, K7ONO 17, K7NTH 17, W7ALFO 10, W7CTG 6, K7EPH 5, W7DJS 5.

WASHINGTON-S7CV, Robert R. Thurston, W7QYX The Washington State Net (WASN) changed its starting time to 0215Z effective Oct. 27. The Vancouver zone is running code and theory classes for Scouts to help them obtain their Alert badges. W7SAP has RTTY meetings and TD unit going on 80 and 160. The Northwest Slow Speed Net had 30 sessions, 306 QNTs, 115 QTCs during October. K7CJH has received his Extra Class license. K7VSN has a new T-160A. W7YAB says UN is almost at a standstill because of extreme high noise levels on the high bands. W7AMC eagerly awaits his new equipment and antennas. K7REB received his 6P-30 and reports that Washington chapter No. 3 of the ORP Amateur Radio Club has been formed. K7-SBT saves school keeps him inactive. K7CIV and K7-PTY joined the Coast Guard. W7STP says he is QRT. Other things: New officers of the Everett State Net (ESSN) are K7BY, mgr.; K7JXC, secy.-treas.; K7-MHE and K7PZO, directors. W7RIB says that thanks to W7JDC the excessive noises in the Bremerton area are fast fading. Your S7CV received a very nice letter from W7RSO/K3BL, in Australia, who passes along his records to the Washington zone. I will be glad to forward his address to any who wish to write him. W7BA has completed twelve years of traffic-handling without a break and has to his credit a string of 14 RFD cards. K7OPW and K7OEX are sporting a new Mercury and a TR-3. K7TBI has the Apple working FB. K7RSNI has his two-element tri-band beam peaking working. K7DED is the proud daddy of a new daughter. A new OBS in the Seattle area is K7JZT. W7LEA reports that all ham talent including hoodlums must and magic acts. W7IC is switching out the overhaul of his HQ-170. The Bremerton ARAB honored W7CXT 7 with a Chinese dinner and get-together party. The following Novices obtained their General Class licenses: K7YAA, K7YVY, K7YVZ, K7YVO, K7YVS and K7Y-VOB. K7YVY received his Tech. Class license. A new call in the Walla Walla area is K7GOL. K7TRA is receiving a new tower. W7RBF has the new Collins S-Line. K7RAO has been handling traffic for the local cross in the Walla Walla area. W7NDG suggests more activity in the 6-meter band to encourage the Technicians. Traffic: Oct. 1, W7BA 407, W7BDX 688, K7CTP 543, W7APS 264, W7OEB 213, K7TJA 212, W7YIB 46, W7ANC 29, K7JRE 22, K7SRI 22, K7WYV 22, K7RSD 11, K7EY 8, W7RIB 7, W7EUC 7, K7PIC 6, W7EWV 3. (Sept.) W7DZX 692, W7HNA 30.

(Continued on page 132)

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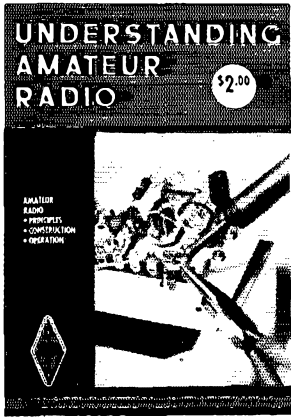
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THIS recent addition to the ARRL family of publications is written for the beginner and explains in simple language the elementary principles of electronic and radio circuits, tells how transmitters, receivers and antennas work, and includes complete how-to-build-it information on low-cost gear — receivers, phone and code transmitters up to 150 watts, v.h.f., measurements, and easy-to-build antenna systems.

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AMERICAN RADIO Newington
RELAY LEAGUE, INC. Conn. 06111

NEVADA—SCM, Leonard M. Norman, W7PBV—SEC: W7JU. The Nevada Amateur Radio Assn. of Reno has a new meeting (QTH, Room 326 of the new Electrical Engineering Bldg. The Nevada Centennial QSL cards are being distributed with great success. W7BVX and his NYL are vacationing in Mexico. K7UGE has a new 6- and 2-meter transceiver. K7YWF probably will be heard as an aeronautical mobile since he received his pilot's license. K7CW is installing a 44-element vertical on 432 Mc. W7DYX is on 6 meters. K7PYF is on 2 meters. K7SFN, ex-K8TWM is active with traffic at Stead AFB. W8EAD, ex-W7YNO is on in SV-Land. W7LFF is in the Salt Lake City Hospital. W7QYK has a new SR-150, W7TGG, Boulder City EC, pulled a surprise SET on 2 meters with W7BJY. W7LQS, W7JU, W7PBV, W7PRM and K7RKH handling traffic for the Police and Fire Departments. Traffic: (Oct.) K7SFN 58, W7JU 36, W7PBV 10, K7RKH 8, W7BJY 5, W7TGG 5. (Sept.) W7YU 17.

SANTA CLARA VALLEY—SCM, Jean A. Gmelin, W6ZRJ—Asst. SCM: Edward T. Turner, W6NVO. SEC: W6HVN. I.M: K6KCB. V.H.F. P.M: W6RRH. The SET was the major project for most groups in the section during October and this year saw an increase in activity. W6HVN, our new SEC, handled much of the coordination of the operation, including the Red Cross traffic relaying for W6CXO. The high AREC group was Redwood City under EC W6DEF, with 534 points. Others reporting were San Jose Red Cross and C.D., Salinas Red Cross, San Mateo, Santa Cruz, Burlingame and Half Moon Bay. Much of the SET traffic was handled via W6ZRJ for the SEC. Santa Clara Valley Section Net, 2 meters, reports 21 sessions, check-in of 135 and 39 traffic. V.H.F. P.M W6RRH reports that the net activity is picking up and is higher than ever. Traffic is relayed via K6GZ to RN6. W6ZRJ now sends code practice bulletins on 3580 kc. at 6 p.m. local time Mon., Wed. and Fri. Speed is 10 w.p.m. BPL was made by W6RSY, W6JNK, W6ZRJ and K6GZ, all active on NCN. W6RSY reports taking a trip to Tahoe City. W6DEF blew his power transformer so was off the section net for a few weeks. W6AUC is busy with traffic. K6MTX and K6DYX were active on RTTY during the SET. W6HC, W6HVN and W6ZRJ visited the Palo Alto Amateur Radio Assn. and the West Valley Radio Club with the ARRL slide talk. W6PLS, EC for Half Moon Bay, was active during the SET and then was alerted by the local police for duty during a tidal wave alert. Gene contacted Hawaii via s.s.b. to find that the wave, when it passed there, was minor in nature and so Half Moon Bay was the only city on the coast to shut down early. W6UAM is now active on NCN. W6ASH installed a full-size five-element 20-meter beam. W6OH was active in the Phone CD party. W6WX runs Northern California DX Club bulletins on 14,002 kc. Sun. K6YKG reports activity for W6UW of the Santa Clara County Amateur Radio Assn. K6TEH is the new Salinas EC. K6HEP has an APX-6 now in operation. W6JNK is active on RACES in the Daly City area. W6NAV was endorsed as ORS. W6ARXM is active as OO and now sports a DX-100. W6IDBC is a new OO. The Salinas Valley Red Cross Radio Club now has the call W6HUK: K6JHK is pres.; W6GTKE, vice-pres. San Mateo Oct. 20 with 37 amateurs attending. The affair was sponsored by the U.H.F. Radio Society and featured a talk on moon bounce by W6JZN. Traffic: (Oct.) W6RSY 1455, W6JNK 798, W6ZRJ 333, K6GZ 227, K6DYX 155, W6AIT 110, W6DEF 99, W6AUC 91, K6MTX 83, W6YRV 61, W6PLS 40, W6UAM 26, W6ASH 14, W6OH 11, K6VQK 9, W6WX 3. (Sept.) W6JNK 97, K6VQK 14.

EAST BAY—SCM, B. W. Southwell, W6OJW—John A. Vaidean, W4POR/6, 30973 Braevurn Ave., Hayward, Calif., has been appointed Section Emergency Coordinator to succeed W6MTE, who recently resigned. W4POR/6 reports that traffic is coming up. W6UQM got 6 new countries with his 90 watts. W6ECF has a DX score of 111/99. KH6HAA has moved to the Dixon area. K6BJJ is going a.i.s.k. with #15 and kw. amplifier. The East Bay Amateur Radio Net meets at 7:30 local time each Sat. on 7270 kc. W6UB, SACEN 6 Net, is handling an average of one emergency call per day, accidents, fires, etc., reported by amateur mobiles for relay to police, etc. The SACEN Net is on 50,300 Mc. and the Frequency is monitored for emergency calls at all times, call "CO-SACEN" for aid. W6ENE, WN6HAM, W6RBS, WN6GVF and WN6EYV are new members of the HARC. W6CBA is building a Tower. The LARK manned a UNICEF booth on Halloween. W6ODP, LARK Club station, is gunning for a WAS sheepskin. The ORC held its annual Old-Timers nite with W6SS as guest speaker. W6ELW and his NYL took in the ARRL Southwestern Division Convention. W6TMX has gone

(Continued on page 134)

SSB COMMUNICATIONS

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TWO NEW FIXED CHANNEL SSB RECEIVERS FOR **COMMERCIAL APPLICATIONS**

Model RF-501, Single Channel Strip Receiver

FREQUENCY RANGE: 1.6 to 28 Mc with Four plug-in heads

FREQUENCY STABILITY: 3 parts in 10^7 per day

SENSITIVITY: 1 μ V for 10 db S+N/N

IMAGE REJECTION: 65 db

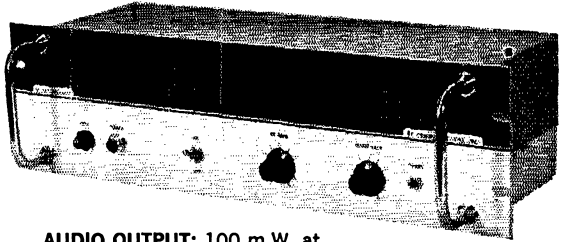
IF REJECTION: 70 db

IF BANDWIDTH: 2.1 KC, Mechanical Filter

AGC: 3 db Audio Variation, 10 μ V to 100,000 μ V
Time Constant 0.02 seconds charge
2.0 seconds discharge

AUDIO RESPONSE: 350 to 2450 cycles

ANTENNA IMPEDANCE: 50 ohms unbalanced



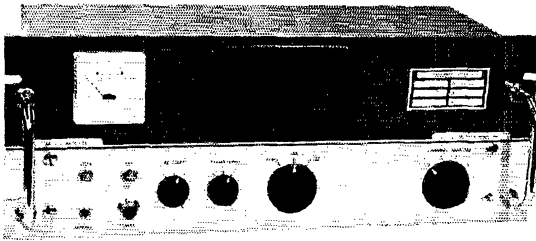
AUDIO OUTPUT: 100 m.W. at 600 ohms balanced, 1 watt at 3.2 ohms

POWER INPUT: 115/230 volts, 50/60 cycles
Approximately 65 watts

SIZE: 5 $\frac{1}{4}$ " H x 17" W x 6" D

WEIGHT: 15 pounds, approximately

Model RF-503, Six Channel SSB Receiver



METERING: "S" Meter

POWER INPUT: 115/230 volts, 50/60 cycles
Approximately 70 watts

SIZE: 7" H x 17" W x 8" D

WEIGHT: 17 pounds, approximately

FREQUENCY RANGE: 1.6 to 25 Mc

MODE: SSB-Selectable upper/lower sideband and Compatible A.M.

FREQUENCY STABILITY: ± 2 part in 10^6

SENSITIVITY: SSB-1 μ V for 10 db S+N/N
A.M.-1.5 μ V for 10 db S+N/N at 30% Modulation

IF BANDWIDTH: SSB-2.1 KC Mechanical Filter
A.M.-7.0 KC

AGC: Fast/Slow Time Constant

AUDIO RESPONSE: 350 to 2450 cycles

ANTENNA IMPEDANCE: 50 ohms unbalanced

AUDIO OUTPUT: 100 m.w. at 600 ohms balanced
1.5 watts to built-in speaker

SPEAKER: 4 x 6 inch

Write for details on this and other items in the world's most complete line of fixed channel commercial SSB communications equipment.



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BEAMS High Forward Gain



Rugged, lightweight, and real performers. Booms 1" aluminum tubing, elements 1/4" aluminum rod pre-assembled on booms. Reddi Match for direct 52 ohm feed. Add on stacking kits available for dual and quad arrays.

Model A144-11—11 element, 2 meter, boom 12'	\$12.75
Model A144-7—7 element, 2 meter, boom 8'	8.85
Model A220-11—11 element, 1 1/4 meter, boom 8.5'	9.95
Model A430-11—11 element, 3/4 meter, boom 5'	7.75

6 METER BEAMS: Full size, wide spaced, booms 1 1/4" and 1 1/2" diameter, elements 3/4" diameter aluminum tubing. Reddi Match for direct 52 ohm feed 1:1 SWR.

Model A50-3—5 element, 6 meter, boom 6'	\$13.95
Model A50-5—5 element, 6 meter, boom 12'	19.50
Model A50-6—6 element, 6 meter, boom 20'	32.50
Model A50-10—10 element, 6 meter, boom 24'	49.50

COLINEARS Broad Band Coverage

Ideal all around VHF antennas featuring lightweight, mechanical balance, high power gain, major front lobe, low SWR, low angle or radiation, and large capture area.



Model CL-116—2 meter, 16 element colinear	\$16.00
Model CL-216—1 1/4 meter, 16 element colinear	12.85
Model CL-416—3/4 meter, 16 element colinear	9.85
Model CL-MS—Universal matching stub matches 300 ohm 16 element antennas to 200, 52, or 72 ohm feed lines	4.75

Add on stacking kits available for 32, 64, and 128 element arrays.

TWIST Another CushCraft Is!

For Tracking Oscar III



For satellite tracking, back scatter, or point to point communications. The Twist provides either vertical or horizontal and left or right circular polarization. Ideal as a combination point to point or base to vertical mobile antenna. Reddi Match driven elements for direct 52 ohm feed. Cut to frequency within 130 to 150 Mc. range.

Model No. A144-20T Single 20 element TWIST	\$24.95
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Dual and Quad arrays available.

BIG WHEELS & HALOS 360° Coverage



The amazing Big Wheel is a horizontally polarized, broad-band, omnidirectional gain antenna. It provides direct 52 ohm coaxial feed.



Model No. ABW-144 Single 2 meter Big Wheel	\$10.95
Model No. ABW-220 Single 1 1/4 meter Big Wheel	9.95
Model No. ABW-430 Single 3/4 meter Big Wheel	8.95
2 Bay stacking Kits available	3.95
4 Bay stacking Kits available	11.75

MOBILE HALOS: Aluminum construction; machined hardware; Reddi Match for 52 or 72 ohm direct feed. 2 meter. Dual halo two bands one 52 ohm feed line.

Model AM-2M—2 meter, with most	\$8.70
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Model AM-6M—6 meter, with most	12.50
Model AM-26—6 and 2 dual halo, with most	17.45

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over to 50 Mc. K6MKQ is in charge of the program for the Blind School in Richmond. K6FLH spoke on Project Oscar at the October meeting of the MDARC. W6RUZ is on 144 Mc. K6VLH bought a new car and is thinking of mobile operation. K6PRK has a new Swan on 75-meter mobile. Traffic: W4FOR, 6 213, K6GK 95.

SAN FRANCISCO—SCM, C. Arthur Messineo, W8-UDL/K6CWP—SEC: K6KZF. The San Francisco section wishes all a Very Happy New Year. New officers of the San Francisco Radio Club are W46IVM, pres.; W6HRA, vice-pres.; W46VLX, sec.; W6FAX, treas. A code and operating class will be inaugurated with the Jan. meeting under the direction of W46IVM. Anyone interested is invited. Visitors at the club GO3MIK, from the Isle of Mann, and Lynn, K2DGO, the "Don't Give up" kid, who is studying in Provo, Utah. The AREC Net is celebrating its 12th anniversary. Check in Sun. at 10:30 a.m. on 3900 kc. W46ALK now has a tower with 2- and 6-meter beams and a Collins 62S-1 to supplement her G-50 on a.m. The BAYLARC had its Annual Halloween Party with a fine turnout. EC W6JWF reports the NET was very successful. K6RCR, in Santa Rosa, now has ORS and OES appointments. W6GUU is the new call assigned to the Eureka Radio Club. The new Petaluma Radio Club now boasts a membership of 25 and 5 new AREC members. The Santa Rosa 6-Meter Net meets Mon. on 50.25 at 8 p.m. and the AREC Net meets Tue. at 8 p.m. on 145.35 Mc. W6BYS has been appointed Asst. Coordinator for the San Francisco area for Navy MARS. He has daily skeds at 0100Z on 21.440 Mc. W6YKS is converting commercial gear for c.d. use. The Sonoma County amateurs assisted the Cotati Police on Halloween on 2 meters. W46-FLX served as NCS. W6MTJ worked 27 states, 3 countries, No. and So. America during the RTTY SS Contest. I urge all of you to send in your net affiliations so we can bring the listing up to date for the new year. Your cooperation will be greatly appreciated. We want more representation in the northern part of the state. Drop a card if you are interested in ORS, OPS, OES or OES appointments. K6NCG has started the Pacific Islands Net on 14.340 kc. Sat. at 1800 PST or Sun. at 0200Z. The RACES program is being checked in to by W6JXK. Traffic: K6TJWJ 160, W6MTJ 104, K6NCG 44, W6UDL 40, W6PZE 29, W6RIP 16, W6YKS 14, W46-IVM 8, W46QXV 3.

SAN JOAQUIN VALLEY—SCM, Ralph Sarovan, W6JPU—Happy New Year, everybody! Let's all turn over a new leaf and send in those reports and news. K6ACO is an OO. W46VPN got his CP-35. The Tulare County Net is operating on 145.62-Mc. f.m. and hopes to have one station in each city in Tulare county. W6RRN is on 6-meter s.s.b. K6IWS is being heard on 6. K6GZN is having a ball on 40-meter c.w. W6PSQ has a Tri-band Swan and is mobile on 40-80. W6PPO got his quad up and is on 20-meter s.s.b. W6FXV's new QTH is half a block from K6UDX. K6UDX has a 6-meter beam up 51 ft. W6BJI slipped and fell while putting up a rotator for his beam. W6MVU is on 2-meter f.m. mobile. W6NCG has moved back to Fresno from Bakersfield. W6JNY has a 75A-4 and an HT-32 exciter. K6APE has a Cascade converter into a 348Q on 2 meters and is running 90 watts to a 5804. K6CKL, K6ACR and K6APE are experimenting with APX-6 on 1215 Mc. The MTN Net reports for Sept.: 30 sessions, 111 QTC, 1431 QNT, 186 QSO, 21 QST, 43 QSP. For Oct.: 31 sessions, 218 QTC, 1481 QNT, 203 QSO, 24 QST, 53 QSP. The MTN Net is operated in the interest of PICON. W6ADB reports a traffic count of 161. The Fresno Amateur Radio Club holds code and theory classes every Wed. night at the San Joaquin Memorial High School. The FARC meets the 2nd Fri. of each month on the 10th floor of the PG&E Bldg. Traffic: W46ESH 293, W6ADB 161, W46VFN 67, W6ARE 32, K6AXV 11.

ROANOKE DIVISION

NORTH CAROLINA—SCM, Barnett S. Dodd, K4-QFV/W4YZH—Asst. SCM: Robert B. Corns, W4FDV. SEC: W4MFK, RM: W4FJM, PAM: K4ODX, V.H.F. PAM: K4MHS. According to the many reports received, the National SET was a success in the N.C. section. The SEC and myself wish to thank the fellows for sending in their reports. All evaluations were welcome, both brickbats and bouquets. The SEC has plans for one and possibly two section SETs in the coming months so that we might make a better showing in the National SET next year. W4VSI is building a very active AREC group along the prescribed lines. According to W4EVN, the Robeson County Two-Meter Net soon will be activated with nine fixed stations. W4-ANH has added a Twoer to his station equipment. K4MPE has been snagging some rare ones on 20 lately; his DXCC now stands at 193/180 with 75 watts or less. W4EIP and XYI, W4EJQ visited K4POA and K4PQL in Virginia, and K3QFG, in D.C. W4AETS and W4-ANH are planning to utilize 2 meters for hooking (Continued on page 136)

BETTER THAN EVER FOR '64!

Clegg's GREAT NEW

INTERCEPTOR

B



HERE'S THE ULTIMATE RECEIVER FOR THE SERIOUS VHF OPERATOR WHO WANTS TOP PERFORMANCE ON AM, CW, OR SSB

Now the top favorite of VHF Amateurs everywhere, Clegg's INTERCEPTOR receiver, in 1964 offers even more spectacular performance.

The new "INTERCEPTOR B", now available at your dealers, is a dual conversion 50-54 mc receiver with a self-contained crystal controlled converter for 144-148 mc reception. A switchable crystal lattice filter permits extremely sharp selectivity for SSB and CW as well as providing 8 KC of bandpass for strong local signals and net operation. Both diode and product detection are provided. Automatic and variable threshold noise limiters function respectively for AM and SSB/CW reception. A new electrical band spread control provides ± 1 KC to the receiver's main tuning dial for ease in tuning SSB and CW signals.

Converter input provides for 220-432 mc and up, as well as for excellent general coverage of the lower frequency bands using Clegg's new ALLBANDER converter/speaker combination (described to the right).

Space will not permit a complete description of this fine new receiver, but we'd like to suggest that you see one at your dealers or write to the factory for complete data

NOW ADD SUPERB GENERAL COVERAGE

3 THROUGH 30 MC
TO YOUR INTERCEPTOR RECEIVER
(Either B or Earlier Model)

The new Clegg ALLBANDER converter/speaker combination, attractively packaged in a matching cabinet, now extends the tuning range of any INTERCEPTOR receiver to completely cover all frequencies (with the exception 22-27 MC) between 3 and 31 megacycles.

Frequency range and preselector controls provide easy selection and matching of the desired tuning range while the INTERCEPTOR contributes superb selectivity, sensitivity and stability. After adjustment to the desired frequency segment all tuning is accomplished with the INTERCEPTOR's main tuning dial.

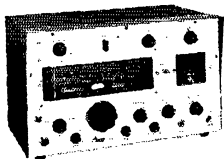
With the ALLBANDER your INTERCEPTOR will not only receive all ham bands between 3-30 MC but also intermediate frequencies where many desirable signals (WWW, Citizens Band, foreign broadcast, etc.) are found.

Operating power is supplied by the INTERCEPTOR

Clegg ALLBANDER/Speaker—
Amateur Net\$129.95

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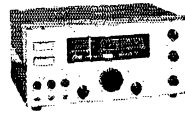
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ZEUS 6 & 2 meter transmitter 185 watts AM & CW . . . \$695.00 amateur net



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99'er six meter 8 watt transceiver . . . \$159.95 amateur net

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TWO CATEGORIES TO CHOOSE FROM

Standard Duty Guyed in Heights of 37 - 54 - 88 - 105 and 122 feet

Heavy Duty Self Supporting and Guyed in Heights of 37 - 54 feet (SS) 71 - 88 feet (guyed)

ROHN has these 6 IMPORTANT POINTS:

Ease of Operation—roller guides between sections assure easy, safe, friction-free raising and lowering. **Strength**—welded tubular steel sections overlap 3 feet at maximum height for extra sturdiness and strength. **Unique ROHN raising procedure raises all sections together**—uniformly with an equal section overlap at all heights! **Versatility**—designed to support the largest antennae with complete safety and assurance at any height desired! **Simple Installation**—install it yourself—use either flat base or special tilting base (illustrated above) depending on your needs. **Rated and Tested**—entire line engineered so you can get exactly the right size and properly rated tower for your antenna. The ROHN line of towers is complete. **Zinc Galvanized**—hot dipped galvanizing a standard—not an extra—with all ROHN towers! Prices start at less than \$100.

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"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers, and installers of complete communication tower systems."

THEN to NCSN/4RN. K4JBH is building a quad for 15 meters. Net traffic: CCEN 935, NCN 300, NCSN 116. Traffic: (Oct.) W4APDS 491, K4CDZ 295, WA4FJM 216, W4LWZ 181, W4EVN 144, W4EJP 134, WA4ANT 122, W4BAW 104, W4EQJ 79, K4YJY 74, W4FDY 58, W4AELS 35, W4COJ 34, K4MPE 18, K4QDQ 16, W4VSI 12, W4AJCS 8, K4FO 6, W4EYA 5. (Sept.) W4EJP 112, W4EQJ 68, W0PPA/4 32.

SOUTH CAROLINA—SCM, Lee F. Worthington, K4HDX—SEC: W4BCZ, RM: K4LND, S.S.B. PAM: K4IOQ. Nets: C.w., 0000Z and 0300Z, 3795 kc.; a.m., 0000Z, 3930 kc.; s.s.b., 0000Z, 3915 kc. New appointments: K4BMS as EC, K4GBH as EC, W4FRY as OBS, W4JA as OO Class 1, W4NTO as ORS and W4ALPV as ORS. The ARRT Section Meeting held in Rock Hill Oct. 12 was well attended by members of all 8 C. nets and interested parties. Highlight of the meeting was a most informative talk by W4MWH, Roanoke Division Director. The program centered on the incentive licensing program and was followed by a question and answer period. We were pleased to be hosts to the second annual meeting of the 4RN during this period and look forward to many more successful meetings. Congrats to a real working OO—W4NTO sent out 49 OO reports during October. All appointees wishing to keep their appointments are reminded to check their renewal dates. W4ALPV is sparking the c.w. net. Net traffic: C.w. 160; s.s.b. 141. Traffic: K4LND 203, W4AKC 193, W4ALPV 132, K4OCU 73, W4PED 53, W4NTO 37, W4JA 2.

VIRGINIA—SCM, Robert L. Follmar, W4QDY—Asst. SCM and SEC: H. J. Hopkins, W4SHJ, RM: K4MXP, W4ZAU, W4SHJ, W4QDY. Area 4 did an outstanding job under the able leadership of W4RHC together with W4TE, W4XND, W4PAY, K4BAV, W4HFH, K4YCG and others in the SET. In the Tidewater area W4BCP and his XYL, W4ABVE did a nice job. 4RN Mgr. W4SHJ reported that this group handled 574 messages (SET). W4ZAU was in competition with an arcing power transformer across the street which made a sound like lightning about every 5 seconds. The VSBN is coming right along with W4JMA steering it on a tight course. K4PUD, W4GVQ, K4EUS and K4MIF, all OESS, sent in nice reports. Incidentally, K4MIF reported on the 50- and 144-Mc. operations (SET) naming about 15 stations and traffic about 50. W4FZG received his amateur Extra Class license. W4DVT made the BPL for the first time. K4PNY received a plaque from ISS Hermitage. W4QDY is relocating the shack. W4EUL is NCSNG 3 nets. W4ZM attended the QCVW annual dinner in N.Y.C. W4DLA is just about the busiest trafficker you know. W4NVX got back his Advanced Class license by submitting proof of having held same before. VFN Mgr. W44FCS has been in the hospital. W4PTR is awaiting the renewal of his ticket. Have you checked your license date? The RVARC is sponsoring amateur activity in our "rare" counties. W4JUI received WRONE and Florida Awards. K4JQO is in a new QTH. K4PQL, K4MYO, K4IVT, W4UJ, W4NLC, K4SDS, K4YNI, W4ZAU and K4WVT have organized a group to sponsor Field Day-type operation in rare counties of the state. Those who wish to receive notification of the scheduled operations should write to Earl R. Savage, K4SDS, 113-A Apple Tree Road, Charlottesville, Va. Initial operations will start in Jan. 1964. QSLs should be sent to K4MYO, and no cards will be answered unless a self-addressed, stamped envelope is included with the request. Traffic: W4DLA 669, K4FOA 588, W4DVT 534, K4PNY 310, W4BHA 261, W44FL 158, K4IVT 155, W44FCS 136, K4MXP 129, W4PTR 124, K4PQL 109, W4SHJ 107, K4WVT 101, K4FSS 87, W4MXU 73, W4ZAU 62, W4TE 60, W4QDY 55, W4HFH 47, W4BCP 45, W4JMA 42, W4LRN 42, W4ZAU 38, W4GVQ 34, K4BAV 22, K4SDS 30, W4ABVE 24, W4JUI 17, W4NVX 15, W4OWV 15, W4JXD 11, W4NLC 11, W4KX 10, K4YZT 10, W4MK 6, W4WBC 6.

WEST VIRGINIA—SCM, Donald B. Morris, W8JM—SEC: W8SSA, PAM: K8EPI, West Virginia nets: C.w., 3570 kc.; phone 3890 kc.; s.s.b., 3903 kc.; FON, 3905 kc. The Kanawha County SET was quite successful with EC W8IRN directing. W8CRW reports 7 sessions of the S.S.B. Net with 86 reporting stations. W8VMP and K8CSG placed high in the recent FMT. W8KRK is a new General at Weirton. W8CKN is quite active in OBS work. W8CKX enjoys traffic work and would like to see more traffic on 3570 kc. The Grafton Radio Club has an excellent hilltop club shack and promotes v.h.f. work with the club call of W8SP. The State Wide Net on 29.3 Mc. is growing, with many stations active. W8MIS and K8HUX divide operating time, with only 50 feet separating their stations. W8QG is active on 10 meters after a long absence. W8GQE handles traffic for servicemen and receives good publicity for amateur radio. The Kanawha, Quepon, and East River Clubs publish excellent club bulletins. Traffic: W8DGE 263, W8CKN 76, K8EPI 42, W8CKX 22, K8CNB 7.

(Continued on page 138)

INTRODUCING THE NEW SWAN-TCU TRANSMITTER CONTROL UNIT COMPANION FOR YOUR SW-240



EXTERNAL VFO—PROVIDES FOR SEPARATE TRANSMIT-RECEIVE FREQUENCY CONTROL.

- Complete coverage of 20, 40, 75, and 80 meters.
- 100 kc Calibrator. • 15 mc Reception of WWV
- VOX. Voice Controlled Operation, including Anti-trip.
- Built-in Speaker. • Phone Jack.
- Plugs into ALL SW-240 Transceivers. (Installation Kit included.)
- Operates directly from Transceiver supply. No additional power supply is required. Those who now own an SW-240 and AC supply need to buy only the Swan-TCU.
- The New SW-117B AC supply may be installed inside the TCU cabinet if desired, thus making a complete home station in two matching units.
- SW-240 Transceiver may still be used in mobile operation by simply disconnecting the TCU, and inserting a jumper plug.



complete with connectors and installation kit for use with all SW-240s.

\$115

THE FABULOUS SW-240 TRANSCEIVER



240 watts PEP input. High frequency crystal lattice filter. Precision tuning mechanism. Exceptional frequency stability. Receiver sensitivity better than one microvolt.

Automatic gain control. Break-in CW operation.

14,000-14,350 kc

7,000- 7,300 kc

3,650- 4,000 kc*

*Kit for full 80 meter coverage available.

\$320

SWAN ACCESSORIES

MOBILE MOUNTING KIT

Locking type, including speaker switch, with front-mounted mike jack. **\$19.50**

SIDEBAND SELECTOR KIT

Provides both opposite sideband and AM receive position. **\$18**

SW-117AC Power Supply With Matching Cabinet.

With 5x7 speaker and phone jack. **\$95**

SW-12DC Power Supply for mobile operation.

Has pre-wired cables and installation hardware. **\$115**

NOW A NEW SWAN AC POWER SUPPLY—THE SW-117B
Designed to fit inside the Swan TCU cabinet or may be used separately to power the SW-240.

Includes top and bottom covers and rubber feet. **\$75**



SWAN
ELECTRONICS CORP.
Oceanside, California



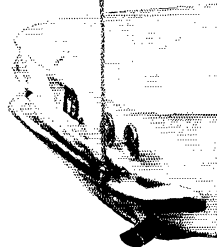
BUMPER MOUNT PROBLEMS SOLVED!

New Band-spanner H-215 mount . . . fits any contour bumper . . . of all sizes and widths . . . on cars having very small clearance between bumper and car body. Installed in 5 minutes using only screwdriver.

See upper picture for details. Note heavy duty pedestal of die cast, chrome plated bronze which is held down securely by strong stainless steel band with locking worm-drive take-up.

Sturdy stainless steel bracket locks securely to pedestal, is adjustable to any angle . . . has insulated, plated brass insert with standard 3/8-24 thread.

Positive! Enduring! Permanent! Rustproof!



H-215 mounted on curved portion of small size bumper securely supports "Top sider" antenna.

Please send information on H-215 mount and other Band-spanner products.



317 Roebing Road,
South San Francisco,
California.

NAME _____
NUMBER STREET _____
CITY _____ ZONE STATE _____

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, Donald Ray Crompton, K0-TTB—SEC: W0SIN. It seems that one of our Colorado lians lives a very proper life, namely K0C0L. So far this year his convention winnings include a KWM-2 and a big share of the price on a Hunter Bandit 2000 linear. The Western Slope Hamfest was a big success with the able help of K0WVL, K0WJF and many others. The SCM was in the middle of moving to Alamosa, Colo., and had to guess it, but got all the details via c.w. from K0WJF. The HNN will miss WA0BDM; he up and joined the Navy. That is a slick way to get out of net duty. W0SIN reports that Greeley, Colorado Springs, Pueblo and Montrose had simulated emergency tests conducted by the AREC. Amateur radio could very well save your home town some day, so give a little time and effort to this worthy cause. K0FDB, Flabbergasted Dick Hoppe, is doing a great job with TWN. We hate to miss anyone so will just say that the boys on the Columbine, HNN and WX Nets are doing an FB job. Net traffic: TWX 248, HNN 156, WX Net 29. Traffic: K0ZSQ 347, K0-DCW 94, WOENA 48, KOQGO 20, W0CBI 13.

UTAH—SCM, Thomas H. Miller, W7QWH—Asst. SCM: John H. Sampson, W7OCX. SEC: K7BLR, K7-PRJ has accepted appointment as EC for Utah County. The Utah County AREC group had a very successful SET. Participating stations were K7s LUM, SAB, GOF, EYE, OXR, DJW, COT, WOA and PRJ. K7AUM has returned to Utah and expects to start in electrical engineering at BYU. Band conditions on BUN have improved along with participation. BRAT awards went to W7OCX, W7OWU, K7AIPQ, W7VJ, K7IFV, K7QGW, W7VTD, K7RGY and K7DJM for October. K7TOE has three Novice classes and one General class going for those interested in getting their tickets. W7LOE worked two new countries and did excellent work along with W7OCX during the SET. W7VJ and W7LOE worked PY280 and PY2CQ. Both husband-and-wife teams exchanged QSL cards. Traffic: W7OCX 97, W7LOE 78, W7VJ 33, W7QWH 1.

NEW MEXICO—SCM, Carl W. Franz, W5ZHN—SEC: K5QIN, V.H.F. PAM: W5FPB. 10-Meter PAM: W5WZK. W5ZHN moved to a new QTH, 1100 Wade Circle N.E., Albuquerque, phone 299-7773. The Albuquerque AREC/RACES group had a very nice SET exercise. W5HWP is the SWAN agent for the Albuquerque area and has a number of the boys going mobile s.s.b. The Yale ARC is running classes in traffic net procedure. Three have been awarded Club Awards for proficiency in c.w. reception; the highest speed was 25 w.p.m. W5FQP won the 25-w.p.m. certificate with four and one-half minutes of perfect copy. W5JJI reports 7 new AREC members for the Santa Fe area. The Red Cross of Albuquerque was very pleased with the AREC support in the recent SET. Mutual aid agreements have been signed between AREC/RACES and Red Cross under new civil defense plans for Bernalillo County. W5ZHN is now preparing his records for transfer to a new SCM. Since my term will be over by the time this is in print, I would like to thank all you have given me such loyal support and ask that you support the new SCM and help him to make this section an active one. As I have often pointed out, no organization is any better than its membership and our state deserves a good and active representation. How good it is, is up to you. My sincere and best wishes to each and every one of you. Traffic: K5ETT 102, W5UBW 43.

WYOMING—SCM, Lial D. Branson, W7AIIU—The Pony Express Net meets Sun. at 0830 MST on 3920 kc. The YO Net is a c.w. net on Mon., Wed. and Fri. at 1830 MST on 3610 kc. The TWN Net is a daily net at 2000 MST on 3570 kc. W7AEC and XYL enjoyed a vacation trip to Salt Lake City and Ogden. W7BCL, an old-timer, is coming back with a new 100-watt phone rig. W7VTB, W7LUV, W7UFB, W7AIZW, W7PSO and W6LBJ7 have an active net on the 144-Mc. band. W7BHH has been having mike trouble but is OK now. W7PVN has a new home about finished at the ranch. K7YWA, Margaret, is a new call on top of Big Horn Mountains. K7WRS, Ruth, is a new call in Casper. Traffic: W7BHE 54, W7AIIU 25, K7ITH 12, W7HIW 10, K7RSI 10, W7IHH 8, K7AHO 6, K7TAQ 4, W7YWW 4, K7IAW 2, K7OWT 2.

SOUTHEASTERN DIVISION

ALABAMA—SCM, William S. Crafts, K4KJD—SEC: W4NML, RM: W4USM, PAMs: K4BTO, K4TNS, K4-WIUV. Oct. reports of all reporting section nets (all times GMT):

Net	Freq.	Time	Days	Sex- stats	Ave. Tfc.	Attend- ance
AENB	3575	0100	Daily	30	6	7.3
AEND	3725	2200	Mon.-Sat.	22	1.2	6.5

(Continued on page 140)



The New Standard of Performance

The SS-1R sets a new standard of performance for amateur band communication receivers. A completely new front end design¹ provides superb freedom from cross modulation and overload, while the low noise balanced mixers deliver superior sensitivity — with *no r.f. stage*. Steep-skirted crystal bandpass filters and newly developed high-Q IF circuits provide optimum selectivity with greater than 80 db ultimate attenuation. Extreme linearity, double loop AGC and front end freedom from cross modulation make this selectivity as effective as though it were *at the antenna terminals*. Frequency precision and stability exceed that of most frequency meters; frequency is read directly on a *digital display*.

There are many new operating conveniences not found in other amateur equipment. The unique SS-1R design, plus fixed tuned WWV positions at 10.0 and 15.0 MC (and an auxiliary 5.0 to 5.5 MC band), permits autocalibration of the amateur bands — *with no cursor lines to twiddle*. The manual tuning rate is slow enough for easy and exact sideband tuning — 10 kc. per knob revolution — while pushbutton motor tuning gives fast traverse. An optional noise silencer accessory with spectacular performance² is available, as will be a Video Bands scanner. The SS-1R may be operated in transceiver mode with the SS-1T transmitter.

¹"A New Approach to Receiver Front-End Design", W. K. Squires, W2PUL, QST, Sept. 1963. ²"A Pre-I.F. Noise Silencer", *ibid.*, Oct. 1963.

SPECIFICATION PROFILE

- **Frequency Coverage:** 80 through 10 M (eight 500 kc. segments). Fixed tuned WWV at 10.0 and 15.0 MC; 5.0-5.5 MC auxiliary (WWV 5.0 MC). Two general coverage 500 kc segments
- **Selectivity:** 5 kc./2.5 kc./0.35 kc.
- **Stability:** Less than 500 cps warmup drift (typically in less than 5 min.); less than 100 cps thereafter including low to high line variation
- **Sensitivity:** ½ µV, or better, for 10 db S/N on 10 M with 5 kc. bandwidth
- **I.F. and Image Rejection:** Greater than 60 db
- **Cross Modulation:** Example: Receiving a 10 µV signal with 2.5 kc. selectivity, an unwanted 0.1 volt signal 20 kc. away produces negligible cross modulation
- **Internal Spurious:** None at stated sensitivity
- **AGC:** Attack — 1 ms., Slow release — 1.0 sec., Fast release — 0.1 sec.
- **ANL:** I.F. type; operates on AM, SSB, and CW
- **Size:** 7¾" H x 16¼" W x 13" D, 25 lb.

Squires-Sanders, Inc.

475 WATCHUNG AVENUE, WATCHUNG, N.J. • 755-0222

BARRY ELECTRONICS

AMECO 1.8 to 54 Mcs Nuvistor Preamp (wired) \$24.95.

ZEUUS 1 KW Gas Generator, 115 VAC/60 CPS. \$148.13.
1 1/4 KW ZEUUS. \$190.88; 3 KW ZEUUS (115 or 230/60 CPS) \$431.25.

600 PIV 750 Ma. Silicon Epoxy Rectifier. 36¢; Surge Limit Capacitor for Silicon Circuits .001 Mfd. 10¢.
HAMMARLUND 320/320 Mfd Dual Nmtg KV capacitor. \$4.25.

CERAMIC ANTENNA INSULATOR SALE: 4 1/2" x 3/8", 10¢; 7 1/2" x 1/2", 15¢; 6 1/8" x 3/4", 20¢.

JOHNSON MINIATURE BUTTERFLY CAPACITOR: 4.3 to 26 Mmfd. per section. (With 1/4" shaft) 95¢

JOHNSON SINGLE SECTION MINIATURE VARIABLE CAPACITOR: 3.5 to 27 Mmfd. With 1/4" shaft. 75¢.

CAPACITOR SALE. .01 Mfd/5 KV \$1.00; 10 Mfd/1500 VDC G.E. Oil. \$2.50; 2 Mfd/7500 WVDC G.E. oil. \$13.50; Pair of brackets for 2 Mfd 7500 VDC \$1.00; C.D. .5 Mfd @ 600 VDC 10¢; 8 Mfd./1500 VDC G.E. Oil. \$1.95; 4 Mfd/2KV Oil \$2.95; 3000 Mfd/150 VDC \$2.95; 1500 Mfd/270 VDC Surge \$2.95; 3800 Mfd/108 VDC \$2.50; 1700 Mfd/180 VDC \$2.25; 2000 Mfd/75 VDC \$1.75; 1250 Mfd/175 VDC \$1.00; 8000 Mfd/55 VDC \$2.95.

FOLLOWING ITEMS IN FACTORY SEALED CARTONS will be shipped prepaid continental USA if money order or certified check accompanies order: HQ-180AC Recvr \$449.00; HQ-110AC Recvr @ \$259.00; HQ-170AC Recvr \$379.00; HX-50 SSB Nmtr with ZRZ factory installed \$483.90; National NCX-400 general coverage SSB Recvr \$895.00; National NCX-3 Tri-Band SSB Transceiver \$369.00; NXC-A AC Pwr Supply for NCX-3 \$110.00; NCX-D12 V.D.C. Pwr Supply for NCX-3 \$119.95.

LARGEST DIVERSIFIED TUBE STOCK IN THE USA! Over 4,000 types of Unused, First-Quality, Only Name Brands (G.E. RCA, Westinghouse, Eimac, etc.) Write or call for immediate quotations. Get all your tube needs at Barry... here are some examples: 4-65A @ \$10.00; 4E27 @ \$8.75; 811A @ \$3.95; 816 @ \$2.50; 866A @ \$1.65; 1616 @ \$1.00; 6146 @ \$3.25; 4-1000A \$95.00; 3R28 @ \$2.50; 812A @ \$3.95; 830B @ \$1.00; 872A @ \$4.95; 6360 @ \$3.90; 4CX300A @ \$42.00; 4CX1000A @ \$120.00; 5847/417A @ \$5.90; 5847/404A @ \$3.90; 5894 @ \$18.90.

Full line of brand new TV, Radio, Hi-Fi types... for example: 1B3 @ \$1.00; 3C86 @ 75¢; 4RC5 @ 75¢; 5B07 @ \$1.40; 5146R @ 75¢; 6AU6 @ 70¢; 6AN4 @ 90¢; 6BA6 @ 70¢; 6SN7 @ 90¢; 12A17 @ 85¢; 12A17 @ \$1.05; 12AX7 @ 90¢; 12DQ6 @ \$1.45; 50C5 @ 75¢; 5654 @ \$1.20; 5881 @ \$1.80, etc.

MASTER MOBILE ADJUSTABLE LOADING COIL. 1/16" overall size. (Reg. \$14.95) Sale - \$6.95.

ARD-2 VHF/UHF Receiver-Freq. Meter. 80 to 3000 Mcs. Complete. Unused with book. \$60.00.

2 AMP. SILICON RECTIFIER: 2 Amps/700 PIV. Mounts with 10-32" screw. 60¢.

G-V THERMAL RELAY: 120 V. 60 Second delay. Normally open S.P.S.T. contacts. \$1.50.

110 OR 220 VAC FILAMENT XFMR: Sec: (1) 6.3 VCT @ 11.5 Amps., Sec. (2) 2.5 V.C.T. @ 10 Amps. \$5.95.

PRICE 10 KW MYCALEX ANTENNA RELAY: D.P.D.T. 600 Ohms Impedance. Operates from 230 VAC Gvt. cost approx. \$330.00. Sale: \$25.00. (Brand new in orig. carton with book.)

DRAKE 2B RECEIVER: SSB/CW/AM \$279.95; Drake 2B-O Speaker/O Multiplier \$39.95.

H5 VAC BLOWER ASSEMBLY (Torrington). With squirrel fan R/E. \$6.95.

COME IN AND BROWSE, MONDAY TO FRIDAY - Thousands of items that we cannot list in an ad. MON. TO FRI. 9 to 6. SATURDAY'S 10 to 2 P.M. (Free parking on Street Sat.) Mon. to Fri. parking lot 501 Broadway. WE BUY AND SELL AND SWAP AS WELL. LET'S HEAR FROM YOU WRITE FOR 1964 GREEN SHEET CATALOG.

BARRY ELECTRONICS DEPT Q-1
512 BROADWAY, NEW YORK, N. Y. 10012
WALKER 5-7000 (AREA CODE 212)

Enclosed is money order or check and my order. Prices FOB, NYC. Shipments over 20 lbs. will be shipped collect for shipping charges. Less than 20 lbs. include sufficient postage. Any overage will be refunded. Fragile tubes shipped via Railway Express.

Send copy of 1964 "Green Sheet" Catalog.
 Send information.
 I have available for trade-in the following.

Name..... Title.....
Company.....
Address.....
City..... State.....

AENM	3965	0030	Daily	32	4	33.2
AENO	50.55	1115	Al.W.F.	13	1.9	25.5
AENP	3955	1230	Mon.-Sat.	25	2.5	16
AENP	3955	1000	Daily	35	6.77	28.1
AENT	3970	2230	Daily	32	2.88	12.81

New net managers are K4DJR for AENO and K4NSU for AENM. Officers of the new Tuscaloosa club are WA4EXY, pres.; WA4EIX, vice-pres.; WA4HSK, secy-treas. WA4AVM made WA8 in the Oct. CD Party. New officers of the Springville club are WAHSU, pres.; WA4-AZJ, vice-pres.; WA4BDW, secy.; K4NSD, treas.; K4NUW, trustee. WHCP spoke on Antennas at the Montgomery club Oct. 31. K4WOP and K4BSK received RN5 certificates. New equipment: WA4HXC-linear, WA4HGN-Swan 175, W4YRM-Globe Scout Deluxe and HQ-110, WA4AIRQ-T-150 and KT-320, WA4YFN-HE45B, K4KJD, WA4MML and K4YUD made good measurements in the Sept. FMT. K4DSO made BPL Traffic: (Oct.) K4DSO 527, WA4AVM 437, WA4-EXA 368, WA4ML 280, K4WOP 188, K4WHW 163, W4USM 114, K4BSK 85, K4KJD 76, WA4EEC 58, K4FMD 56, K4NHW 41, K4GXS 37, K41KR 37, K4PBY 32, K4FZQ 27, WA4HXC 25, K4AOZ 23, WA4EDF 23, K4RIL 17, WA4HGN 15, W4YRM 14, K4RTO 10, W4DFE 10, WA4KZT 10, W4TSY 10, WA4FHD 7, K4-HIM 7, W4KQC-W4YSG 7, WA4MRQ 6, W4PAC 6, W4ZVI 5, K4GDX 4, K4WSH 4, W4CTU 2, W4ACVI 2, W4DGH 2, WA4FWP 2, W4YFN 2, K4FTC 1, WA4-IHI 1, K4WQO 1. (Sept.) WA4HCW 72, W4FOH 12, WA4HGN 5.

EASTERN FLORIDA-SCM, George E. Cushing, W4QVJ-SEC; WHYT, W4EXM still is staked out in Washington, D.C. Officers of the U. of Florida, W4DFU Gator Amateur Radio Club; K4MZR, pres.; K4ODS, vice-pres.; WA4HWI, secy.-treas.; K4WXT, act. mgr. W4AGM is back in Punta Gorda for the winter signing /4. The ATC center at Hilliard, north of Jax, now has a 2-meter transceiver tied into the Nassau County C.D. Net. K6SXX/4 passed the Extra Class exam, scored high in the CD Party and racked up 84 countries, mostly on 40, before QSYing to Kansas. The Daytona Beach Club has started theory classes. The Jax Club continues its theory and code classes. K4PMK has moved to Winter Park from St. Pete. The St. Pete SPARC Net now has been reactivated. Sun. at 8 p.m. K6CTV/4 now is WA4NGO in Largo. Vigorous SET activity throughout State resulted in several BPLs and high traffic totals. The QPN had the biggest month ever. The Tami-am ARC officers: K4RYM, pres.; WA4FRJ, vice-pres.; K4DVL, treas.; K4YHU, secy.; WA4FVF, act. The club now is an affiliated ARRL club. W4EHL and W4LVV tied at only 4.5 parts per million in the recent Frequency Measuring Test. The Tropical Hamboree and State ARRL Convention will be held in Miami in mid-January. Duie Club members have tickets. Traffic: W4KIS 815, WA4BMC 762, WA4JHJ 620, W4TUB 559, W4ABGW 505, W4YU 437, W4MIN 386, WA4JYB 381, W4VWL 370, K4KDN 350, K4YSN 287, WA4CTP 239, K4EIV 230, W4SGH 217, K4BY7 206, W4AKB 197, K4HYT 189, W4FRS 165, K6SXX/4 165, K4JFT 154, W4EHW 134, W4FGE 108, W4SDR 89, K4FQP 66, W4GJ 65, K4QAP 65, W4FP 50, WA4TNI 47, W4OCX 40, W4ZJZ 39, W4SMK 30, K4DXN 26, WA4NBE 25, W4EAT 21, K4MTP 16, W4LMT 8, W4YXP 8, W4AGM/4 7, K4OSQ 6, W4DFU 5, WA4FVD 2.

WESTERN FLORIDA-SCM, Frank M. Butler, Jr., W4RKH-SEC; W4MLE, PAM; W4WEB, V.H.F. PAM; W4ZGS, RM; W4RVE, Madison; W4PBO acquired a Globe King 500A, Monticello; W5IBD/4, Jefferson Co., EC got back his old call, W4WSZ, Marianna; WA4DED did an outstanding job of public relations during the Oct. SET. Panama City: K4VYF leads the section in traffic-handling. WA4JIM is now on s.s.b. WA4FIJ/EJF traded in the a.m. mobile rig for a Drake TR-3. WA4FIJ was reelected net mgr. for WFPN. WA4JFJ operated fulltime during the SET. New officers of the PCARC are W5GWA/4, pres.; W4ZJB, vice-pres.; WA4-NBT, secy.; WA4JFJ, treas.; WN4NTD, sgt. at arms. The club had a very successful games night, thanks to WA4NRP and K4AHV. The Tyndall AF Club held a hidden transmitter hunt, won by WA4MFC. K4PMO's work is cutting into his traffic handling. WA4MNT and WA4MMU are the proud parents of a new harmonic. Ft. Walton: W4BYE has taken over as net mgr. of QFN. He reports W4RN functioned very well during the recent storms, Pensacola: A ham station was maintained at the State Fair, thanks to K4QAC, K4LAN and others. W4EQR has resigned as editor of the V.H.F. Club's High-bander. At a recent PARC meeting W4-ETB tried hypnosis on W4VBU. WA4ECY has new Hallicrafters gear and beams on 40 through 6 meters. The Corry Club went all out in the SET. Traffic: (Oct.) K4FVY 755, WA4MLE 352, WA4FIJ 211, W4RVE 155, W4ZWD 140, W4RKH 95, K4SMB 89, WA4DED 82, K4QAC 28, WA4DCN 9. (Sept.) WA4EY 180, K4-QAC 20.

(Continued on page 142)

SBE

AGAIN!

with most for least

.... SB1-LA LINEAR AMPLIFIER

Exceptional ... in its compactness ... in its high power ... in its modest price ... new 1000 watt P.E.P. four-band amplifier (80-40-20-15). Small ... a size match for SB-33 transceiver and a companion unit to make up a pair without equal as a multi-band mobile combination. But SB1-LA will also work with any SSB transceiver ... can boost its output to a full KW in fixed or mobile service.

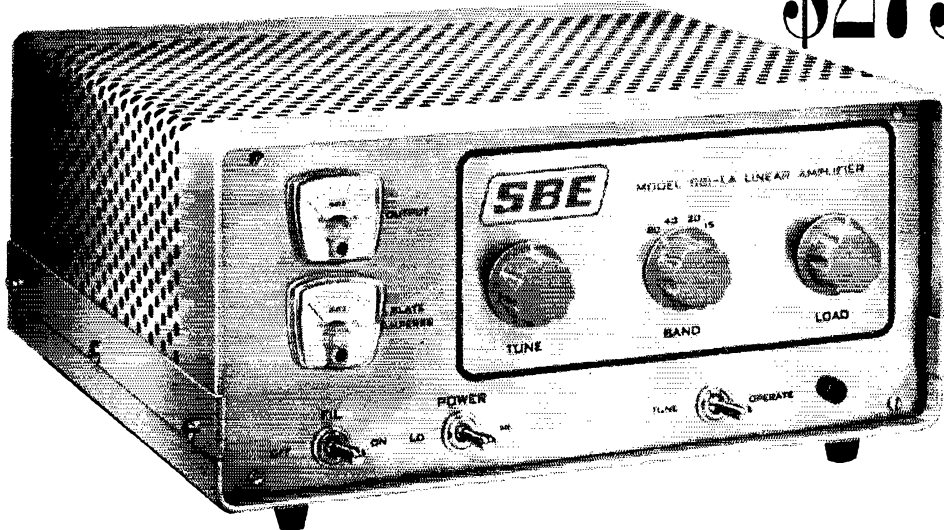
This new linear incorporates every desirable modern feature. Stable, with passive grid input, it offers a 50 ohm resistive load for SSB excitors. Operation is Class AB-1 for low distortion. Output is conventional pi network.

SB1-LA applies the desirable technique of low plate voltage (only 800 volts) and high plate current. This lower plate voltage is far easier on capacitors—diode rectifiers—transformers—insures safer operation under environmental extremes.

All-solid-state, 117V AC heavy-duty power supply is built in. (No rectifier tubes).

Tubes used are 6JE6's—six of them, parallel connected. These are standard, low cost types, available anywhere. (See specifications below for other features.)

\$279⁵⁰



Please send full information on SB1-LA Linear and SB-33 Transceiver.

NAME _____

NUMBER STREET _____

CITY _____ ZONE STATE _____

SBE SIDEBAND ENGINEERS

317 Roebling Rd. So. San Francisco, Calif.

An operation of Webster Manufacturing

Bands: 80-40-20-15 meter amateur bands.

Power rating: 1000 watts P.E.P. input. (750 watts 15 meters).

Drive requirements: Approx. 75 watts for full rated output.

Input impedance: 50 ohms resistive.

Output impedance: (antenna) 50 ohms, unbal. VSWR 1.5 or less.

Power supply: Built-in all solid-state, 117V AC.

Primary power requirements: 115V AC @ 12A max. at peak output.
(DC) Standby: 12.6V (nom) @ 7.5A. Peak: 12.6V @ 110A.

Tubes: Six, type 6JE6. (parallel connected).

Control circuits: Antenna switching relays (2) built in. Rear terminals for transceiver relay control.

Size-Weight: 5½"H, 11¾"W, 11¾"D. Weight 35 lbs. approx.

New

POSTPAID!

ALL BAND VERTICAL

WRL

WVG MARK II

New low cost vertical antenna which can be tuned to any amateur band 10-80 meters by simple adjustment of feed point on matching base inductor. Efficient radiator on 10, 15, 20, 40, 75 and 80 meters. Designed to be fed with 52 ohm coaxial cable.

Conveniently used when installed on a short 1-5/8" mast driven into the ground. Simple additional grounding wire completes the installation. Hoop top or tower installation. Single band operation ideal for installations of this type. Amazing efficiency for DX or local contacts. Installed in minutes and can be used as a portable antenna.

Mechanical Specifications:

Overall height - 18' Assembled (5' Knocked down)
Tubing diameter - 1 1/4" to 7/16"
Maximum Wind Unquenched Survival - 50 MPH.
Matching Inductor - Air Wound Coil 3 1/2" dia. Mounting bracket designed for 1-5/8" mast. Steel parts irritate treated to MILS Specs. Base insulator material - Fiberglass impregnated styrene.

Electrical Specifications:

Multi-band operation - 10-80 meters. Manual tap on matching inductor. Feed with 52-75 ohm line (unbalanced). Maximum power - 1000 watts AM or CW-2KW PEP. Omni-directional. Vertically Polarized.

WRL

WORLD RADIO LABORATORIES

3415 West Broadway
Council Bluffs, Iowa

Check enclosed. Ship one WVG MK. II @ \$15.95 Postpaid.

Name _____
Call _____
Address _____
City _____
State _____

WVG MARK II

\$15.95

GEORGIA—SCM, James A. Giglio, W4LG—SEC: W4YE, PAMs: W4FYH, K4PKK and W4RZL, RM: W4DDY. The GSN meets Mon. through Sun. on 3595 kc. at 1900 EST and 2200 EST.; the GCEN meets on 3995 kc. at 1800 EST Tue. and Thurs. 0800 EST on Sun., the Coosa Valley Emergency Net meets each Sun. at 1330 EST on 3950 kc.; the 4RDN operates on 7115 kc. at 10 A.M. daily; the Georgia Cracker Mobile Net meets each Sun. on 3995 kc. at 1330 EST. K4VQ reports good results on 50 Mc. with a quarter-wave base-loaded whip. K4OLN is working skeels on 20 meters with an FB RTTY signal. W4MV sported a red cap and plaid shirt at the Rome Hamfest. WA4FTM, in addition to traffic-handling, finds time to be a variable star observer. K1KSH/VK9 writes from Papua that he is waiting out a ticket. He reports making 160-meter c.w. records with WIBB from Guam and Marcus. Using a 170-ft. antenna he read the mail recently while a WA4 was working a K4 mobile—both in Atlanta. The most ingenious gadget we've seen lately is the push-button combination latch on the shack door at W4DOC, designed and installed by K4KPU. K4QOC is now 6-meter mobile—says there is less cross-polarization in a Studebaker—and we wonder. New appointments: W4KGP as EC Chatham County and K4NGI as EC Johnson County. Happy New Year to all Georgia Hams! Traffic: W4YE 373. K4WVY 173. K4BAT/4 110. K4MCL 82. K4FRM 40. WA4FTM 25. K4YRL 20. WA4GPA 8.

SOUTHWESTERN DIVISION

ARIZONA—SCM, Kenneth P. Cole, W7QZH—Asst. SCM: E. A. Marshall, Jr., K7AWL. SEC: K7N1Y. PAM: W7OIF. RMs: W7LND and W7FKK. The Copper State Net meets at 1930 MST Mon. through Fri. on 3880 kc.; the Grand Canyon Net Sun. at 0800 MST on 3880; the Tucson AREC Net Wed. at 1900 MST on 3880; the Cochise County AREC Net each Sun. at 1400 MST on 7260; the Tucson 2-Meter Net at 1000 MST on 145.35 Mc. K7VQI transmits TV signals on or about 432 Mc. Sat. and Sun. from 1100 to 1200 MST. Anyone receiving this pattern, please contact K7VQI, 2018 East Cooper Street, Tucson. A Tucson inventor's club is being organized. Interested amateurs contact K7YF at EA 5-5801. The Calhe family, K7SUU, RQP, SJN, ZFP and SUT is another all-amateur group. K7WIP is convalescing from surgery. The Huachuca Radio Club plans to reactivate its hamfest previously held at Garden Canyon, Ft. Huachuca. Check the Copper State Net for information. K7YF and WDN, father and son, dropped the "N." A Technical Assistance Committee, W7FXT, K7KCB and VKH, has been formed by the Scottsdale Radio Club. Amateurs in the Scottsdale-Phoenix area with equipment troubles should contact Ken WII 6-0372. K7KAV and KAV recently returned from their vacation. The Phoenix V.H.F. Radio Club, which meets the first Wed. of each month at the Valley Bank, 19th Street and McDowell Road, Phoenix, has purchased a 6-meter transceiver for use by any member who is hospitalized. Club officers—Old Pueblo Radio Club: K7HVP, pres.; VWJ, vice-pres.; VNS, acting editor; W7DRU, secy.-treas. Scottsdale Amateur Radio Club: K7QWR, pres.; UYG, vice-pres.; KAV, secy.; RJD, treas. K7AUW and his NYL, K7IYI, moved to Swardsville, Penna. AUW now is K3FJJ. W7YLR and SNI recently celebrated their golden wedding anniversary. Traffic: W7CAF 60, K7RUR 12, K7VQI 9.

SAN DIEGO—SCM, Don Stansifer, W6LRU—Asst. SCM: Thomas H. Wells, W6EWU. SEC: W6SK. RM: W6EOT. New officers of the Newport Amateur Radio Society are W6KNP, pres.; WA6VJV, vice-pres.; K6IME, treas. W6WYH, secy. The Nov. 8 meeting featured a talk on Crystals by WIBHE/6, W6HAW now has a five-element beam up 90 feet. W6NAT vacationed to Mt. Shasta. W6CCE toured Europe. Sorry to report the passing of W6SFE in Vista. Orange County EC W6VAA and the entire AREC gang up there did a bang-up job for the SET. W6QCN, WA6ZNX, WA6ZWR and WA6YME, of the CQ Club of San Diego, helped nine Boy Scouts earn the Participation Certificate given by the Scouts World Bureau. K6TET, 2-meter EC, reports a total of 547 points made during the SET with 38 hams participating. Division Director W6MLZ was guest at the Orange County Club meeting in October. Both K6EC and W6CDF did outstanding jobs in the September FMT. K6ENC, pres. of the San Diego DX Club, is the first area ham to make the ARRL DXCC Honor Roll. W6SK, our SEC, is working hard at his new job, and AREC plans and activities are picking up. Many section hams were heard during the Sweepstakes. The American Radio Club of El Cajon handled communications for the annual Mother Goose Parade, Seasons Greetings and all the best in 1964 to all the gang, and make a resolution to keep your reports and club bulletins coming in to your SCM.

(Continued on page 144)

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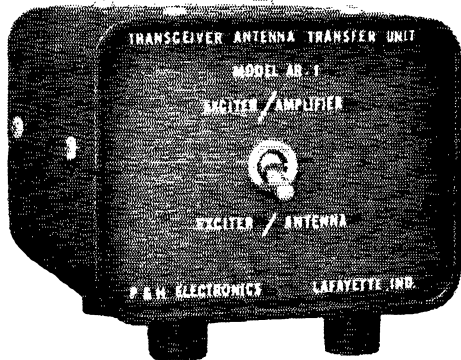
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Traffic: (Oct.) W6YDK 5574, K6BPI 4125, K4APK/6 553, WA6BRG 541, WA6UO 507, W6EOT 454, WA6ROF 338, K6TAE 93, W6DGM 52, WA6CDD 37, WA6ATB 6, K6GJM 2. (Sept.) WA6UO 56.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, L.L. Harbin, W5BNG—Asst. SCM: E. C. Pool, W5NFO, SEC: K5AEX, PAM: W5BOO, RM: W5LR, I had the pleasure of attending the birthday party for W5RV, Oct. 20. Loren celebrates his birthday by having a big feed and inviting everyone to come. This year it was a dual celebration, his XYL was celebrating the arrival of her ham ticket with the call W5IIBY. Her daughter and son-in-law immediately came up with the phonetics "We All 5 Heard Babe Yell" when her ticket arrived. WIICP received a nice welcome from the Dallas ARC Oct. 20, with more than 200 hams attending. WA5CMC is the new Wichita Falls County EC, W5H5OW and W5IIC are new hams in Wichita Falls. The Red River ARC is starting its third annual Novice and theory class. If interested, contact Chester Luddam, WA5CAIC. K5ETA received an ARRL certificate as high scorer in the North Texas section in the 1963 DX Contest. The Dallas ARC has club station on the air, W5FC. W5BOO has been appointed PAM because of the resignation of W5AYX. Jim has had plenty of experience and will appreciate your support. K5MUT has been appointed OBS. Food for thought: Some people blame their failure on hard luck and their success on their own good judgment. The person who has never made a mistake has never tried to do anything. Support the ARRL, it is your only representative. Traffic: W5DTA 478, W5BKII 198, WA5CMC 17, W5LR 5, K5ETA 2.

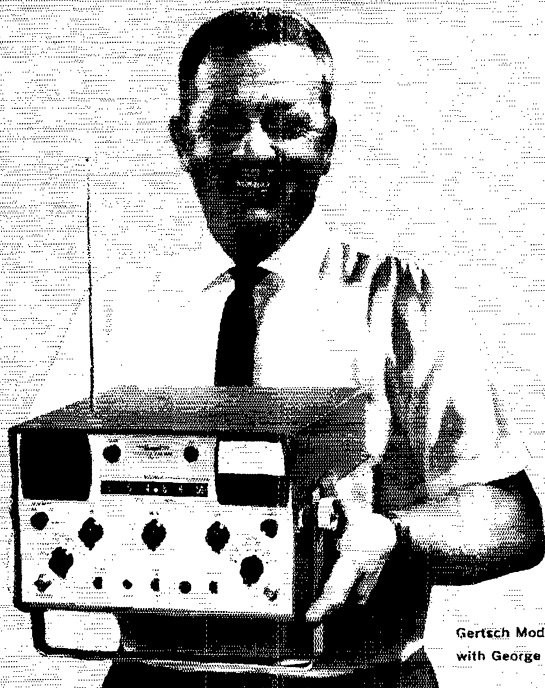
OKLAHOMA—SCM, Bill F. Lund, K5KTW—Asst. SCM: Cecil P. Andrews, W5MFX, SEC: K5DLP. We had the pleasure of having WIICP, of ARRL Hq., here in Tulsa to give us a very interesting talk on antennas and feedlines and discuss and answer questions on the new ARRL program. The meeting was attended by over 150 hams from all over Oklahoma. A poll was taken and more than 90 per cent were for the new program. I had a very pleasant meeting with the Aeronautical Center Amateur Radio Club in Oklahoma City. It is real encouraging to see and hear the type of programs this club has at each meeting; the technical talks and demonstrations are very educational. Nim, K5TEY has the Sooner Nooner Net going on 40 meters now; because of the long skip the check-ins have been light. The Ardmore Amateur Radio Club has become affiliated with ARRL, W5G8AI made a trip to Kansas City and dropped the "N" from his call. K5JZT has a new NCX-3 and demonstrated it to the Bartlesville Club. K5IBZ is a new OBS on c.w. and W5RTU, has been appointed Oklahoma County EC. W5JMQ resigned because of business interests and time. Thanks Bill for a job well done. W5FFW has been moved from Class II (O) to Class I. Harold has been doing an outstanding job in helping to police the bands. Traffic: K5DLP 371, W5PPE 364, K5IBZ 293, K5TEY 246, K5CAY 64, K5KTW 58, W5MFX 53, W5CCK 45, K5MHZ 29, W5EUL 20, W5PML 12, W5EHC 10, K5JOA 9, WA5FLV 5, W5PNG 4, K5MTC 3.

CANADIAN DIVISION

MARITIME—SCM, D. E. Weeks, VE1WB—Asst. SCMs: A. E. W. Street, VE1EK, and H. C. Hillyard, VO1CZ. Boy Scout Headquarters wishes to extend a sincere "Thank you" to the many amateurs who participated in the recent Jamboree-On-The-Air. Newly-elected officers include—Halifax ARC: VE1OM, pres.; VE1GC and VE1AJE, vice-pres.; VE1OB, treas.; VE1AFN, secy. Loyalist City ARC: VE1AJI, pres.; VE1XN, vice-pres.; VE1AN, treas.; Ken Butler, secy. Goose Bay ARC: VO2UA, pres.; VO2DP, vice-pres.; VO2BA, secy.-treas.; K5DYR/VO2, pub.; VO2NA, awards. Congratulations to VE1GB on passing his A3 exam. The Premier Smallwood Field Day trophy has been awarded to the Harmon Amateur Club, K3ICK/VO was the winner in a recent Harmon AFB hidden transmitter hunt. VO1AM has transferred to Toronto, VE1PP is on 6 meters from Windsor. VE1AKC (Vince) has transferred back to Sydney. VE1AHD is on course in Toronto with IBM. VO2CA has a 32-V and 75-A setup. Don't forget the new c.w. net (SKN) 3660 kc. Sun. at 1300 GMT. Nets have a purpose! Your cooperation, please, when working on or near net frequencies. The VE1 Contest will be held on Jan. 18-19 (c.w.) and Jan. 25-26 (phone). Traffic: VE1DB 33, VE1OM 8.

ONTARIO—SCM, Richard W. Roberts, VE3NG—The Boy Scouts Jamboree on the Air was the biggest yet. Ottawa has a volunteer for EC for the AREC. VE3CGP has been appointed. Fort William has VE3-ECA as its EC. *The Great Bruce Net News* is a peppy paper. Congrats to VE3EBI, editor, VE3DBJ has a

(Continued on page 146)



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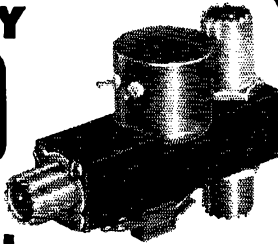
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TENTH ANNUAL VE1 CONTEST

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All VE1 amateurs are invited to participate in a contest sponsored by the New Brunswick Amateur Radio Association. The contest is divided into two sections, phone and c.w. The highest scoring contestant in each section will be awarded permanent possession of an engraved cup, the NBARA Trophy.

RULES: 1) The c.w. contest will begin at 2400 GMT Saturday, Jan. 18 and end at 2400 GMT Sunday, Jan. 19. 2) The phone contest will begin at 2400 GMT Saturday, Jan. 25 and end at 2400 GMT Sunday, Jan. 26. 3) Any and all amateur bands may be used but only c.w. to c.w., or phone to phone contacts will count. Any contestant may participate and be eligible for awards in both sections. 4) The same station may be counted but once for credit (in each section) regardless of band used, Mobile, portable, and home stations covered by the same station license constitute the same station. 5) The general call is "CQ VE1." 6) Exchange signal reports, county, province, and operator's name. Local QTH is not required. 7) Logs should show band, type emission, signal reports, county, province, time, and date. Logs not showing this information IN FULL will be disqualified. 8) Score one point for information received and one for information sent and confirmed. Multiply total points by the number of individual counties worked in the three provinces to determine final score. For contest purposes Sable Island will be classed as part of Halifax County. 9) Decisions of the contest committee will be final. Logs must be postmarked not later than Feb. 7 and should be in committee hands not later than Feb. 14. Forward all entries to: Contest Committee, P. O. Box 366, St. Stephen, N.B., Canada.

half-gallon jug. Officers of the Radio Society of Ontario are VE3CP, pres.; VE3CNY and VE3BKO, vice-pres.; VE3CO, secy.; VE3AML, rec. secy.; VE3KA, treas. The Society is affiliated with the ARRL. VE3ECY is on 2 meters. The Niagara ARC has a 2-meter net on Sun. at 12:30 p.m. on 144.6 Mc. Windsor ARC has a 2-meter net on 146.430 Mc. at 8 p.m. VE3DHB is now Class AA. The Sarnia ARC has the following on 2 meters: VE3DHB, BHG, CVG, ELI, VE3DRF, PAM for the Toronto Metro Two Meter Net, reports that the net is well attended. The Westside ARC elected VE3FNN, pres.; VE3CWN, vice-pres.; VE3FGW, treas.; VE3BQL, secy. VE3JN, of London, is a Silent Key. VE3BXL suffered severe burns in the rescue of a fellow worker in a recent accident. From all the reports the Hamilton-sponsored ARRL Convention was one of the best. Congrats to VE3CFE and his gang. The QUN still needs new members. VE3CYR is mgr. VE3FGV writes nice articles for the Bellowville paper. Soon at the Syracuse V.H.F. affair were VE3BRV, CUA, CAU, ETO, AGU, BGA, CSB, VE3ZZ, VE3ZF, VE3CNB has worked his 50th state. A new monitoring station is in operation now at Aeton, Ont. The big ear is on all bands. Be careful. Traffic: VE3CYR 187, VE3DRF 184, VE3CFR 171, VE3BZB 145, VE3NG 109, VE3DPO 86, VE3EIL 79, VE3GI 73, VE3BAQ 70, VE3FGV 65, VE3IA 45, VE3RG 44, VE3HZT 39, VE3AUU 28, VE3ETM 27, VE3AKQ 23, VE3CFI 22, VE3CWA 14, VE3OT 1.

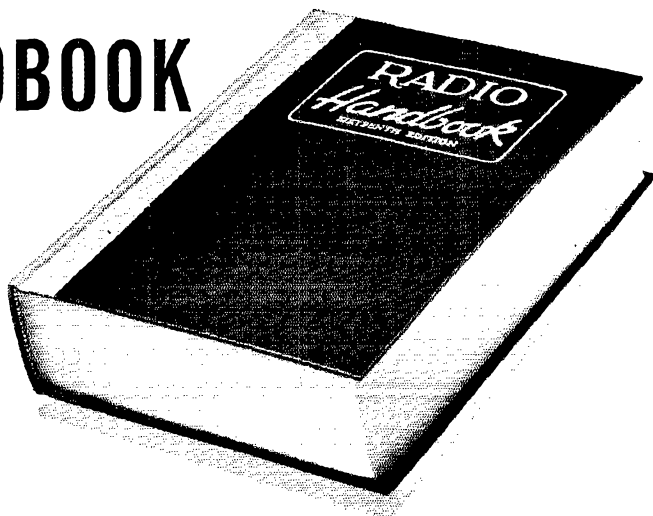
QUEBEC—SCM, C. W. Skarstedt, VE2DR—Asst. SCM; Jean P. Achim, VE2ATL. It is with deepest regret that we accept the resignation of VE2ATL as Asst. SCM. The Annual Scout Jamboree received fine cooperation from various groups and individuals in this section. This is a splendid service rendered by amateur radio and we are indebted to all those who took part. The Montreal Club sponsored a Burlington/Montreal get-together and a good time was had by all. Plans already are being discussed in connection with a convention and other activities during the 1967 World's Fair at Montreal. O's VE2CK and VE2AT are active again. VE2SC has replaced ex-VE2AEV as South Shore EC. VE2TA is pleased with his new boat. VE2ALE, with a halo antenna, is doing fine work on 2-meter mobile. VE2BGX is proud of his phone endorsement. VE2AUI is temporarily QRT fixing the station. VE2AXT and VE2AXU acquitted themselves well during the FAIT. VE2ATL reports: Le nouveau comité du CJR se compose de VE2BREZ prés.; VE2BJV vice-prés.; VE2PY, secy.; VE2AWR trés.; VE2BITK, dir. act. tech.; et VE2BKE, dir. act. sociales. VE2SO a visité plusieurs amateurs à Québec. VE2BDZ a plutôt été malchanceux avec sa nouvelle voiture sport. La grande vogue dans le Québec est la

(Continued on page 148)

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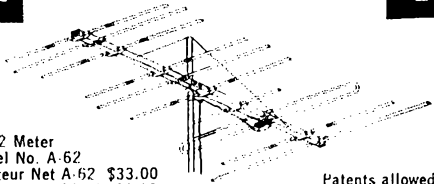
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ruée vers les transmetteurs-récepteurs en BLU. And a final word from your SCM: To all my silent friends; the postman still delivers mail to my QTH. Get the point? Traffic: VE2DR 136, VE2ALH 108, VE2BEZ 62, VE2EC 35, VE2SD 34, VE2BG 22, VE2AJD 31.

ALBERTA—SCM, Harry Harrold, VE6TG—SEC: VE6FS, PAM: VE6PV, RM: VE6AEN, ECs: VE6FK, VE6SS, VE6ABS, VE6AJY, VE6AFJ, VE6PZ, OPSs: VE6CA, VE6PV, VE6HM, VE6SS, VE6BA, OOs: VE6HM, VE6NX, VE6PL, OBSs: VE6HM, VE6AKV, ORS: VE6BR, OESs: VE6DB, VE6HO, VE6AKV. Glad to hear from the different clubs that classes will be their main programs for this winter. Most of the boys report that because of hard conditions activities are at a very low ebb. The boys in this section had fair results in the Boy Scout on the Air Jamboree. Thanks to all in this section who helped the police in patrolling for Halloween. The AREC did very well this year on its province-wide test and received cooperation from civil defense. Thanks to VE6FK as provincial control station, VE6AJX and VE6ADJ are operating phone now. The PAM reports some improvements in APN with check-ins and conditions. The SEC is well satisfied with the growth and interest shown in the AREC. VE6JJ is moving his QTH from Barons to Lethbridge, VE6PZ and VE6AFJ are both under the weather and in and out of the hospital. Traffic: VE6HM 175, VE6FK 69, VE6FS 69, VE6TG 17, VE6AJX 9, VE6SS 4, VE6WN 4, VE6ABS 3, VE6UH 3, VE6PV 2.

BRITISH COLUMBIA—SCM, H. E. Savage, VE7FB—During the SET held in Vancouver Oct. 5, equipment for 3755 kc. was set up in the basement of the Provincial Fire Marshal's building. The 2-meter link was in the elevator penthouse on the roof with a link into the basement. The test so satisfied the Fire Marshal that he dispatched a letter to all the heads of the Government prising amateur radio. Your SEC, VE7OM, and I wish to say thanks to all the amateurs and ECs for making it a success. We have two new ECs: VE7ACE Nanaimo, and VE7KZ Penticton. Please support your ECs by asking for and filling out a Form 7. New appointments: VE7BDJ as ORS and VE7BJV as OBS. A new club, the West Kootenay ARC, reports things are progressing well. Code and theory classes are about to start, also activity on 2 meters. VE7AC reports that farming is done for awhile and he will now harvest some DX. The Boy Scout Jamboree was well attended by both the Scouts and the amateurs. Nanaimo ARC reports sixteen candidates, two of them YLs, attending this winter's code and theory classes. The Vancouver ARC's Annual Christmas Dinner was held Dec. 7 at the Sands Motel. Grade thirteen is causing VE7BJV extra work. Plans for the QCW's big party in Vancouver in 1964 are progressing very well. Keep your eyes and ears open for the ticket sales. It should be a sell-out with the program that is being arranged for us. See VE7BHH. Traffic: VE7BJV 223, VE7BHH 102, VE7KZ 34, VE7AC 12, VE7AKE 10, VE7BHV 9, VE7AMW 7, VE7DH 4.

MANITOBA—SCM, M. S. Watson, VE4JY—Our OO, VE4JY, reports that VE4EZ, ex-VE5NT, now is located in Beausejour working 15 and 20 meters. The recent transmitter hunt was won by VE4GC. VE4HW is on a month's tour of Hawaii. VE4JY discussed articles in QST by Prose Walker, WODCA, and Dana A. Griffith, W2AOE, and gave a resume of his recent trip to London, England, at the October meeting of the ALRM. Plans are progressing for the holding of a hamfest in Winnipeg in 1964. John A. Bell, Jr., VE4OL, has consented to take over the SEC post vacated by VE4FO. The Manitoba Phone Net shows a marked increase in members over last fall in spite of the hash produced by the northern lights. VE4PA, VE4HF, VE4JT, VE4UT, VE4FX, to name a few, took part in the Boy Scouts Jamboree on the air with VE4GK controlling the Boy Scouts station, VE4JAM. VE4DQ recently returned from a month's stay in Bermuda. Traffic: VE4JY 31, VE4QD 26, VE4EP 7, VE4JA 6, VE4HF 4, VE4IW 4, VE4NW 3.

SASKATCHEWAN—SCM, Jack Robinson, VE5BL—A c.w. contest was held by the SARL during October. The results will be published when all logs are in and checked. New officers of the Moose Jaw Club are VE5KZ, pres.; VE5IL, vice-pres.; VE5GA, secy.-treas.; John McGullin, activities. The welcome mat is out for VE5PS, Moose Jaw's newest ham. VE5QA has a new SX-117, Tower beam and rotator; VE5IU also has an SX-117. VE5GI has a new 6-meter beam and tower. VE5RH now is signing portable W2 in Buffalo, N.Y. VE5JV is in the hospital in Regina. A number of stations took part in the Boy Scouts Jamboree on the air. Thanks, fellows, for a job well done. VE5JR is now in Regina. Any takers for the position of EC? Your SCM would sure appreciate any news sent in for publication. The Saskatoon Amateur Radio Club is holding a QSO Party from 0600 Jan. 18 to 0600 Jan. 20, 1964 (GMT) with the express purpose of promoting the WheatBelt Award. All bands and modes will be used. Traffic: VE5HP 106, VE5LM 38, VE5NY 38, VE5HQ 7, VE5SF 5, VE5IL 4, VE5IA 2.

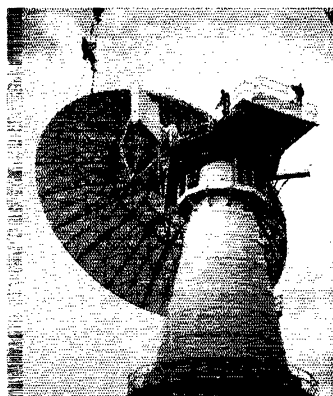
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Ed Dodge, W1CMU, has been an active ham for 35 years and a member of the Raytheon staff for more than 20. Ed spends a good deal of his leisure time with a key in his fist. He works the whole spectrum from 20 to 160 meters concentrating on CW except in the summer when he operates on 6 and 10 meter mobile from his cabin cruiser. Ed feels that ham radio has been a relaxing extension of his deep interest in electronics.



As Manager of Raytheon's Field Operations, Ed Dodge coordinates the activities of five project engineers and more than 300 field engineers. He has been involved with field engineering assignments on radar, fire control and many other key military electronic systems and installations. His duties have taken him through the United States, Europe, Central and South America. Ed Dodge's association with Raytheon has certainly been exciting and rewarding.



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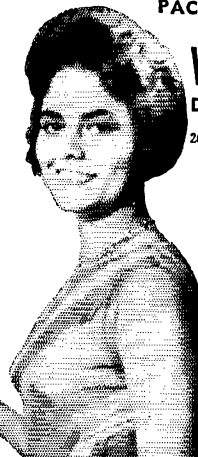
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ARRL Message Precedences

(Continued from page 44)

when it leaves. As a relaying or delivering agent, you have no responsibility for it, nor do you have the prerogative to change it. In extreme cases you may wish to advise the originating station of your opinion that he erred in assigning the precedence.

Since most of our traffic handling is done in nets, you may ask about the procedure for handling traffic of mixed precedence. Usually, this will be up to the net control station. Net stations do as he says; he is supposed to have the judgment to handle things properly. Generally, however, a message with "Emergency" precedence is a net-stopper. All other activity stops immediately and NCS takes steps to see that the Emergency message is cleared and dispatched to its destination or as close thereto as possible. Of course if there are several or many such messages in the net, they are handled in order, with other messages being held up until all Emergency messages are cleared. In the case of Priority messages, no such drastic measures would be called for, but they would be handled before and in preference to Routines.

Message precedences are a good device, if properly used. They can be an infernal nuisance if abused. Let's use them right, fellows and gals, in the best interest of our amateur radio public service. QST

Novice Roundup

(Continued from page 43)

3) *QSOs*: Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80-, 40-, 15-, or 2-meter bands. Crossband contacts are not permitted. C.w. to phone, c.w. to c.w., phone to phone, phone to c.w. contacts are permitted. Novices work any amateur stations eligible; non-Novices work only Novices. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section.

A Novice may operate in the Novice portion of the competition until he receives his General Class License, then must operate as a non-Novice entry.

4) *Scoring*: Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this QST) worked during the contest is the "section multiplier." Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold ARRL Code Proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of qualifying run from W60VP, January 3, or February 6, or from W1AW, January 17 or February 15. CP credit equals the w.p.m. speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting*: Contest work must be reported as shown in the sample form. Reporting forms and a map of the United States will be sent gratis upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be post-marked not later than February 20.

6) *Awards*: A certificate award will be given to the highest-scoring Novice in each ARRL section.

7) *Disqualifications*: Failure to comply with the contest rules or FCC regulations are grounds for disqualification. ARRL Contest Committee decisions are final. QST

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SALES LIMITED TO AMATEURS ONLY

- FMTR-41V 12 watt 30-50 Mc 12 volt..... \$39.95
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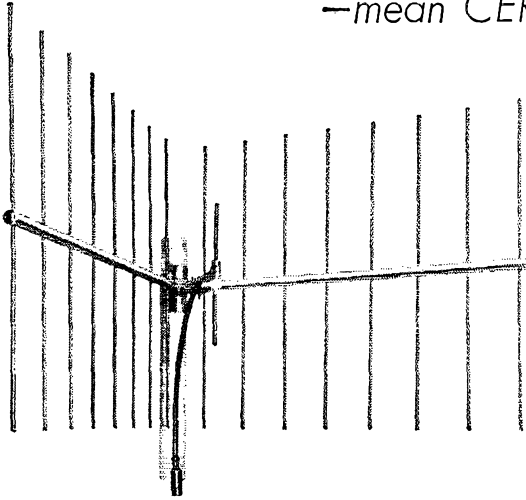
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Nominal input impedance	50 ohms
Forward gain	10 db
Front-to-back ratio	20 db
Maximum power input	.....	250 watts
Internal feedline	.....	RG-8A/U
Flexible terminal extension	.....	18" of RG-8A/U
Termination	.....	Type N male with Neoprene housing
VSWR	.....	1.5:1
Bandwidth	.....	±3%
Lightning protection	.....	Direct ground

Mechanical Specifications:

Reflector (size per side)	.....	2' x 2'
Reflector material	.....	High strength aluminum alloy
Radiating element material	.....	High strength aluminum alloy
Radiating element diameter	.....	3/8"
Rated wind velocity	.....	100 MPH
Lateral thrust at rated wind	.....	16 lbs.
Torsional moment on mounting pipe	.....	16 ft. lbs.
Weight	8 lbs.

Stainless steel hardware supplied to mount antenna on 2" IPS pipe.

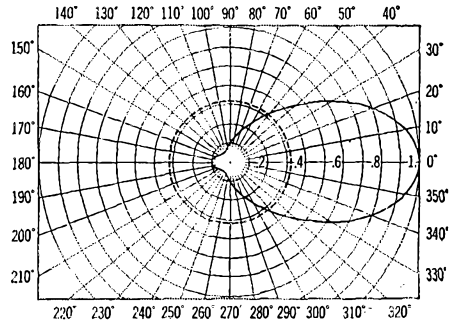
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Frequency Range
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Cat. No. 161-509 Corner Reflector Antenna is designed for use in the 450-470 Mc band. All reflector screen components are manufactured of high strength aluminum alloys, all mounting components are fabricated of hot-galvanized steel and all radiating components are fabricated of aluminum. The above combine maximum strength, optimum electrical performance and minimum weight for the first time in an antenna of this type.

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Horizontal field strength pattern of Corner Reflector 10X-Gain Antenna Cat. No. 161-509. A dipole pattern is shown for reference,



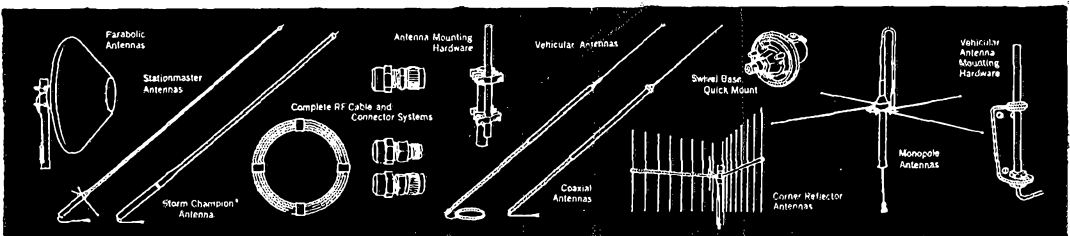
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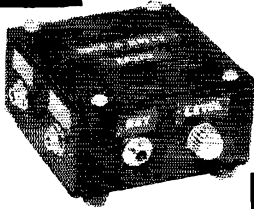
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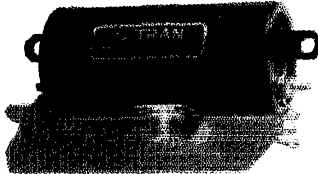
CODE O MATIC used with your existing tape recorder enables you to pre-record code transmissions accurately for later use. Simply make tape from code oscillator, T.O. keyer, or through "SI(OT)" function of your transmitter/receiver. Connect 3.2 or 8 ohm Ext. Spkr. jack into *CODE O MATIC*, adjust tape volume until LEVEL lamp flashes, and you're ready to go. *CODE O MATIC* is only 4" x 4" x 2", weighs only 1 lb., 5 oz. and has a steel cabinet with black crackle finish.

Code O Matic Keyer, factory wired and tested.....\$29.95 PP in U.S.
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The MODEL 101 Q-TRAN. For use with 50 or 75 ohm unbalanced feed (co-ax) to 50 or 75 ohm balanced antennas.

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SP-600 Receivers, 540 Kc.-54 Mc. Teletype: #11, 15,
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TOM, WIAFN, ALLTRONICS-HOWARD CO.,
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Geneva Space Conference

(Continued from page 81)

Of almost equal importance, however, was the announcement by Australia that her 1959 plans to reallocate 144-146-Mc. to another service have been dropped, thus continuing that band for amateurs on an exclusive worldwide basis.

Once again an international conference challenge has been met by the amateur service. The IARU group was larger than at any previous conference, illustrating the growing realization among member-societies of its importance to the international amateur picture. However, there is still much to be done in the way of "homework" by each national amateur society, through adequate liaison with its administration *in advance* of future conferences. More of this in early 1963 in various foreign countries would have made the chances for additional space bands much higher, or at least made the problems at Geneva less critical.

Perhaps the results of the conference, from the amateur standpoint, can be summed up in the words of the chairman of the U.S. delegation, the Hon. Joseph H. McConnell: "Satellite experimentation by radio amateurs, as typified in the Oscar I and Oscar II programs, has received recognition by the conference through the allocation of the band 144-146-Mc. Although the International Amateur Radio Union would have preferred similar privileges in other bands as well, the value of the amateur experimental work and the widespread interest it has created has been recognized by the conference." **QST**

Correspondence From Members

(Continued from page 94)

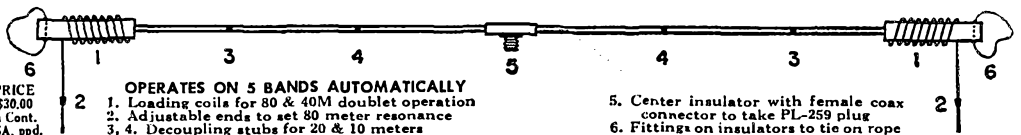
zation, the individual members must forego some privileges in order that all the members can have even greater privileges through confederation. Every ham should be willing to give a little to retain the basic privileges which we now have. The present licensing system is the one which smacks of socialism, offering the same privileges to nearly everyone, regardless of merit. Certainly the proposed incentive system is the democratic one . . . — *W4TPN/3*.

☐ Your proposal on incentive licensing is just about five years overdue. Frankly I didn't think you had the intestinal fortitude to take the position you have taken. If I lose any benefits from incentive licensing, then I'll just study and take the test required. If my memory serves me well, there were few Generals that couldn't pass the old Advanced test if they applied themselves. Keep fighting on this issue. You may lose a few members and subscribers, but you may well save amateur radio in this country. — *W3QDQ*.

(Continued on page 154)

LRL-66 ANTENNA 66' LONG. 80 THRU 10M

Power rating 2 Kw. P.E.P. or over on 80, 40, 15
On 20 and 10 1 Kw. P.E.P. Transmitter input



PRICE
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OPERATES ON 5 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
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Ideal for any fixed station, its compact size and high power efficiency makes it FB for mobile and portable use, too! Weighs only 35 lbs.

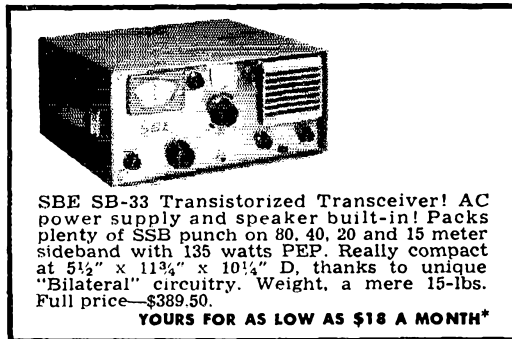
Easy to tune and operate. Switches for Tune-operate and Hi-Lo power. Meters read plate current and RF output. Its stable, passive-grid-type amplifier presents a 50-ohm pure resistive load to any SSB exciter. Pi output to 50-ohm coaxial-fed antenna. VSWR 1.5 or less automatic antenna selecting relays are built-in.

Full 1000 watts PEP input on 80, 40, and 20 meter bands, 750 watts on 15. Uses six type 6JE6 tubes.

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BAND	MODEL	FREQUENCY RANGE	PRICE
160M	CV2-H or L	1.3 to 2.3Mc	\$12.95
80 M	CV4-H or L	3.3 to 4.3Mc	
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H = High Impedance Antenna L = Low Impedance Antenna

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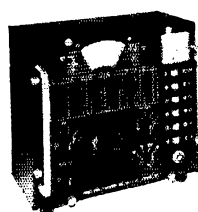
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Q . . . This club, after surveying its own membership determined that more than half of the general class amateurs would for good reason, be unable to get still another license. Since they have a considerable investment in equipment which will become worthless to them should the League's proposal go into effect, and they would suffer financial loss in disposing of such equipment on a distressed market which would develop, it was unanimously voted to crack the League across its financial ankles by acquainting the "appliance" manufacturers who support you with a much more accurate appraisal of what would happen to their markets and business . . . — W6OIF.

Q . . . Alright, go ahead and make your goofy proposal to the FCC! You'll probably have the inadvertent presentation hanging on a long hook of other proposals anyway. I know something that you will have — a lot of amateur gear. There will be so many hams irritated by this mess that they'll band together, charter a private cargo plane, load it up with their useless gear, and drop it down your pretty little smoke stack. I will be the pilot. BCNU!! — K4KRL.

Q Your incentive license program will force me to junk most of my equipment, along with other hams . . . — W4OIIJ.

Q I plan to be a member of the ARRL for many years to come. I do not agree with some of the points of your program, but do agree with most. I have developed a standard on-the-air remark to the pessimists who say they are going to sell out and quit, i.e.: Please send me a list of the equipment and bargain prices! — W15C/MC.

Q You are against me. Therefore I am against the ARRL. I will never buy another Handbook, QST or ARRL pub. I will burn my 30-year collection of QST and Handbooks. In short, I hate you. — K5TJW.

Q I have just read the correspondence from my fellow members of QST. I am surprised to find many, that are acting like children, crying because their candy has been taken away from them. We don't bring home a paycheck for doing nothing, and we should not expect to get an amateur license for doing nothing. Whoever cancels their membership from the ARRL will be hurting themselves more than they will be hurting you. We hams must stick together, and our glue is ARRL. — K5WGA.

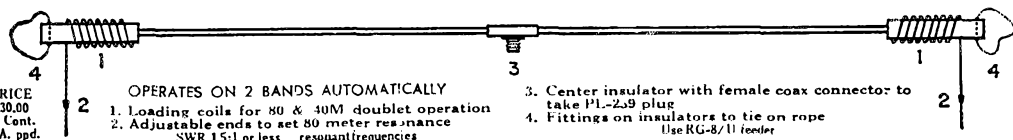
Q My hat is off to your bold step to bring about some better form of incentive licensing system. There are too many free-loaders in this world as is, and with a year and a half of study a few simple rules and theory anyone now holding a ticket should be able to pass the test. If they can't make the grade they don't belong on the bands . . . — W3HPO.

(Continued on page 156)

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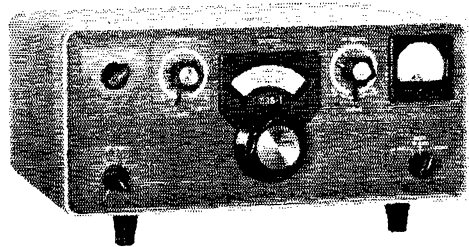
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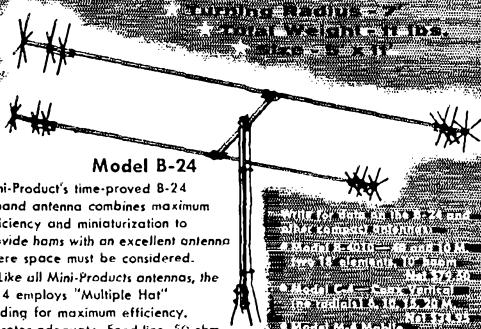
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... Your incentive license #a. frequency plan isn't perfect — what is? But it's a step in the right direction and is bound to improve matters. — W2PEO.

After hearing and reading some of the gripes about the recent action of the board on incentive licensing I must write to commend the outstanding group on the board for not wavering on their stand. From the gain being raised it looks like more than ever that we are way late on this action and already have many in our ranks who are willing to receive the rights and benefits of amateur radio with only a minimum of effort on their part. To paraphrase a bit — we have drunk from wells we did not dig and we have been warmed by fires we did not build. It is time all of us do our part to improve the state of the art by our efforts instead of resting on the laurels of our predecessors, lest the well dries up and the fire burn out. — W5LMI.

The World Above 50 Mc.

(Continued from page 88)

number of 1s and 2s were heard and worked. The 26th is another day that stands out in Joe's mind (and log) as the day of the best two-meter opening to the southwest that he had ever experienced. He worked K4QIF and WA4DKU, both in North Carolina. At Donora, Pennsylvania, K3CFA just missed working state #12 during an aurora on October 23 when local power-line noise suddenly blanked out everyone, including W2AMJ in New Jersey (the new one for Joel).

K3KPA in Philadelphia sez that ground wave has been very, very good during October on two meters with activity greater than he's ever heard it before. On October 25 John worked W4CVJ, K4OYT and W4AUR, all in Virginia. Back on 144 after a long absence, W4FIG is looking for contacts. Only contact to date is W4CIN, although Pres has heard K4MBM in Huntsville and W4TLV in Demopolis. Regular frequency of W4FIG (Birmingham) is 144.270. In North Carolina both K4GYL and K4YYJ report openings on two meters on October 25-27. Ron (K4GPL) sez that five or six states were heard, that he worked New Jersey and Pennsylvania and heard Delaware and New York. K4YYJ sez that on the 25th and 26th he worked 13 2s in New York and New Jersey. At Durham, North Carolina W4FDO sez there are now 10 active stations on 144 Mc. K4EUS reports an opening on two meters on October 6 when he worked a number of 2s. Sam says that on the 11th he took down his beam so doesn't know what else happened during the month. Just hope he took it down to replace it with a bigger one. A report from W4MNT concerning his meteor shower sked results: "In the Orionids I worked WA2PZB and W7PUA/2. In the Leonids, I worked W1JSM, K2RTH and K8AXU. K2RTH and I had a 70 second burst in which we were even calling each other by first names. This occurred on the 5th minute of the first sked and followed the contact with W1JSM by 8 minutes." Congratulations, George and we'll think over your suggestions.

Oklahoma comes through this month via Sam, W5WAX, who tells us that during the September contest he worked W0IAY for state #11 on 144 Mc. At this time (with no exceptional conditions) he also worked Missouri, Kansas, North Texas, Nebraska and Oklahoma on two meters. Sam is looking for skeds with Iowa, Nebraska, Illinois, Kentucky,

(Continued on page 166)

ANTENNA TESTER 520A

- Read Forward Power and Reflected Power DIRECTLY IN WATTS—0-10, 0-100 and 0-1,000 watts ranges
- Read antenna efficiency in SWR from 1:1 to 8:1, in per cent or in GOOD-POOR
- For 50 ohm coaxial lines
- Inserts no error in coax up to 160 MC
- Dual air coupler rated at 1,000 watts maximum



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- Read both positive and negative modulation peaks from 0-120%—no scope needed
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- Also serves as field strength and remote RF indicator
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- Jack for headphone or scope



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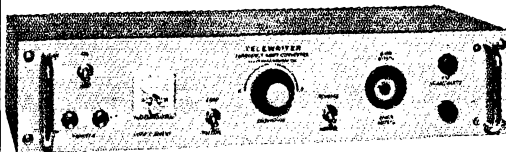
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STATE _____

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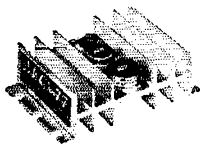
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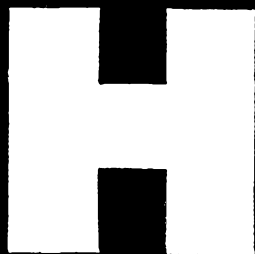
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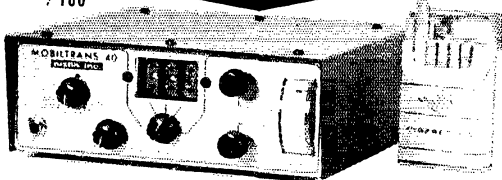


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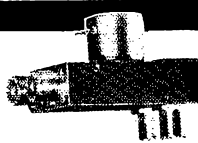
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W1AZK.....9	3 412	W1BU.....11	3 390
W1BU.....14	5 600	W1HDQ.....9	3 370
W1HDQ.....12	5 450	K1JLX.....8	2 330
K1JLX.....11	4 615	W1MFT.....8	3 170
W1OOP.....12	4 400	W1OOP.....11	3 390
W1RPU.....15	5 480	W1QWJ.....10	3 230
W2AOC.....15	5 530	W1UHE.....10	4 430
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W2BAE.....4	2 167	W2BLV.....12	5 360
K2CBA.....16	7 660	K2CBA.....8	1 230
K2DIG.....4	3 140	W2DZT.....6	2 300
W2DWW.....15	5 740	W2DZJ.....10	4 196
W2DZA.....12	5 410	K2DZJ.....10	1 390
K2DZM.....12	5 400	W2EUS.....7	4 353
K2ITP.....10	5 265	K2GGA.....4	4 280
K2ITQ.....11	5 265	W2HQB.....8	4 100
K2JVT.....6	3 244	W2HQB.....8	4 100
K2KIB.....12	4 300	W2NTY.....2	100
W2LRI.....10	4 250	W2OTA.....10	4 300
W2LWI.....12	4 400	K2UR.....9	3 280
W2NTY.....12	5 300	W2VCG.....9	4 280
K2PIZ.....11	4 400	W2YPM.....6	3 300
K2QJQ.....13	5 540	K3CLK.....9	4 250
W2SED.....11	5 450	K3EOP.....6	3 296
K2UGR.....6	3 210	W3FEY.....8	4 310
W3AHQ.....4	3 180	K3IUV.....7	3 310
W3FEY.....11	5 350	W3LCC.....10	5 425
K3IUV.....8	3 310	W3LZD.....15	5 425
W3JYL.....4	2 295	W3RUE.....10	5 480
W3LZC.....4	2 250	W3UJG.....13	5 400
W3KEN.....10	4 255	W3ZRP.....5	4 112
W3LCC.....10	5 300	K4TUT.....8	4 400
W3LZD.....15	5 425	W4TLC.....5	1 315
W3RUE.....10	5 480	W4UYB.....7	5 320
W3UJG.....13	5 400	W5AJG.....3	2 1050
W3ZRP.....5	4 112	W5RCL.....5	5 700
K4TUT.....8	4 400	K6GTG.....2	1 240
W4TLC.....5	1 315	W6MMU.....2	2 225
W4UYB.....7	5 320	W6NLZ.....3	2 2540
W5AJG.....3	2 1050	K7ICW.....1	1 250
W5RCL.....5	5 700	K8AXU.....11	5 1050
K6GTG.....2	1 240	W8JIG.....9	5 475
W6MMU.....2	2 225	W8LPD.....6	4 480
W6NLZ.....3	2 2540	W8NRM.....8	4 390
K7ICW.....1	1 250	W8PT.....10	5 660
K8AXU.....11	5 1050	W8WV.....10	5 520
W8JIG.....9	5 475	W9JCS.....6	2 340
W8LPD.....6	4 480	W9JEP.....9	4 540
W8NRM.....8	4 390	W9OVL.....6	3 475
W8PT.....10	5 660	W9UED.....4	1 905
W8WV.....10	5 520	W9ZHE.....10	5 500
W9JCS.....6	2 340	K9DGU.....5	3 425
W9JEP.....9	4 540	K9ITF.....6	3 515
W9OVL.....6	3 475	KH6UK.....1	1 2340
W9UED.....4	1 905	VE3AIB.....7	4 450
W9ZHE.....10	5 500	VE3BPR.....3	3 300
K9DGU.....5	3 425		
K9ITF.....6	3 515		

The figures after each call refer to states, call areas and mileage of best DX.

Tennessee and Louisiana. He prefers c.w. but is also a.m., is usually rock bound at 144.090 but does have a v.f.o. and will use it if necessary. W7JRG, in Billings, Montana, reports his Leonids sked results: "K8AXU, not heard; K9UIF, heard but not worked; K6HMS, WORKED! This is a new state for K6HMS but I remain at 19. I worked New Mexico during August, and Nebraska during the September aurora." October 29 was an interesting day for K7ICW when he worked K6LZC on A1/A3, followed by contacts with W6CDB and W6DEE, both on s.s.b. George is presently installing a 44-element vertical (?) beam for 432 Mc. K7BBO in Washington sez that rebuilding has begun on his two-meter dish which was damaged in a heavy wind storm. Dave is ready for two-meter moon-bounce skeds with anyone interested. In Michigan K8PBA sez "nothing outstanding on 144 Mc. during October. Open into Kentucky on the 6th and aurora on the nites of the 23rd and 26th." Bob is presently building a paramp for 432 and intends to be on s.s.b. on that band soon.

(Continued on page 160)

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32S1.....	439	HQ100.....	329	DX100B.....	189
312B4.....	439	HQ105.....	97	DX20.....	159
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MOBILE MOUNT.....	22	SP600.....	297	R100.....	149
SWAN SW-240.....	239	HN50.....	339	R100A.....	34
DC SUPPLY.....	79	HN500.....	299	B&W 5100.....	69
SX101A.....	269	HROB0.....	399	LA400C.....	79
SX111.....	169	NC180.....	267	P&H 6-150.....	147
SX100.....	199	NC183D.....	177	AP68.....	217
SX115.....	379	NC125.....	99	PMR7.....	109
SX110.....	99	NC109.....	79	EICO 723.....	87
SX140.....	74	NC155.....	139	AMECO 86W.....	37
SX96.....	129	VFO-62.....	37	AC SUPPLY.....	77
SX99.....	87	DRAKE 2A.....	189	A-H RTTY MOD H.....	27
SX62A.....	229	DRAKE 2B.....	209	CONV. RLY & MTR.....	87
SX62.....	147	DRAKE 2BQ.....	29	NUVISTOR.....	44
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S83A.....	47	G76.....	219	FISHER FM90X.....	117
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SR34 3 way sup.....	229	G77a.....	144		
HT32.....	347				

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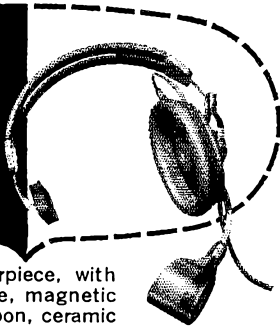


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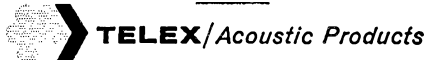


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From Detroit, WNSHTL reports working or hearing Ohio, Pennsylvania and New York during the week of October 13. Al, K8AXU, reports working W4MNT in Florida on November 18, but had no luck with his skeds into Montana and Colorado. At Mokena, Illinois, W9OEQ lists 20 stations on two-meter s.s.b. in the Illinois, Wisconsin, Missouri area. Interesting letter from W0PHD: "I am located about 20 miles from the North Dakota border (in Warren, Minnesota) and 60 miles from the Canadian border. This places me about 120 miles airline from Winnipeg, Manitoba; 90 miles airline from Fargo, North Dakota; and 320 miles from the twin cities of Minneapolis and St. Paul, Minnesota. Each Tuesday evening, starting at 8:00 P.M. CST, I hold skeds with VE4JX, VE4RE, VE4GI and any other VE4 that may be wanting to try out some new two-meter gear. At 9:00 P.M. CST I turn my beam toward the Minneapolis-St. Paul area and hold skeds with K0GQG, W0AWK and WA0FDY. I have had some very nice f.s.k. RTTY contacts with Al, WA0FDY. Our frequency for these skeds is 144.200 + or - 1 kc." Wally would like the gang to know that there is an active station in northwestern Minnesota who is on the lookout for them during every auroral opening.

RECORDS

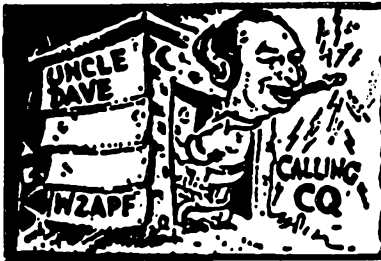
Two-Way Work

- 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.: SM6ANR — G3JHM
- 686 Miles — August 31, 1961
- 1215 Mc.: W1BU — KH6UK
- 5092 Miles — August 9, 1962
- 2300 Mc.: W1EHF/1 — W2BVU/1
- 170 Miles — July 1963
- 3300 Mc.: W6IFE/6 — W6VIX/6
- 190 Miles — June 9, 1956
- 5650 Mc.: W6VIX/6 — K6MBL
- 34 Miles — October 12, 1957
- 10,000 Mc.: W7JIP/7 — W7JHL/7
- 265 Miles — July 31, 1960
- 21,000 Mc.: W2UKL/2 — W2RDL/2
- 14 Miles — Oct. 18, 1959
- Above 30,000 Mc.: W6NSV/6 — K6YYF/6
- 500 Feet — July 17, 1957

50 Mc.

From Iowa both W0DRE and W0PEP report the aurora of October 24. John (W0DRE) worked stations in Illinois, Michigan and Minnesota during this period with 5-4-A to 5-4-A reports exchanged. Jim (W0PEP) worked W9FLH in Illinois during this auroral session. WA0DZI in Kansas caught an opening on the 23rd during which he heard stations in Lincoln, Nebraska and Arvada, Colorado. "My luck seems to have run out in October" sez WA0FLL. "Longest ground wave was 75 miles. Heard only W0ZBL at Ames, Iowa, but couldn't make it a two-way contact. So we are still looking for our first Iowa contact." On October 20 Bob copied WA9CPN, at Indian Springs, Wisconsin, who was working a local but he didn't manage to nab him.

(Continued on page 162)



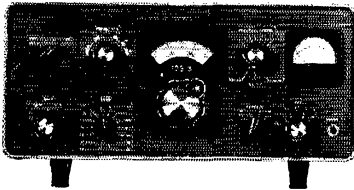
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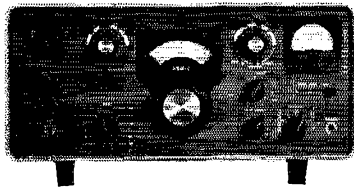


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The Collins 75S-3 is a versatile receiver with the sharpest selectivity available to you in any of three modes—SSB, CW and RTTY. AM reception is also provided and an additional Mechanical Filter may be installed for improved skirt selectivity.

Outstanding features of the receiver include: Rejection Tuning, Choice of Variable or Crystal BFO, Nominal 200 cps Crystal Filter and a 2.1 kc Mechanical Filter.

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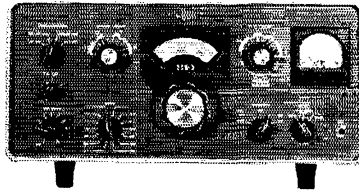


KWM-2 TRANSCEIVER

The Collins KWM-2 Transceiver assures you of superior single sideband performance in a variety of installations—automobile, airplane, boat or fixed station. The KWM-2 design incorporates time-proven and advanced communication concepts.

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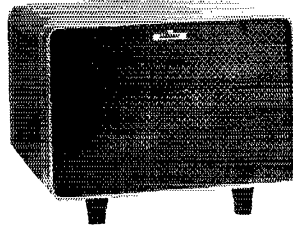


32S-3 TRANSMITTER

Collins' highly flexible 32S-3 Transmitter covers all the amateur bands between 3.4 mc and 29.7 mc with a power input of 175 watts PEP on SSB or 160 watts on CW. The transmitter has a nominal output of 100 watts.

Outstanding features of the transmitter include: Collins RF Inverse Feedback, CW Spotting Control and Dual Conversion for Frequency Stability.

Price.....\$750.00



516F-2 AC POWER SUPPLY

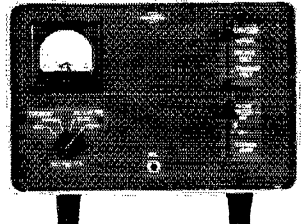
Operates from 115 v ac, 50-60 cps. Provides all voltages for the 32S-3 and KWM-2.

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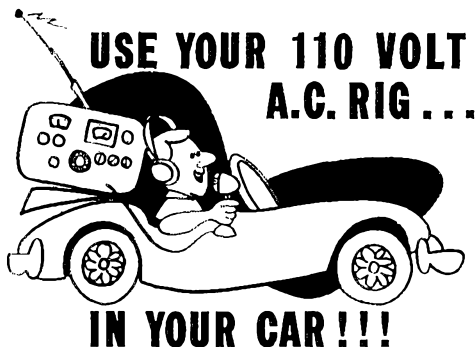
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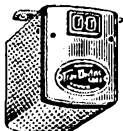
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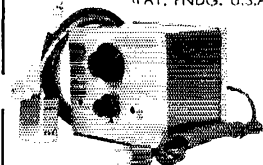
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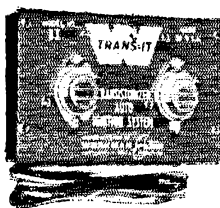
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An old-timer (converted from the low frequencies), W9FLH has given up c.w. and DX on the low frequencies for more of the same on the high frequencies. "Dewon" observed the auroral session of October 24 when he had his first experience with c.w. on six meters during an auroral session and worked stations in Iowa, Michigan, Ohio, Minnesota and Wisconsin. He also heard K0TVX in Kansas but had no contact with him. From Illinois, WA9FH reports good ground wave on October 12 with Michigan and Wisconsin stations very strong. Jim also noted the aurora of October 23 during which he heard s.s.b. and c.w. stations from Minnesota, Ohio and Michigan. Jim sez, "I call 'CQ East' or 'CQ Michigan' very frequently on 50.100 on c.w. between seven to eight p.m. with no response. I can work Michigan O.K. on 50 watts a.m., so know my 90 watts c.w. must get over there." From WA9CWZ we hear of some interesting conditions. "On October 6 both K9BIV/J and I worked W9DRT in Peoria and noted that DRT's signals peaked up to the west instead of the northeast as they should. October 24 was the big day. We noted several aurora signals from 0207 until 0405. Didn't snag anyone but we heard WOELQ, K3NNZ, K5WKZ and WA0ABG with the last two stations being strongest signals heard." In Michigan the aurora of the 23rd was noted by W8CVQ from 2000 to 2300 E.S.T. and again on the 29th from 1930 to 2030 E.S.T. Also of Michigan, W8EMD sez that most of the month of October was spent in work on antenna construction and building of a new six-meter s.s.b. exciter.

W5WAX in Oklahoma sez that the last E skip heard at his QTH was on August 24, but since then he has worked out very well on groundwave with Kansas City, Dallas, and Palmer, Texas being regular contacts. During the September contest Sam worked Oklahoma, Arkansas, Missouri, Kansas and North Texas, although no skip was heard. He is looking for skeds, either a.m. or c.w., and frequency is 50.140. Six-meter groundwave was excellent from October 20 through 24 at Durham, North Carolina, according to WA4BBY. During this period Bill worked stations in Kentucky and Carolina with good reports both ways. Bill is also one of many now working on s.s.b. gear for 50 Mc.

Another report concerning good ground wave comes from K4PUD in Virginia, who reports such condition on about eight days during the month of October. Bernie also noted the aurora of the 29th. W4GVQ also of Virginia sez: "Some good ground-wave working up into New Jersey, New York and Pennsylvania. There was a limited breakthrough on October 21 when W4NQX in Florida started pounding through at 2115 and made contact with a chap in D. C. He apparently was able to hear only the one station from this area and from my QTH he was the only station I could hear outside of the Maryland, Virginia, D. C. area." At Sunbury, Pennsylvania, K3ARR also observed good ground wave during the month, although best of all was on October 22 when 1s, 2s, 3s and 4s were coming through. K3AKR writes that he heard a brief session of sporadic E on October 15 when Florida stations were coming through; aurora was worked on the 24th, and good tropospheric conditions on the 24th and 26th of the month. John sez he is now on 220 Mc. with 100 watts and is looking for contacts. Florida was also heard in New Jersey by W2FYT on November 13. Tony's first band opening since getting on 50 Mc. and to Florida only.



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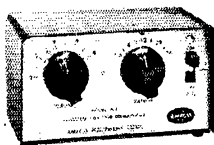
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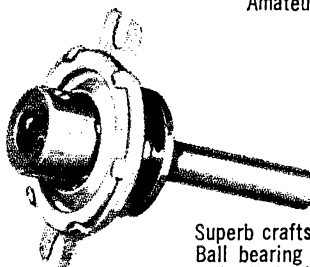
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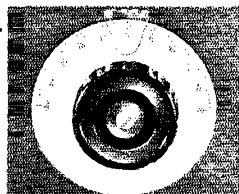
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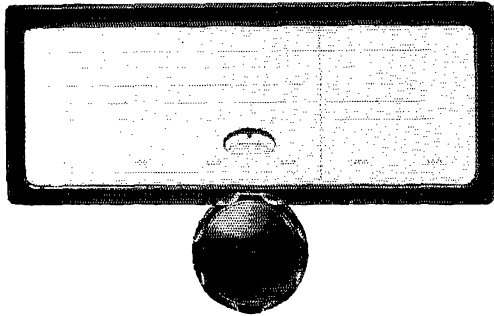
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The Bottle

(Continued from page 36)

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"What was that, sir?" Why yes, sir, of course — it's pale blue." QST

How DX Kings Rate Antennas

(Continued from page 77)

It will be noted from Table I that the Quad antennas are not nearly as popular as the Yagis. All indications are, though, that they will grow in popularity, for these DXers indicate that 12 new Quads will be tested in the future, and 18 more would be if circumstances allowed. These totals compare more than favorably with the equivalent figures on the Yagis, a strong indication that element-for-element the Quad is the better antenna. Why else would these users of 3- and 4-element monoband Yagis today be trying out the Quads tomorrow?

The 3-Element Monoband Yagi

Winner by a very wide margin of the popularity contest is the 3-element monoband Yagi, a real surprise to the author who would have guessed earlier that the triband Yagi would win handily. Not so. The DX Kings learned long ago, it would seem, that limiting one's DXing to just the 20-meter band involves no sacrifices whatsoever — therefore the reason for all the monoband Yagis for this premium DX band.

Table I shows that the 3-el monoband Yagi also has the best rating for DX effectiveness, somewhat better than its 4-element brother. In direct head-to-head comparison in the 12 cases where a DXer has used both, the 4-el wins in 7 instances, loses in 3 and "ties" in 2 others. This evidence indicates the 4-el monoband Yagi to be the better. The 3-el came out on top in the averaging probably because it picked up a lot of first-place votes, being so popular in usage; and 3rd- and 2nd-place votes hurt it a lot less than 3rd- and 2nd-place votes for the 4-el. (Those nasty Quads did the damage.)

There was insufficient comment in the returns to shed much light on the additional advantage a 4-el offers over a 3-el, except that generally the

(Continued on page 166)

YOUR CALL AND HANDLE IN GOLD —



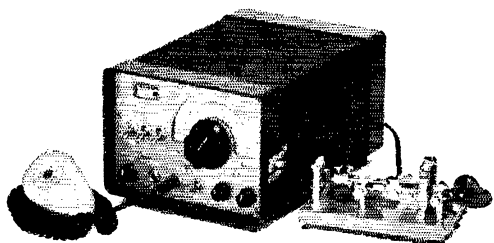
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opinion prevails that the more elements the better the results. W3GHD states, "4-el is an improvement on reception and sharper on transmit than the 3-el." W9LNM feels that "advantages of more elements do not justify mechanical problems at optimum spacing — more elements close-spaced are too hard to handle electrically." As in many aspects of ham radio, final decisions must be made in accordance with individual situations.

Conclusions

It would be misleading to imply that one needs a super-duper antenna to work a lot of DX. HB9J reports working over 280 countries using a ground plane vertical. 4X4DK tells of similar results, and LATY has built up his impressive total using nothing but dipoles for the various bands. So it can be done.

Without an exotic call which attracts DX to him, however, the average American ham, at least, needs an antenna which is rotatable, enabling him to direct his signal at the DX and, at the same time, by means of some front-to-back discrimination, eliminate some of the QRM. You may, if you wish, limit your DX chasing to 20 meters, but it is nice for DXing and rag-chewing as well to radiate effectively on 15 meters, and to a lesser degree on 40 meters and 10 meters.

Depending upon individual circumstances and desires, the average ham thinking of a new antenna system or systems for DXing could limit his deliberations to these designs, according to survey evidence:

40 meters — A vertical ground plane.

20 meters only — 3-el monoband Yagi; single band 2-el Quad.

20 & 15 meters; or 20, 15 & 10 meters — 2- or 3-band, 2-el Quad; or a triband 3-el Yagi.

The Quad is the choice according to the survey findings. As G4CP states, "The triband 2-el Quad score very heavily on a small suburban location. It is cheap, lightweight, and easy to tune for top performance on each band without specialized equipment. It has a smaller turning circle than a horizontal beam. It is not aesthetically pleasing to a non-ham, nor is it quite as good as a single-band parasitic beam that is tuned on the nose for that one band."

But whatever your decision, get the antenna of your choice as high up as your pocketbook will allow!

If on the other hand you are desirous of putting out what is called a "big signal" on the DX bands, then you are talking about the 4, 5 and 6-el Yagis and the 3- and 4-el Quads. They are in a class by themselves, along with stacked anten-

(Continued on page 168)



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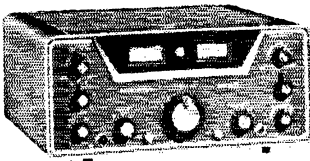
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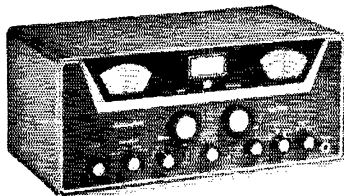
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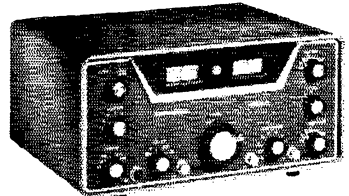
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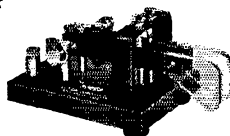
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QST

NEW BOOKS

CB Radio Servicing Guide, by Leo G. Sands. Published by Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis 6, Indiana. 160 pages, including index, 5½ by 8½ inches, paper cover. Price, \$2.95.

This servicing book covers troubleshooting procedures, alignment and measurement of receiver sensitivity, how to analyze receiver circuits, step-by-step analyses of transmitter circuits with sections devoted to crystal oscillators, modulators, and power amplifiers, as well as antenna tuning and coupling networks. There is also information regarding CB radio regulations, chapters on field and shop maintenance, and the business aspects of CB radio servicing.

Electronics Math Simplified, by Alan Andrews. Published by Howard W. Sams & Co., Inc., 4300 West 62nd St., Indianapolis 6, Indiana. Cat. No. MAT-2. 208 pages, including index, 5½ by 8½ inches, paper cover. Price, \$4.95.

This book and Volume 1 combine to give a complete coverage of the mathematics needed to understand and work with electronic principles. Volume 2, however, is entirely self-supporting, since a brief coverage of basic principles of algebra and trigonometry are covered in the beginning chapters. Other chapters cover topics such as special products and factoring, exponents, radicals, linear, quadratic, and simultaneous equations, geometry, vectors, graphs, imaginary numbers, component data calculation, slide-rule operation, Boolean algebra, and mechanics. Each of the topics has several example problems along with practice exercises. Answers are available in the Appendix, as are log and trig tables.

How To Solve Problems in Electricity and Electronics, by Henry Jacobowitz. Published by John F. Rider Publisher, Inc., 116 W. 14th St., New York 11, N.Y. 152 pages, 5½ by 8½ inches, paper cover. Price, \$3.50. Cat. No. 302.

This book is devoted to the solution of typical problems that arise in the study of electricity and electronics. Starting off with simple problems in d.c. circuits, the book progresses to more complex problems involving a.c., tubes and transistors. It is filled with sample problems and answers, and contains a review of the principles and laws of electricity and electronics upon which the solutions are based.

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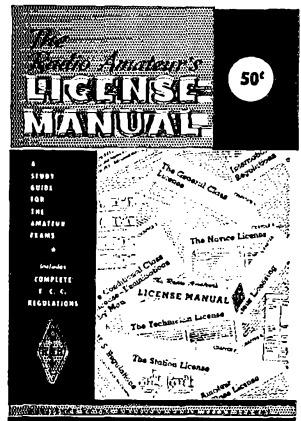
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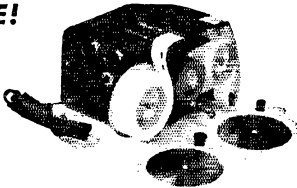
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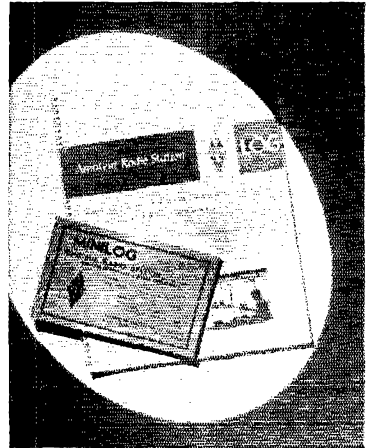
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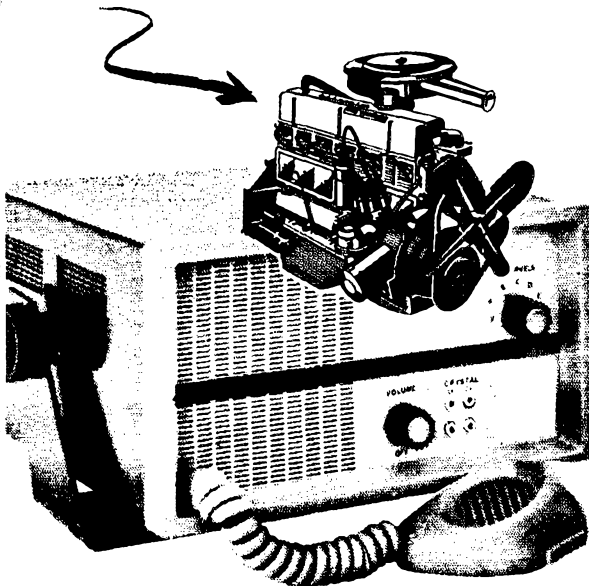


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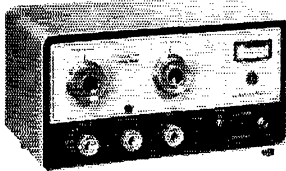
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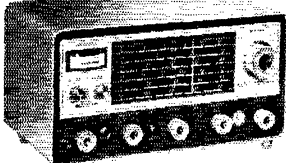
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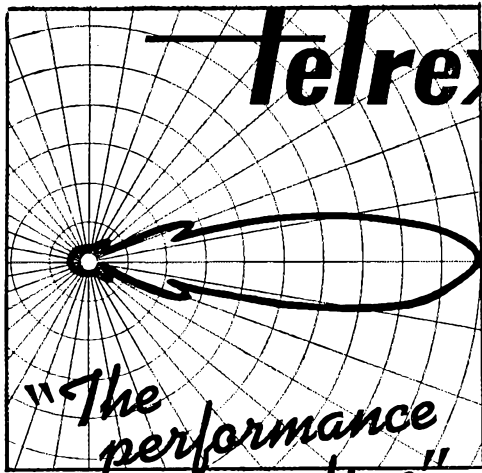
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W4VM, Roy L. Wells, of Rocky Mount, N. C.,
was erroneously listed in the Silent Keys column
of the December 1963 issue of QST. We apologize
for the error, and are glad to report that Mr. Wells is
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THE QSO THAT

STARTED ME UPWARD FINANCIALLY!



As the skip shortened up on 20 one morning and the VK5 I was QSO QSB'd out, a W8 called me. My contact with him was so long that it could have qualified me for the RCC! But it brought me something much more tangible: from this W8 I learned of the big money many hams are earning in commercial and public-safety 2-way radio maintenance. He told me how several years ago he had sent in a coupon from a Lampkin ad in QST—and received a free copy of "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE". It started him on the road to a high extra income.

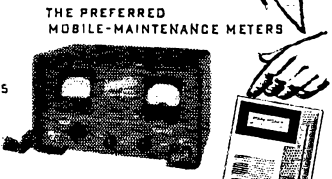
So after signing him out in the log, I found and mailed the coupon from a Lampkin ad. Now I, also, am in high-paying mobile-radio maintenance.

Why don't you send in the coupon? It's at the lower right of this ad!



LAMPKIN 105-B FREQUENCY METER RANGE 0.1 TO 175 MC AND UP PRICE \$260.00 NET

LAMPKIN 205-A FM MODULATION METER. RANGE 25 TO 500 MC. DUAL SCALES, 0-12.5 AND 25 KC, \$270.00 NET. QUAD SCALES, 0-1.25 AND 2.5 KC ADDED, \$310.00 NET FOR SPLIT-CHANNEL MEASUREMENTS: The Lampkin PPM Meter accessory for the 105-B. Accuracy 0.0001%. Price \$147.00 net.



THE PREFERRED MOBILE-MAINTENANCE METERS

MAIL COUPON TODAY

LAMPKIN LABORATORIES, INC., BRADENTON FLA.

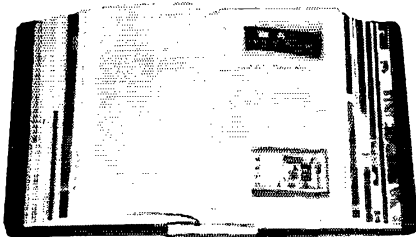
LAMPKIN LABORATORIES, INC. MFG. DIVISION, BRADENTON, FLORIDA

AT NO OBLIGATION TO ME, PLEASE SEND ME "HOW TO MAKE MONEY IN MOBILE-RADIO MAINTENANCE"—and data on Lampkin Meters.

NAME _____

ADDRESS _____

CITY _____ STATE _____



QST PROTECTOR!



Are your 1963 QST's scattered sloppily around your shack? If so, get a QST Binder and file them away neatly for future reference. While you're at it, start the New Year right by obtaining another Binder in which to preserve those interesting ARRL 50th Anniversary Year issues to come throughout 1964.

- Holds 12 issues of QST
- Opens to any page and lies flat
- Protects and preserves your copies
- QSTs always available for reference

QST BINDERS (POSTPAID)
Each—\$3.00

*Available only in the United States
and Possessions*

**AMERICAN RADIO RELAY
LEAGUE**

Newington, Conn. 06111

BIG SAVINGS ON NEW & DEMO HAM GEAR

TRADE-INS ACCEPTED
On Ham Gear, CB, Marine
Electronics & Hi-Fi equip.

TIME PAYMENTS
Up to 24 months
to pay

PARTIAL LIST OF NEW & USED EQUIPMENT

New NC 270	National NC 155 ...	\$125.00
National	Globe Chief.....	45.00
New Poly 6 and 2...	Globe Scout.....	69.95
275.00	Globe Sidebender...	69.95
Geloso 212.....	Multi-Elmac AF 67...	60.00
179.95	Fico 720.....	50.00
Hallicrafters SX 110	Hammarlund HQ	
90.00	100 C.....	104.50
Hallicrafters SX 100		
169.95		
Gonset GBS 100.....		
219.50		
Heath DX 100.....		
125.00		
Heath DX 20.....		
35.00		
Multi Elmac AF 67, PRM 7, PW supply.....		\$225 Total

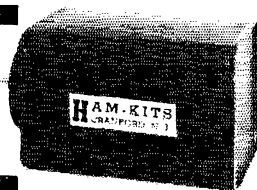
WE WILL BUY FOR CASH

Your used Ham, C.B., Marine
Electronics, and Hi-Fi equip.
High prices paid!

Mail orders filled promptly. 20% deposit required. Balance C.O.D. Many other specials available. Send us your requirements and get our quotation.

AIREX RADIO CORP.

85 QS Cortlandt St., New York 7, N. Y., WOrth 4-1820



DUMMY LOAD

52 ohm, non-reactive
film oxide R.F. unit. All
band, all power to 1 kW.
SWR 1.2 to 1.

Kit \$7.95 postpaid.
Wired, add \$2
HAM KITS

Box 175, Cranford, N. J.

ENJOY EASY, RESTFUL KEYING

With **VIBROPLEX**

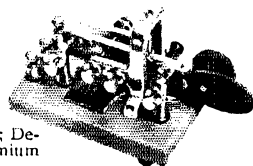


Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium

Base and red finger and thumb pieces. Five models to choose from, priced at \$17.95 to the 24K Gold Plated Base "Presentation" at \$33.95.

VIBRO-KEYER

Works perfectly with any Electronic Transmitting Unit. Weighs 2 3/4 lbs., with a base 3 1/2" by 4 1/2". Has Vibroplex's finely polished parts, red knob and finger, and thumb pieces. Standard model \$17.95; DeLuxe model includes Chromium Plated Base at only \$22.45.



Order today at your dealers or direct

THE VIBROPLEX CO., INC.
833 Broadway New York 3, N. Y.

**FREE
Folder**

NOW

EXCLUSIVE 66 FOOT MOR-GAIN 75 AND 40 METER DIPOLE
NO TRAPS — NO COILS — NO STUBS — NO CAPACITORS
Fully Air Tested — Hundreds Already In Use



40% Copper Clad wire—Under 2 lbs. Air Weight—Rated for full legal power—AM/CW or SB—Coaxial or Balanced 50-75 ohm feed—VSWR under 1.5 to 1 at most heights—Rust resistant hardware—Drop-proof insulators. Completely assembled, ready to put up. Model 75/40 Amateur Net \$28.00. Terrific Performance—No coils or traps to break down or change under weather conditions—Fully Guaranteed.

Other MOR-GAIN Antennas—Model 40/20—34 feet—Net \$22.00. Model 75/40/15 Net \$35.00. Verticals 5 to 34 feet—Net \$9.00 to \$22.00. 40/20 Rotatable Dipole \$69.50.—Plus many more.

ORDER DIRECT OR WRITE FOR FULL INFORMATION

MOR-GAIN P.O. Box 6006
Alexandria, Virginia
Phones: Days 301-743-3334; Nights 703-780-2171

OR THRU YOUR FAVORITE DISTRIBUTOR

WANTED

YOUR MILITARY SURPLUS EQUIPMENT

WE NEED:

AIRBORNE: ARN-14, ARN-18, ARN-21, ARN-30, ARN-32, ARN-38, ARN-52, ARN-59, ARN-67, ARC-27, ARC-34, ARC-38, ARC-44, ARC-49, ARC-52, ARC-54, ARC-57, ARC-58, ARC-65, ARC-73, ARC-84, 17L-4, 6 or 7, 51R-3, 51V-2 or 3, 51X-2, 618S, 618T, APX-25, TRANSPONDOR, APN-70 LORAN, APS-42 RADAR.

GROUND EQUIPMENT: AN/PRC-6, PRC-8, PRC-9, PRC-10, AN/GRC-3, 4, 5, 6, 7, 8, 9, 19, 27, 32, 46. RT-66, RT-67, RT-68, RT-70/GRC.

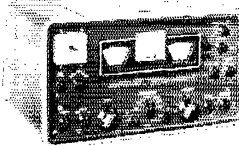
RECEIVERS: R-220, R-274, R-388, R-390, R-391, R-392/URR, SP-600JX, BC-342N, BC-348, RBL. TEST EQUIPMENT WITH ARC, ARM, SG, URM, UPM, USM, AND TS PREFIXES.

TUBES, NEW BOXED TRANSMITTING AND SPECIAL PURPOSE TYPES.

SEND US YOUR LIST OF MILITARY SURPLUS GEAR AND TELL US WHAT YOU NEED. WILL TRADE NEW FACTORY BOXED 1964 HAMMARLUND GEAR. ALL RECEIVERS WITH CLOCK AND MATCHING SPEAKER.



HX-50 TRANSMITTER



HQ-170A



HQ-180A

HQ-100AC	\$213.95
HQ-110AC	273.95
HQ-145XC	298.95
HQ-170AC	388.95
HQ-170C — 1963 Model	288.95
HQ-180AC	458.95
HQ-180AX, 11 CRYSTAL CONTROL FIXED FREQ., PLUS V.F.O. SUP- PLIED LESS CRYSTALS	517.95
SP-600JX 540 KC TO 54 MC High Band	1140.00

SP-600JX 10 KC TO 540 KCS Low Band	1975.00
HC-10 CONVERTER, USE WITH ANY SUPERHET HAVING 450-550KC I.F. FOR SSB, CW, OR AM RE- CEPTION	149.00
HK-1B ELECTRONIC KEYS	39.95
HQ-105TRS CITIZEN BAND TRANSCEIVER WITH BUILT-IN SPEAKER	229.50
TRANSMITTERS	
HX-50 SSB TRANSMITTER	449.50
HX-500 SSB TRANSMITTER	695.00

SLEP ELECTRONICS CO., Box 178 QT, Ellenton, Florida 33532, Ph. 722-1843 (813)

Dear Bill, W4FHY:

I have to Trade in my _____

I'm interested in a Hammarlund _____

Name _____

Address _____

City _____ State _____

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. 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 copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signatures must accompany all authorized insertions. No checking-copies be supplied.

(8) No advertiser may use more than 100 words in any one issue nor more than one ad in one issue.

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.

S.R.R.C. Hamfest: June 7, 1964. Write for details after April 1, 1964. Starved Rock Radio Club, W9MK5/W9QLZ, RFD #1, Box 171, Oglesby, Illinois.

WANTED: Early wireless gear, books, magazines, catalogs before 1922. Send description and prices. W6GH, 1010 Monte Dr., Santa Barbara, Calif.

MOTOROLA used FM communications equipment bought and sold. W5BCQ, Ralph Hicks, Box 6097, Tulsa, Okla.

We buy all types of tubes for cash, especially Elmas, subject to our test. Maritime International Co., 199 Front St., Hempstead, N.Y.

TORQUES: Uncased 88 Mhz. like new. Dollar each. Five/\$4.00. P. P. DaPaul, 309 South Ashton, Millbrae, Calif.

SOUTHERN California: Transmitter and receivers repaired, aligned. Bandwidth, frequency, harmonics measured. Used ham gear bought, sold, traded. Robinson Electronics, 922 W. Chapman, Orange, Calif. Tel. KEllogg 8-0500.

CASH for your gear! We buy, trade and sell. We stock Hammarlund, Hallicrafters, National, Johnson, RME, Hy-Gain, Mosley and other lines of ham gear. Ask for our equipment list. H & H Electronic Supply Inc., 506-510 Kishwaukee St., Rockford, Ill.

WANTED: Military or Industrial laboratory test equipment. Electronicraft, Box 13, Mt. Kisco, N.Y.

WANT 1925 and earlier ham and broadcast gear for personal collection. W4AA, Wayne Nelson, Concord, N.C.

MICHIGAN Hams! Amateur supplies, standard brands. Store hours 0830 to 1730 Monday through Saturday. Roy J. Purchase, W8RP, Purchase Radio Supply, 327 E. Hoover St., Ann Arbor, Michigan, Tel NOrmandy 8-3262.

HAM TV Equipment bought, sold, traded. Al Denson, WIBYX, Rockville, Conn.

TOROID RTTY Kit: Mark-Space discriminator and bandpass filters. Includes 4-88 Mhz and 1-44 Mhz uncased like new condx. toroids: information sheet, mounting hardware and six mylar capacitors, \$5.00 ppd. Toroids: specify 88 or 44, less capacitors, \$1.00 each. 5/\$4.00, ppd. KCM Products, Box 88, Milwaukee 13, Wis.

ACT Now! Barry nays cash for tubes (unused) and equipment. Barry Electronics, 512 Broadway, NYC 12. Call 212-WALKER-5-7000.

VALIANT, Drake 2-A, \$450. Excellent, K8VYY.

WANTED Handbooks, literature, manuals, everything concerning ham radio. Zapateria, Lopez 13, Mexico City.

WANTED For cash: Collins 314B-4 console and MM-1 mike. W0DVZ, Box 475, Ottumwa, Iowa.

INTERESTED in two-meter linear amplifiers, transmitters, receivers, etc. If the price is reasonable to members of St. Mary's Radio Club, or as tax exempt donation to Missions. K8WL8, St. Joseph's Mercy Hospital, Centerville, Iowa.

304TL tubes wanted. Also other xmtg and special purpose tubes. We will buy military or commercial transmitters and receivers with designations ARC, GRC, URR, 51 and MN. Air Ground Electronics Co., 64 Grand Pl., Kearny, N.J.

QSLs? WPE? SWLS?? Outstanding variety regular samples, 10¢. Deluxe samples, 35¢. Gospel samples, 10¢ (refunded). Sakkers, Box 218, Holland, Michigan 49424.

C. FRITZ QSLs. Highest quality consistently for a quarter century! Samples 25¢ deductible. Box 1684, Scottsdale, Ariz. (formerly Joliet, Ill.)

QSL SWL cards that are different. Quality card stock. Samples 10¢. Home Print, 2416 Elmo, Hamilton, Ohio.

QLS Specialists. Distinctive Samples 15¢. DRJ Studios, 2114 N. Laverne Ave., Chicago 39, Ill. 60639

QSLs: samples 25¢ (refundable). Schuch, W6CMN, Wildcat Press, 6707 Beck Ave., North Hollywood, Calif.

QSLs "Brownie." W3CII, 3111 Lehigh, Allentown, Penna. Catalog with samples, 25¢.

QSLs-SWLS/WPE. Finest. Since 1946. Largest assortment. Priced right. Send 10¢ for samples to: Glenn Print, 1430 Bonsal St., Baltimore 24, Md.

QSLs. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs-SMS. Samples 10¢. Malgo Press, Box 375 M.O., Toledo 1, Ohio 14107.

PICTURE QSL Cards of your shack, etc. Made from your photograph. 1000, \$14.50. Also unusual non-picture designs. Samples 20¢. Raum's, 4154 Fifth St., Philadelphia, Pa., 19140.

DELUXE QLS. Petty, W2HAZ, Box 27, Trenton, N.J. Samples, 10¢.

QSLs. Special, 100 50 Star U.S. Flags on glossy cards. \$3.70. Ppd. Other samples 10¢ or 25¢ refunded. Dick, W8VXK, Rt. 4, Gladwin, Mich.

QSLs-SWLS, 100 2-color glossy, \$3.00; QSO file cards, \$1.00 per 100. Samples, 10¢. Rusprint, Box 7575, Kansas City 16, Mo. 64116.

QSLs. Distinctive samples dime. Volpress, Box 133, Farmingdale, N.Y.

CREATIVE QSL Cards. Free, new catalog and samples. Personal attention given. Wilkens Creative Printing, P.O. Box 10641, Atascadero, Calif.

QSLs SWLS/WPE. Samples 10¢ in adv. Nicholas & Son Printery, P.O. Box 11184, Phoenix 17, Ariz.

ZIP Code rubber stamp, call, name, address, with ink pad, \$1.00. K4ISA, E. Perry, Box 8080, Allendale, Fla.

QSLs SWLS. XYL-QMs (sample assortment approximately 9¢) covering designing, planning, printing, arranging, mailing: eye-catching, comic, sedate, fantabulous. DX-attracting, prototypical, snazy, unparagoned cards (Wow!), Rogers, K0AAB, 961 Arcade St., St. Paul 6, Minn.

SUPERIOR QSLs, samples 10¢. Ham. Specialties, Box 73, Hobbs, New Mexico (formerly Bellaire, Texas).

QSLs 300 for \$4.35. Samples 10¢. W9SKR, "George" Vesely, Rte. #1, 100 Wilson Road, Inleside, Ill. 60041

QSLs. Samples 25¢. Rubber stamps: name, call and address \$1.55. Harry Sims, 3227 Missouri Ave., St. Louis 18, Mo. 63118

QSLs 3-color glossy, 100, \$4.50. Rutgers Vari-Typing Service. Free samples Thomas St., Riegel Ridge, Milford, N.J.

QSLs. Kromekote 2 & 3 colors, attractive, distinctive, different. Free ball point pen with order. Sample 15¢. Agents for Call-D-Cal decals. K2VOB Press, 62 Midland Blvd., Maplewood, N.J.

QSLs \$2.50 per 100. Free samples and catalog. Garth, Jutland, N.J.

QSLs. All kinds, free samples. W7IIZ Press, Box 183, Springfield, Ore.

AT Last! Something new in QSL cards! All original designs. Send 10¢ for samples to Yarsco, Box 307, Yorktown Heights 1, N.Y.

PHOTOSTAMPS of your station with gummed back for your QSLs, 100 \$1.50. Samples 10¢. Morgan, W8NLW, 443 Euclid, Akron, Ohio.

DON'T Buy QSLs until you see my free samples. Bolles, W5OWC, Box 9363, Austin, Texas.

QSLs. Stamp and call brings samples. Eddie Scott, W3CSX, Fairplay, Md.

QSLs: 300 2-color, \$3.00. Samples 10¢. Brigham, 32 Colson St., North Billerica, Mass.

RUBBER Stamps \$1.00. Call and address. Clint's Radio, W2UDO, 32 Cumberland Ave., Verona, N.J.

RUBBER Stamps to make your own QSL cards. Complete QSL kit includes 3 stamps, ink and pad, also 5 year certificate for QTH and call changes. Complete \$6.50. Write for free information and sample impressions. E & R Rubber Stamp, 50 Gerald Rd., Rantoul, Ill.

1147 Call QSLs (2 sides printed) 100, \$3.15. Sample free. Gariepy, 2624 Kroemer, Ft. Wayne, Ind.

BLANTON'S QSLs. Write for samples. Box 7064, Akron 6, Ohio.

FINE QSLs, Dime. Filmmasters, Box 304, Martins Ferry, Ohio.

QSLs. Nice designs, Nice colors, Reasonable prices. Samples 10¢. Gates Print, 317-11th Ave., Juniata, Altoona, Penna.

QUALITY QSLs. New designs monthly. Samples, 10¢, 25¢, 50¢. Savory, 172 Roosevelt, Weymouth, Mass.

QSLs. Samples 20¢. QSL Press, Box 281, Oak Park, Illinois 60303.

1964 QSL Catalog. New designs 10¢. Longbrook, Box 393-W, Quakertown, Pa.

QSLs. Beautiful new designs. Dime. Filmmasters, Box 304, Martins Ferry, Ohio.

QSLs. Large selection styles including photos. Fast service. Samples Dime. Ray, K7HLR, Rte. 3, Twin Falls, Idaho.

RUBBER Stamps for hams, sample impressions. W9UNY, Hamn, 542 N. 93, Milwaukee, Wis.

QSLs. See our new "Eyebinder" cards. Visible 1/2-mile. Samples 25¢. Dick, W8VXK, 1996 N. M-18, Gladwin, Mich.

ATTRACTIVE QSLs: Guaranteed largest variety of individual samples (25¢ deductible). Paul Levin, K2MTT, 1460 Carroll St., Brooklyn, N.Y. 11213.

QSLs: Nice designs. Reasonable prices. Samples 10¢. Gates Print Shop, 317-11th Ave., Juniata, Altoona, Penna.

QSLs: Samples, dime. Printer, Corwith, Iowa.

QSLs: Glossy. New distinctive designs. Samples 10¢ (refundable). R. A. Larson Press, Box 45, Fairport, N.Y.

Q-Stamp: now \$1.50! Postage-stamp size photographs for QSLs. 100 small or 50 large. \$1.50 per gummer-back perforated sheet. Free samples. Q-Stamp, Box 149, Dept. 1-A, Gary, Ind. 46401.

QSLs-SWHLs: Beautiful quality! No junk. Low prices. Samples 10¢. Refundable. Joe Harms, WA4FJE (W2JME/W1GET), 907 Fernald, Edgewater, Florida.

ENVELOPES Printed with your call, name, address, Zip Code. Save time, writing! #634 or #10, \$1.95 first 100, 95¢ each additional 100, 5-day service. Envo-King, Box 152, M.O., Springfield, Mass. 01101.

WANTED: Commercial, Military. All types, ARC, ARN, ARM, HC, GRC, PRC, TRC, URR, URM, TS, 618S, 17L, 51R, others. Ritco, P.O. Box 156, Annandale, Va.

HAM Discount House. Write us for lowest prices on Ham Equipment. Factory sealed cartons. Specific equipment wanted. H D H Sales Co., 170 Lockwood Ave., Stamford, Conn.

SELL: Excit Drake 2-A, \$190; Knight VFO, \$20. Keith Lawrence, 13212 Stanbridge, Downey, Calif.

WANTED: 2 to 12 304TL tubes. Callanan, W9AU, P.O. Box 155, Barrington, Ill.

COMPLETE Ham Station with Collins S/Line transmitter and receiver, 516F-2 power supply and 31B-4 station control, brand new. Present market price over \$2100 plus provincial taxes. Will consider all reasonable offers. Write J. Long, 920 Chénier Ave., Ottawa 13, Ont.

WANTED: FMC GSB-1 slicer, state condx and price. C. Gutman, 7526 Mountbatten Rd., Cote St. Luc, Montreal 29, Que. P., Canada.

HALLICRAFTERS SR-150 amateur band. Fixed/mobile transceiver and its accessories for \$695.95. Contact Michael Reed, 1021 Garrison St., Fremont, Ohio. Tel: 332-3453.

COLLINS 75A3 with product detector, \$300; Collins 32V2, \$200. Must sell. John P. Tiedeck, WA2SDE, Indian Run Farm, Woodstown, N.J.

ATTENTION! Mobiles Heavy-duty Leece-Neville 6 volt 100 amp. system, \$50; 12 volt amp. system, \$50; 12 volt 6 amp. system, \$60; 12 volt 100 amp. system, \$100. Built-in silicon rectifier alternator 12 volt 60 amps. \$100; 12 volt 100 amps. \$125.00. Guaranteed no ex-police car units. Herbert A. Zimmerman, Jr., K2PAT, 1907 Concy Island Ave., Brooklyn 30, N.Y. Tel DEWey 6-7388.

MUST DISPOSE: 82 copies Proceedings of the IRE. 3 volumes complete, 1926 to 1952. Real bargain for list. Write for list Mrs. Miriam Y. Knapp, W1ZIM, 191 Beechwood Rd., West Hartford 7, Conn. Tel: 521-2055.

WE Have some excellent bargains in new and used antennas, transmitters and receivers. Write for list, Hornet Antenna Products Co., Box 808, Duncan, Okla.

WANTED: Parts, sets, as is GRC-9, BC-610, GRC-27, Autodyne, 236 Park Avenue, Bethpage, L.I., N.Y.

PARTS Sale: Too many—both new and surplus. New K. W. Modulation transformer, PE-103's, tubes, filament transformers, relays, etc. that do you need? Send stamp for list. WANJE, Box 4192, Lynchburg, Va.

WANTED: Tubes, all types, write or phone W2ONV, Bill Sambo, 243 Harrison Avenue, Garfield, N.J. Tel: GARfield 4/1-2020.

CASH promptly paid for your ham gear. Trigger, 7361 North, River Forest, Ill. PR 1-8616.

TUBES Wanted. All types, highest prices paid. Write or phone Lou-Tronics, Inc., 131 Lawrence St., Brooklyn 1, N.Y. Tel. UL 5-2615.

\$1.00 will change all your old xtals to new freq. where you want them, safe etching method, complete, no gimmicks, air-mailed. Ham-Kits, dummy loads, Cranford, N.J.

WANTED: All types of aircraft or ground ratios. 17L, 618F or S 388, 390, GRC, PRC, 51J, RVX. 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, W2KUH, 308 Hickory, Arlington, N.J.

SELL: Drake 2B and 2BQ in mind condx. Best offer. W1VVA, 25 Lincoln Ave., South Norwalk, Conn.

WANTED: 5 or 6 element Telrex 20m beam. W2UGM, 66 Columbus, Closter, N.J. 201 PO 2-1884.

TUBES, Diodes, transistors wanted. High cash prices paid. Astrolabonics, Box 636, Elizabeth, N.J. Tel: 354-3141.

ELECTRONIC Bargains. Discounts from net. Free brochure. Franklin Electronics, Box 51b, Brentwood, N.Y. 11717.

SILICON Rectifiers, 400 PIV, 0.5A, 4 for \$1.00 ppd. While they last! Surplus Sy, 71 Corbin Pl., Brooklyn 35, N.Y.

MUST Sell Collins KW-1 transmitter. Excellent condx. Will sell to the highest bidder. Friar Tom, St. Anthony Friary, Hudson, N.H.

FOR SALE: Complete instructions including 28 page booklet and 26 x 36 schematic for converting the ART/13 transmitter to A.M. and SSB, \$2.50. Satisfaction guaranteed. Sam Appleton, K5MKI, 501 N. Maxwell St., Tulsa, Texas.

SELL: 32 S1 with AC supply, less than 2 hours use. Will throw in old Dumore scope, \$350; Elicico SSB 1000F linear, \$300; Elicico SSB 100F exciter, \$400; Transtenna T-R switch, new, \$45.00; Elicico low pass filter, \$5.00, Sony CS-300 stereo tape recorder, \$225. Concertone professional recorder, 7 1/2" and 15", five heads, 10" reels, \$500. All f.o.b. Lamb, 1219 Yardley Rd., Morrisville, Penna.

SWAP, Sell, trade with other hams! Special subscription to "Ham Trader", 12 issues \$1.00. Box 153Q, Franklin Square, N.Y.

F.W. Ranger, \$150; HQ-170. \$220; AF-67 with mtg rack, 110V supply, mobile supply, G66B and 3-way supply, mike, \$195. All gear exclnt condx. L. Solberg, K9KDV, RR #3, Hartford City, Ind.

IRE Proceedings wanted. WA2VSF, 200 Highland, Ithaca, N.Y. 14850.

KWM-2 and 516F2 AC supply and 351D-2 mount and MP-1 mobile supply, new in February 4, 1963. \$1050. W7WRS, 4200 Lorna Pl., Las Vegas, Nev.

FOR Sale: Serviceman wants quick sale of 30 L 1 exclnt condx. \$400 or best offer. K1EJO, 6 Summit St., New Milford, Conn. Tel: EL-4-8154.

THUNDERBOLT Linear L/N, \$375.00. W2DTD.

HQ-180, new condx, purchased October 1962, repacked in original carton, February 1963, in dry storage since \$330. Prepaid continental US. WA4PHI, Box 246, Savannah, Ga.

WANTED: Drake 2B rcvr. Bob Heister, WBG6EJ, 521 Park Lane, Petaluma, Calif.

BOOST Reception: 3.5—30 Mcgacycle SK-20 Preselector kit, \$18.98; boost modulation, AA-A-1 clipper-filter kit, \$10.99, reduce noise BU-7 noisejector, HF, wired \$4.49. Postpaid! Literature free. Holstrom Associates, Box 8640-T, Sacramento 22, Calif.

FOR Sale: 3600-0-3600 at 1000 Ma. plate transformers with dual 110V and 220V primaries. \$35; General Electric 120 Mid 3000 V filter capacitors. \$30. Peter W. Dahl, 3331 Oaklawn Ave., Minneapolis 55424, Minn.

SALE: KW parts. Thordanson Multimatch modulation xtfrm, new, \$25.00; Heavy duty UTC-CG108, 10 hv. 500 Ma. choke, new, \$20.00; Johnson KW Matchbox like new condx, no Moni-match, \$75.00; Johnson 6 and 2 mtr. converter, \$45.00; Central Electronics 20A SSB exciter and 458 deluxe VFO H/W, \$150.00; Peard KS 15512L S score made for Western Electric. In heavy duty case, \$35.00. H. W. Kutz, K2GGU, 222 Swarthore Rd., Glassboro, N.J.

WANTED: For personal collection: OSTs March, April, May and August 1916; ARRL Handbook Edition 1, W1CUT, 18 Mohawk Dr., Unionville, Conn.

SELL: Transceiver, Gonset G-76, in exclnt condx. postpaid first \$219.00 check. W. F. Anderson, 1025 Glorietta, N.E., Albuquerque, N.M.

COLLINS 32V-2, Mosley CM-1 receiver with speaker. Dow-Key relay and mike. Complete first-class station. \$325.00. F. C. Harper, 101 Griffin Ave., Somersct, Ky.

FOR Sale: Heath mobile single sideband station. HX-20 transmitter \$175.00; HR-20 receiver, \$95.00; HP-10 power supply, \$27.00; first certified check for \$280 or make offer. Harry Moon, 775 Union Ave., Boulder, Colorado.

KNIGHT Kit T-60, in A-1 shape, plus CM-30 mike, \$35.00; Hy-Gain 14 AVS vertical, \$20.00, plus mounting kit and radials. Elio 171 decade resistance box, \$14.00. R. W. Campbell, W5-LNQ/4, 316 Mariemont Dr., Lexington, Ky.

PRINTED Circuit resist. applies with ordinary pen. \$1.00. Box 19083, Ft. Tate, Indianapolis, Ind.

LATE Model RME 6900 receiver in beautiful condx. Must sell. \$325.00. WA2PPE, Randy Brook, 25 Parkview Ave., Bronxville, N.Y.

TRADE Or sell: Unimat lathe, new, never used, in factory carton. See Oct. Popular Science. Worth \$125.00. W4JQK, Wilbur S. Johnson, Rt. 20, Knoxville, Tenn. 37921.

18 Antique radio tubes; de Forest Ultraidion (Hudson filament), Myers "red head" audion, Royal Ediswan Fleming Oscillation Valve, 3 Western Electric 239-A's, RCA UX-199, four RCA 24A's, two Telefunken DRP triodes, Sueddeutsche KTD triode, ETC., VT-11, CG1162/Navv 5W, and an unidentifiable diode; Also have "Yellow Book of Wireless Telegraphy and Telephony for 1914 and 1920. Best offer. Miss Jessie York, P.O. Box 130, Tannery Road, Downsview, N.Y.

"HOSS-Trader," Ed Moory—Sells Cheaper; Unheard of Used Bargains: New Swan Tri-Bander, \$249.00; Galaxy 300, \$259.00; SBE-33, \$279.00; 10-B, \$59.00; Matching Station HT-37 & SX-111, \$409.00; TR-3, \$449.00; Factory Reconditioned Thunderbolt, \$295.00; Johnson Pacemaker, \$129.00; New Demo Hunter Bandit, \$42.00; W-2 in Sealed Carton, \$799.00; 75S1 with Warranty, \$499.00; New Hy-Gain TH-4 Beam and Demo Ham-Rotor \$179.00; Ht-32, \$299.00; Single Band Swan, \$149.00; 75A-4 Serial #4100 Factory reconditioned, \$325.00; Demonstrator Sr-150, \$469.00; Immediate Delivery SR-160 & HT-44; New Loudspeaker, \$199.00; New 75S-3 and Used 32S-3, \$995.00; SX-111, \$129.00; Terms Cash; "Ed Moory Wholesale Radio—(W5BDR) Box 506, DeWitt, Arkansas. Phone Whitney 6-2820

CODE Practice tape, 30 minutes. Exclnt list. 5-20 WPM. Test sheet included. \$1.00. P.P. William Levey, WA4FAT, 3406 Montello Rd., Birmingham, Ala. 35213.

SELL: HT-37, \$350; Gonset 101, \$225; SX-111, \$175.00, perfect condx. WA2QST, George Gromm, 1622 President St., Brooklyn, N.Y. PR 3-8038.

FOR Sale: DX-100 in exclnt condx throughout. \$125.00 F.O.B. K5PAC, 1641 Oakland, Fayetteville, Arkansas.

SIX Meter SSB, Tapetone heterodyne transmitter, 100 watts P.E.P. TVI suppressed. Unit is new and in perfect physical condition. Dave Angel, Green River Road, Williamstown, Mass.

WANTED: Old tenor banjo, Paramount E or F, B & D #4 or Ne Plus, Weyman 4 or plus, Vega Gibson, etc. Have HTS and SX-101 or will buy outright. W8GWA, 4115 Walnut Lake Rd., Orchard Lake, Mich.

NC-270 receiver practically unused and in exclnt condx. Sell: \$185.00. Wayne Hall, 1400 Owens Road, S.E., Washington 21, D.C.

SWAP: Boehme 4-D keying unit with 3-E keying head. Make offer. Roy Broucher, W5HPB, 4002 Levenshire, Houston 25, Texas.

SELL Johnson Signal Sentry, Perfect. Instructions. \$6.00. Bloomingdale, 113 Henderson, Syracuse 9, N.Y.

FOR Sale: 200V, in mint condx, \$575.00; Hallcrafters SX-88, \$275; Gonset Super 12 mobile converter, never used, \$45. Russ Freed, W3AEM, phone HO-9-6004, RD #1, Pottstown, Penna.

DOMESTIC Trouble forces sale of complete Collins station: 75S-3 325-1 with power supply, 30L1, Heathkit R.F. Monitor scope, Hy-Gain DB-24 (20.40 meter beam) all in exclnt cond. Priced to sell. Call Phil Shatz at 7803472 or write 14707 Titus, Van Nuys, Calif.

4CX1000A final and supply, custom built by Eimac, band-switching, 3000 PEP, no shipping, svr; sacrifice. Best over \$495. 0-3000V @ 1 amp, custom supply, has everything, your best offer ever. Evenings. W1WNY, 25 Bayberry, New Canaan, Conn. 303-0966-1346.

LINEAR Amplifier. 1500 W. PEP. 2-4X125As in PP 5-panel meters, rack panel, bandswitching 80-10 meters. Requires 5 watts to drive. A terrific buy at \$225.00. Stephen Lynch, 219 E. 6th St. 211 43192.

HEATHKIT Apache, used less than 10 hours, \$185. M. B. Chaffield, 6867 Dume Dr., Malibu, Calif.

HT-37. Almost new, used less than 4 months, with Dow-Key relay, \$350.00. John McCoy, WB2BFF, Preffer pick-up deal, no shipping, Rte. 8, Coldbrook, (Herkimer Co.), N.Y.

POLYCOM 62B, Watrln 6.2 meter halo, Two 6 meter xrals. \$250.00 takes all. W2RLG, 325 Morgan Ave., Old Bridge, N.J. Phone: CL 7-0227.

COLLINS 75A-3 with 3100 and 800 cycle filters, 8R-1 xtal calibrator, and speaker, in exclnt cond. Best offer over \$300. Greg Pierce, 2514 University Ave., Chicago, Illinois 60637.

HRO 15 Meter ranges, \$15.00, with other range exchange. Details, W1FNS, 392 Central St., Saugus, Mass.

HT-32A, \$395; SX-101, \$175.00. Both are in mint condx. Package deal. Asking \$535. W4TCG, 425 Saddlerock Rd., Norfolk, Va.

WANTED: Used signal generator. Preffer Measurement Corp. model 80 or similar. Also Lampkin Labs 105B. Must be very reasonable and OK condx. Campbell, 2425 Bradley Rd., Rockford, Ill.

RIG D Hambore August 15, 1964. Make plans now. Write Box 30532, Dallas, Texas. H. D. Wheeless, Dallas Amateur Radio Club.

SELL Morrow Twins (MB560A xmtr, MBR5 rcvr, see May and Nov. 1956 QST), complete with Shure 505K mike, James and Morrow P/S, cables, manuals, brackets, 6-12 v. no mods, one owner, in exclnt cond for \$195.00. Orig. cost: \$550. Also NC-98 rcvr \$45.00. J. R. Hall, 4824 Hill St., La Canada, Calif. 790-6643, WA6JBM.

NORTHERN New Jersey Hammarlund HQ-110 with clock, \$150.00 and Globe Chief 90-A, \$30; cash and carry only. 425 Hillside Place, South Orange, SO 3-5287.

DRAKE 2B, xtal calibr., Q-multiplier spkr, \$225.00; DX-100B, grid block keying, set up for SBD, clean, \$150. Bud KW low-pass, \$10; Dow-Key Relay, \$7.00. All for \$375.00. WA6BNI, 3808 W. 180th St., Torrance, Calif. Tel: D1avis 43934.

SALE: Complete station, ready to operate: SX-101 MK III, \$175.00; DX100B with SSB Modification, \$105; above with Dow-Key, Heath SWR, D-104, H/B antenna coupler, and in-terconnection cables for \$300; preffer. Orig. cost: \$550. Also NC-98 rcvr \$45.00. J. R. Hall, 4824 Hill St., La Canada, Calif. 790-6643, WA6JBM.

ELMAC-AF67, PMR-7, M1070 Pwr., mike, 5 plug-in fiberglas whips and mount, \$225.00. On air, K8DOC, 3713 Brooklyn, Cleveland 9, Ohio 44109.

SELL: Eico 720 transmitter, 730 modulator, 722 VFO, w/cables and coax relay. Like new cond, clean, Nice wiring job. Will ship. Best offer above \$150. KIETU, Charley King, 36 Linsley Ave., Meriden, Conn.

SEASON'S Greetings! I have the following, plus list of other gear, mostly in exclnt shape: Navy RDZ 200-400 Mc rcvr, \$75; Hallcrafters 238-143 Mc rcvr, \$65; Johnson Navigator like new \$95; Icom 705 VFO rcvr, \$115; Deluxe Heath MW-33 (DM-34R) Ck, \$68; HD-11 Q-multiplier (like new), \$9.00; Hazeltine 143-236 Mc, AOP-1 wacymeter, \$15. Want: Hallcrafters S-37, (130-210 Mc.) rcvr, J. L. "Jim" Trout, W8GGK, Rte 1, Box 724, Stevensville, Mich, 49127.

COLLINS 312B-4 speaker console with wattmeter, \$125.00. W5YUD, WA 7-8108, 4928 Cockrell Ave., Ft. Worth, Texas.

SELL: HT-37, Drake 2A w/xtal calibr., Turner 211 mike. All in perf. cond: \$490.00 plus shipping. Paul Horton, W4TEW, 132 Argonne Dr., Durham, N.C.

SELL: 75A3 and speaker, all accessories and book: \$450.00; late model Zeus xmtr and book, \$500; RME126 and 2-meter Ameco preamp, \$185.00; D-104 ceramic and heavy brass key, \$20; one 2 & one 6 meter Telrex beams, 200 ft., R-68/U and 2 relays, \$60. All the above in mint condx, original cartons. Sell as a unit. F.o.b. Chalk Hill, Penna. \$1125.00. W3AKZ, Box 34, Chalk Hill, Penna. All inquiries will be answered.

SELL: KWM-1, No. 1007, never used mobile, homebrew AC supply, cable, manual, \$350.00. Heathkit HX-20, unacked, unassembled, \$160.00; Heath Monitorscope HO-10 assembled, new, \$45.00; Ameco 2-meter converter 6-10 Mc. I.F. model CN Nuvistor, new, \$30. Will ship collect anywhere. W8TGL RFD 2, Box 305, Fairmount, W. Va.

MUST Sell complete rig. Landlord forbids operating. Exclnt condx: Heath Apache, HQ-110C w/Hammarlund spkr, Vibroplex Original detector, D-04, dipos W7G-8/U, 100 ft. (2) B&W low-pass. Preffer sell as complete lot. Peter Stafford, WA2TKL, 730 Ft. Washington Ave., N.Y. 40, N.Y.

TRADE-Tektronix scope, type 512 for all band transceiver. Burt Conen, 1801 Drexel St., Hyattsville, Md.

FOR Sale: SB-10 Sideband adapter, \$55.00. Write August Pintak, 19 Wilson Place, Closter, N.J. W2BIK.

WANTED: Old callbooks 1925 or earlier, W8EF, 795 Lakeshore, Grosse Pointe 36, Mich.

FOR Sale: Knight T-150 xmtr in rud wkg condx. Has modification. \$95.00. A Stephenson, 23308 Masonic Blvd., St. Clair Shores, Mich.

FOR Sale: Hallcrafters SX-101A Mark III receiver, parks 6 meter converter, Heathkit Seneca VHF-1, 6 and 2 meter transmitter, Morrow 3BR5 receiver, multi-Elmac A54H transmitter, K7KJD, 411 Central, Sedro Woolley, Wash.

FOR Sale: Viking Valiant; Hallcrafters SX-100; Eico battery eliminator; Gen-E-Motor Model V-50; Eico signal tracer; Hickok volt meter; Sprague Tel-O-Mike condenser checker; Heath Scope 5", rood tube tester, KOMSI, McKee, Blakesburg, Iowa.

PRINTED Circuit boards, Hams, Experimenters. Free catalog, P/M Electronics, Box 6288, Seattle, Washington 98188.

NATIONAL NC-303, in mint condx, used less than 10 hours, with spkr, \$285.00. Also, HQ-145X, new, never used, \$225. Both receivers F.o.b. Northridge, Calif. Write to A. J. F. Clement, 17171 Gresham St., Northridge, Calif. Day phone DJ 1-4850.

APACHE TX1 transmitter, \$185.00; Hammarlund HQ-140X receiver, \$140; both are in exclnt cond, WA6HTA, 632 Meigs Rd., Santa Barbara, Calif.

NEW Hy-Gain 15-meter beam, T-match, \$25.00. Heathkit balun coil, \$7.50. Will ship collect. W7JKN, Box 646, McCall, Idaho.

WARRIOR Linear for sale. Immaculate. Built November, 1962; \$200. K1JPR, 22 Darbrook Rd., Westport, Conn.

MUST Sell: H&W 5100-B with 51-SB-B; SX-111 with R-48, T.O. keyer with Vibroplex; Johnson Matchbox 250 watts; Heath SWR; TA 33 Jr., Ham-M rotor; 5" scope, less cabinet; Dow-Key relay; H&W switch in cabinet; D-104 mike; package for \$700, including spare tubes, parts, miscellaneous accessories, cables, plus magazines and manuals or your best offer piecemeal. Collins, WB2HLK, 60 Wallace Rd., Middletown, N.J.

WANTED: Home generator plant 700 to 1200 watts, push button start preferred, Burlington, Wisconsin product if possible. Will trade new Johnson Matchbox with SWR meter and directional coupler, Alliance Tenna-Rotor, reversible motor, control box complete; 10-meter Gotham beam with tripod, Walt Rasmussen, W9WEK, 215 West 3rd, Marshfield, Wis.

JOB Wanted: IBM 407-1401 trainee. "A" average grade for the course at Electronic Machine Accounting College, Chicago, Ill. Advanced Class amateur license. Married. Three years of University with math background. Reply to J. Chichester, P.O. Box 33, Western Springs, Ill.

SALE: Gonset GSB-101 linear in exclnt condx, complete with manual; \$150.00. Will ship express collect in original cartons. W4DRV, 509 Braddock Ave., Virginia Beach, Virginia 23455.

FOR Sale: Drake 2-B in mint condx; \$189.95. Will personally guarantee. Need: Ham-M rotor, Larry Kleber, K9LKA, W9CPD, Belvidere, Illinois 61008.

SELL: Heath DX-40, \$45.00; VF-1, \$15.00; Alliance Relay, \$5.00; B&W 424 low-pass, \$500, \$65.00 takes all. John Kintz, K3MLJ, 430 S. Hanover, Carlisle, Penna.

SELL: HT-37, perf. condx. First \$300 takes. Will deliver Long Island area. No shipping, svr. R. Lee, 44 Rogers Ave., Southampton, L.I., N.Y. W2LEB.

COLLINS 513, general coverage receiver, in exclnt shape, \$490.00; 75-meter Swan, like new condx, \$160.00; HR-20 mobile receiver, new, \$100, SHF-33, like new, \$330. All equipment is in fine A-1 condx. Bob Hill, K9EID, 402 Bodder St., Marissa, Ill.

APACHE, in exclnt condx; \$200. K0DTK, 1315 Whedbee, Ft. Collins, Colo.

RME DB-23, in top condx; \$25.00. Lee Wood, 620 Lincoln Dr., Idaho Falls, Idaho.

FOR Sale: HT-37, Drake 2-B with 2-B Q-multiplier all in spaker housing; \$550.00. Seldom used. All in brand new condx. H. Weintraub, 1475 Walton Ave., Bronx 32, N.Y.

FOR Sale: BC-779A w/power supply, in exclnt condx; \$135.00. Wanted: Super Pro power transformer. Fred Roberts, 664 W. 163rd St., N.Y. 32, N.Y.

JOHNSON Kilowatt, rud shape, best offer over \$600; 75A4, like new, best offer over 450.00. SX-101A, late model, with Ameco 2-meter Nuvistor converter, best offer over \$250. Johnson 6N2 F.W. like new, with Johnson VFO, best offer over \$145.00. Johnson Ranger I, late one, best offer over \$160.00; Johnson special antique truck load of parts an accumulation of thirty years of ham radio. Write for list \$250 will buy. George L. Keen, K0DGC, 810 East Atkinson St., Pittsburg, Kansas.

COLLINS 32V-2. Price: \$160. In exclnt condx. George Shaffer, RR #1, New Vienna, Ohio.

VALIANT F/Wrd \$218; SX-101A, \$220. Both in new condx. J. Bright, 131 Nugent St., N. H. Park, L.I. FL 2-0088.

MUST Sacrifice new National NC-270 receiver (80 through 6 meters, dual-conversion). Perfect in every way, fine for side-band. Cost \$279 but will let it go for \$195, a real teal! Buck-walter, Wiltride Rd., Georgetown, Connecticut, or call 544-8517.

ART/13, in gud condx; \$65.00; power supply needs work, \$20; BC-224E needs power supply 110V, \$50. Gary Young, 3329 Rex, St. Louis, Mo.

FOR Sale: Viking Ranger and National NC-125, \$250. Excellent. Lawrence H. Lapsinske, 407 9th Ave. So., Wausau, Wisconsin.

COLLINS 75A3 with speaker and manual. In A-1 shape; \$315.00. W3BBV, P.O. Box 222, York, Penna.

BARGAIN! Complete station in operation, in mint condx. Apache low-pass filter, SWR bridge, xtal calibrator, Johnson Matchbox, electronic keyer with power supply, El-Kcy paddle, HQ-140X with speaker, RME preamplifier, Q-multiplier, Value: \$460. Will sacrifice for \$300. C. E. Lane, W1ZGD, 233 Pratt Ave., Somerset, Mass. Tel OS-36821.

SALE: Perfect Hammarlund HC-10, \$75; B&W model 381 TR switch, \$35.00. With manuals. K. B. Crowell, 710 Powder Mill Lane, Phila., Penna. 19151.

SELL: Viking II, factory-wired, in exclnt condx; 122 VFO, WA4ELB, Box 839, Maysville, Kentucky.

FOR Sale: HT-32, \$375 and TB-1000-4 Tribander, \$70. K9VAR, 1851 No. Rutherford, Chicago 35, Ill. Tel TU 9-7703.

WANTED: 500 cycle mech. filter 455 J-05. K6VTC, 1289 Glen Evrie, San Jose, Calif.

8008 Tubes at \$3 or 2/\$4 postpaid. Guaranteed tested OK. Wilder, W2ZCC, 33 Wexford Rd., DeWitt, N.Y. 13214.

JOHNSON "500". Works fine. Offer. R. W. Martin, KÖZFE, Waukon, Iowa.

TA-33 Beam, clean, works FB, \$50; Heath Twoer with 10 el. Hy-Gain beam, \$45. All f.o.b. Miami. Fla. E-Z Way RB540 tower, local sale. K4SC1, 1340 NW 190th St., Miami 69, Fla. NA 16844.

HT-32 Serial 197019, \$325; SX-101, No. 153864, \$185; HQ-110C, #2243, \$145.00; Globe 755 VFO #011 11313, \$40.00; DX-40, \$35.00. Take all for \$700.00. All prices firm. All in gud condx. Will pack for export, I pay shpg. and insurance. Send certified check or money-order to Fred Corliss, WA5ACV, 2139 Robin St., New Orleans, La. Fone 282-7172.

FOR Sale: KVM-2, 516F2, \$850; NCX3, new, \$325.00; HT-37, \$315; 2A and 2HO, \$210.00; 75A-4, \$450.00; 4CX250B, \$15. each; TC99B, \$100; 3-element Telrex, \$90. Need: 30S1 5-el. Telrex 20 meter, Bruscella, WZLEC.

QSTs: Broken run, April 1921 to 1950, Various COs and Radio News. Bernard M. Susman, 30 Wiltshire Lane, W. H'd., Conn. 75S1 with blanker, \$300. Leo Severe, RR #2, Box #5, Wilmington, Ill.

SELL: Microwave and I/F devices: parametric amplifiers, converters, SWR indicators, modulators, couplers, W0YAU, 333 W. 10th St., Claremont, Calif.

SELL: NC-183D, Q Multiplier OF-1, Knight xtal cal. Gud condx, \$195. Gaston Tallet, WB2AWL, 99 Brookwood Rd., Clifton, N.J.

75S-1, immaculate, 500 cycle filter, commercially installed reception tuning, \$395. Paul Zukin, 244 Loring Ave., L.A., 24, Calif. Tel: 279-1660.

HEATH DX-35 plus 80-40 M dipole, \$36.00. Want: Two meter converter, WB2CVZ, 57 Livingston St., Rhinebeck, N.Y.

MOSLEY CM-1 receiver. Purchased in October. New condition. Make offer. W4NI.

COLLINS Owners! Work A.M. Wired kit, \$5.00. No soldering, holes, chassis removal! Switch In-Out! (State Model)! KWM-2 independent receive control, \$15.00. It's a honey! Kit Kraut, R-763, Harlan, Ky.

SALE: Commercial kilowatt transmitter, pair 4-125As, with built-in exciter and separate power supply. Complete with all tubes, cables, and manual. Ultra compact, \$225 shipped collect from D.C. area. All inquiries answered. Earl Smith, K4FVE AMEMB (DSRS) Navy 539, c/o FPO, New York, N.Y. 09575.

JOHNSON Viking Kilowatt with desk and audio amplifier. Spare tubes worth \$175. This is the only transmitter that lost at a full KW on AM, SSB, CW and RTTY. Steal it for \$900 complete, W5CME, 9804 Martha Lane, New Orleans, Louisiana. 504-721-5469.

FOR Sale: QSTs from 1923 to 1960, all for \$150.00 cash. No trades, svy! You pay the freight from Sandwich, Illinois. Leon A. Faber, W7EH, 4348 East Palo Verde Drive, Phoenix 18, Arizona.

R & W 5105B 150-watt power/c.w. transmitter. New, factory packed, \$525 value. First \$300 takes it. Dick Hyde, W0CCX, 888 S. Lipan, Denver, Colo. 80223.

JOHNSON Challenger, \$95; Excellent condx. With factory modifications, all instructions. Will ship. Arnold Trenn, W2-RVR, 621 George St., Teaneck, N.J. 07666.

TRANSFORMERS, new plate and filament customized to your specifications at production prices. Example: Pri 120/240 Sec. 3Kv 700 Ma. F.o.b. Los Angeles, Specialty Engineering, 9007 Avalon Blvd., L.A. Calif. 90003.

WANTED: Johnson Navigator. Must be in gud condx as I wish to send it overseas for mission use. State price and condx. Del Rose, 355 Glenn St., Lake Orion, Michigan.

NEW KWM-2, 12,339 tested only! \$995.00. 512 AC power supply. \$55.00! C. White, 763 Harlan, Ky.

SELLING Complete station: Drake 2B, \$185.00; Eldico 100A, \$300.00; Hammarlund SP-600UX17, \$450.00 with reflex speaker and matching transformer, K4UJZ, Russell Olmsted, 1548 NW 15th Ave., Ft. Lauderdale, Fla.

SALE: S-107, \$50.00; 3 hand portable 450 Mc. transceivers plus 1 base unit, \$55.00; AT-1, \$20.00; 4X150As, \$5.00; 2-4X150A sockets, \$3.50 pair. Harold Harrington, 248 S. Allen St., State College, Penna.

SALE: HQ-129X complete, with speaker, and xtal calibr. Price: \$95.00, W5BMQ, 205 Fifteenth Ave. N.W. Ardmore, Okla.

DISCOUNTS! All reconditioned and guaranteed. Home trial. E-Z terms available. Act now. 20A, \$127.20; AF-67, \$71.96; 75A-3, \$279.20; KWM-1, \$314.10; G-76, \$224.10; SW-140, \$157.50; HX-50, \$296.10; Inverter, \$395.10; 755A, \$35.96; 2A, \$170.10; G66B, \$79.20; NC-88, \$71.10; NC-109, \$107.10; SX-101A, \$229.50. Leo, W0GFG, Box 919, Council Bluffs, Iowa.

SALE: Johnson Ranger II transmitter. Excellent condx. \$200. Hallcrafters SX-99 recvr, \$100. Will ship or will deliver a reasonable distance. K2TXD, P. Bery, East Istip, N.Y. Tel: 277-9642.

WANTED: 36S-1. Will trade 16mm movie equipment, latest 8mm zoom reflex camera and case and/or cash. Interested in 75A3 and 32S-3 also. W9MJH.

KNIGHT 5 Band receiver, 60-W xmt (unassembled); antenna relay, mic, key, 50 ft. coax, all fittings, large clock, phones, xtals, manuals, C.P.O., \$125. Freight collect. Brunson, 130-N Lawn, K.C. Mo. 64123.

COLLINS KWM-1, 312B-2 speaker console includes 302E-1 directional wattmeter, 516F-1 A/C power supply, D-104 mike, Hy-Gain 12AV5 antenna, Johnson low-pass filter, Johnson Speedex bus, cables and manual. Perfect. \$495. Plus shipping. Paul Gerald, 7716 Sale Ave., Canoga Park, Calif.

LOOK: Hams! Replica 1964 front license plate with your call-sign. Highest quality vacuum formed plastic to withstand all weather. Black with 3 in. yellow letters. \$2.50 postpaid. Send check or money order payable to Ontario Sales Co., P.O. Box 9111, Rochester, N.Y. 14625. Dick Job, K2RTU.

COLLINS 75A-3 for sale: \$290. Fred Reed, 198 Boston Post Road, Marlboro, Mass.

SWAP F/W Viking II. VFO for sturdy c.w. only medium power 80-40 meter transmitter, homebrew, surplus or commercial. What have you? H. S. Pettis, W3OCW, 1922 Rosemary Hills Drive, Silver Spring, Maryland, 20910.

PERFECT SX-100, \$179; Pacmaker, \$169; new BC-453, \$24.50; new BC-458, \$9.50; 5" Heath OM-3 scope, like new condx, \$49.50; new 4-65 A, \$10; Heath VTVM V7A, never used, with r.f. probe, \$22. All F.o.b. Elvin Miller, 421 Groveland Ave., Minneapolis, Minn.

FOR Sale: Electro Model D-612T filtered DC power supply, \$18.00; 2-Simpson 0 to 1 RF ampere meters Model 35-37, \$6.00 each; 1 Simpson 0 to 30 DC ampere meter, \$3.00; 2RCA type 5763 tubes never used, \$1.00 each; 14 BR type Z-2 xtals for 40, 80, 6 and 2 meters, \$1.00 each. W3QEW, Scranton 9, Penna.

TRADE: IBM executive typewriter (cost new \$700). Brand new condition. Want: Complete base station from 6 to 80 meters. Prefer a trade within 200 miles. Call or write: G. Dubbs, WB2JMJ, 741 Campus St., Uniondale, L.I. 516 1V 6-3068.

GLOBE KING 500B xmt, Electro-Voice push-to-talk mike stand, crystal mike, in good condx. \$375.00. K8YWS, Dave Steffens, Cincinnati, Ohio, 45240.

SELL: Gonsset G-76 transceiver. Transistor power supply, \$300. Herbert Fozter, W2ELQ, 38 Pendleton Pl., Staten Island 1, N.Y. Tel. SA 7-5835.

WANTED: Lafayette HE-50A 10 mtr. transceiver, or equivalent. Must be perfect. W2LZW.

WANTED: Gonsset Communicator III, two meters, in exclnt condx. W2BNX.

WANTED: Neatly converted BC-454 or 455 with power supply. W9IHG, 193 West Twelfth, Fond du Lac, Wis.

SALE: Hallcrafters S-108 with S-meter. Just aligned by Hallcrafters in Chicago \$135.00. John R. Ottinger, 814-62nd St., Brooklyn, N.Y.

COLLINS 51-J (URR-388) factory aligned, checked. \$600. WA6YOS.

EIMAC 4-400As. Brand new, \$37.50 each. Dick, K0RHO, 1834 Jefferson St., St. Paul, Minn. 55105.

PERFECT HT-37, best offer gets this unit with manual and original carton. Offer F.o.b. Lacey, W0CES/2, Entry Road, RFD 3, Hopewell Jct., N.Y.

COLLINS KWM-2A KWM-2A, CC-2, 30L-1, 516 F-2, 312B-5, SM-2. Sell complete. Will deliver within 100 miles radius of St. Louis. \$1465. W9FRK, 918 Belleville St., Lebanon, Ill.

FOR Sale: Collins 75A-4 receiver, Serial #5700. In vry gud physical and electrical condx. \$425.00. Johnson Ranger with push-to-talk, Gud condx. \$100. Both units for \$500. E. M. Wise, K4KYI, 1534 Clifton Rd., N.E., Atlanta 29, Ga.

GONSET G-76, Super Six, Supereciver, Heath Mohican, Harvey-Wells TB500D, Heath VFO, Hallcrafters SX-71, power supplies. Rest offers. W8DRV, 7761 Big Creek, Cleveland 30, Ohio.

FOR Sale: Package deal: Marauder, Drake 2B, 2-AO multiplier, 60 ft. crank-up tower, 10-20-15 three-element beam, rotor, pick up deal only. \$600.00. Landrine Raper, W6PWJ 371 Walnut, Vacaville, Calif.

ATTENTION! Have you seen "Equipment Exchange"? Buy, sell, swap offers galore! Rush card for interesting sample copy. Brand, Sycamore, Ill.

RADIO Station for sale. 50 hours' use. NC-300 with 6 and 2 meter converters, xtal calibrator, speaker, as new \$235.00; Viking II with 122 VFO as new, \$135.00; Mon-Key, \$18.00; Miller Grid Dipper, \$40.00; 1000 Kc. xtals, \$1.50. Eico signal tracer, \$20; Heath 3 in. scope, \$30.00; many other pieces of gear and tubes. Send stamp to: Samkofsky, 201 Eastern Parkway, Brooklyn 38, N.Y.

CRYSTAL Clear bargains in xtals. Free list. Nat Stinnette, W4AYV, Umatilla, Fla. 32784.

EQUIPMENT Constructed, kits assembled, communication receivers, and service equipment serviced, 40 years of electronic experience. Wally Cox, 1826 N. Falbot, Indianapolis 2, Ind.

FOR Sale: National NCX3, \$325.00; Drake 2A with 2AQ multiplier, \$195. W3JGT, Joe Carden, Reynolds Ave., Carbondale, Penna.

CENTRAL Electronics 200V like new; Hammarlund HQ-180, like new, Gonsset G76 with either AC or DC unit. Cost over \$550. Gonsset Communicator IV like new, also Gonsset VFO. Make offer. WA6LTS: 7549 E. Fourth Pl. Downey, Calif.

AMPLIFIER HT-41, \$250; Teletype Mod. 15 with table, power supply, \$150.00; Exclnt converter also, CV-60/URR \$90. AF5K keyer, \$20. WA2GYC, ED 3-7658, 671 Bryant St., Westbury, L.I., N.Y.

COLLINS 32S-1 exciter with cables. No power supply, perfect condx. late serial number. Best offer over \$400.00 takes it. K0WPZ, 7 Huntleigh Woods, St. Louis 31, Mo.

SELL: AR-22 tot rotator, 100 ft. 4 wire, control box. WA2EPN, IL 7-3772, 31-22 8th, Jackson Heights, L.I., N.Y.

FOR Sale: SX-101A, \$270; in exclnt condx. QST magazines 1936 to date, 1936-1949 bound, your best offer. K4HPD, P.O. Box 337, Fairfax, Va.

HALLCRAFTERS SX-99, extra gud condx, \$80. W4RWQ, Lindwood Road, Savannah, Ga.

VALTANT I, f/w. Can't tell from new, \$285.00. Matchbox 275, \$39.00. Martin Goldhaber, 3903 Forbes, Pittsburgh, Penna.

SELL: 32S-1 transmitter with 516F-2 power supply. 75S-1 receiver w/spkr. All in like-new condx, \$950.00. Earl Eggers, 1900 So. Eads, Apt. 518, Arlington, Va.

WANTED: Collins F455Q5, c.w. filter and xtal for Collins 75S-1. Ken Spaulding, 15 Minivale Road, Springdale, Conn.

MU-WESTERN Model M1 teletype converters, new factory sealed cartons. Regular amateur net, \$111.50, special price; \$89.95. F.o.b. Denver, Colorado. Burstein--Applebee Co. of Colorado, Ham Department, 1237 16th St., Denver, Colorado.

DRAKE 2A with xtal calibrator and O-mutt, spkr, like new condx; \$189.00. Swan power supply, Mod. SW-12DC. Used for

six weeks until rig was stolen, like new. \$75. Fred Menders, 19265 Beaverland, Detroit 19, Mich.

COLLINS KWM2-A, 516F-2 supply, Mint condx, never mobile. Ship anywhere. \$1050.00. WA6VSC, 16 LaSalle Dr., Moraga, Calif.

HEATH Mobile/Fixed, Cheyenne-Comanche with mobile mount, spkr, mike and AC pwr. supply, in exclnt condx. Will demonstrate: \$190.00. Also DC transistorized HP-10, \$40.00, \$225.00 takes all. Will accept Novice xmttr in trade. W5LZU, Box 258, Lake Hamilton, Ark. Phone LA 5-1605.

DX-100, all factory modifications for AM, CW, SSB in mint condx. \$140.00. M. Blank, 280 East 16th St., Brooklyn 26, N.Y. Tel: ULster 6-4498.

LAMPKIN MFM105B, in exclnt condx, complete calibration instruction manuals, \$150 or offer. John Ansley, K8ONM, 37610 Lakeshore Dr., Mt. Clemens, Michigan 48043.

HEATH MR-1 recvr. New, wired, \$90.00. W2JJU, 19 Nassau Rd., Yonkers, N.Y.

THE "Key" to outstanding value! British-made bar-type key serves two purposes, normal keying plus auxiliary functions, such as rcvr muting, etc. This is accomplished by two sets of contacts in SPDT action. Contacts are $\frac{1}{8}$ " 8-amp with independent spacing adjustments. Tension setting employs flange screw, suspending slug, and spring assembly; adjusts easily, stays set. Dup. terminals in sides provide convenient right or left side hook-up. Steel frame, bar, fittings; bakelite base, knob. Solidly constructed for long, dependable service. 2" x $1\frac{1}{2}$ " x $\frac{1}{4}$ " (only \$1.50 each, 2 for \$2.75. Pod. Nordlund, K9KVO, 7635 West Irving Park Rd., Chicago, Ill. 60634.

HR-10 Revr. factory aligned, HRA-10-1 calibrator, DK Pre-amp, \$69. K3JFV, 652 N. Monroe, Media, Penna.

MUST Sell: Going into service, Hallicrafters SX-101A, exclnt condx. \$275; Heath HA-10 Warrior, little use, \$200. K8SHQ, Carl Snow, Jr., 1322 East Ganson, Jackson, Michigan.

SALE: AF-67 xmttr, Deluxe AC supply, cables, antenna relay, \$135.00. Also NC-300 recvr, \$225.00. Will buy crank-up tower, beam. W5KVE, 1307 So. 21, Temple, Texas.

VIKING III, FSK modified VFO, \$100; 19 teletype with table, \$140, 14TD, \$35; 14 repro-printer, \$25; RA-8 supply, \$8.00; TU with scope, \$35. Complete: \$310.00. W6PRY, 3670 Jennifer St., San Diego 17, Calif.

GONSET B2 Communicator, 6-meter station, in exclnt condx, with mike, xtals, pwr. cables, halo antennae, manual, \$140.00; may trade Polaroid 800 camera, like new, worth \$55.00; homebrew a.n.plifier, cool 500 watts, 811A's, with power supply, in exclnt wkg condx, 80 thru 10M, \$150.00. Norm, WA2ZXM, 2012 Nostrand Ave., Brooklyn 10, N.Y. Tel: LU 9-7196.

SWAN SW240 transceiver and AC power supply, in pert. condx; booklet and carton, \$335. Must sell. 14/ landlord trouble. Webb, 125 Ocean Ave., Jersey City, N.J. Phone EC 3-0803.

BEST Offer: Collins 310C 80-meter exc. VFO, cal. 80-10, LP5 Sig. Gen. 9.5 KC, 50 Mc; 1-208H F.M. sig. gen. Sec surplus ads June and Nov. 73 WA6YTR, 3489 Payne Ave. San Jose, Calif.

KWM-2, new, late serial, \$825; Hallicrafters HA-6 and HA-2 transmitters, new, \$185.00 each; Collins 32S-1 and 75S-1, \$750; TR-3, W8WGA, phone 513-2770409.

WANTED: Harvey-Wells "Z" Match. W2RNC, 89 Olden Lane, Princeton, N.J.

SSB Rig for sale: HT-32 xmttr; NC-300 recvr; accessories. Like new. Make offers to Goldenson, Sunny Ridge Road, Harrison, N.Y.

WANTED: 500 cycle mechanical filter for 75A-4. WB2CQM, Lumachi, 73 Bay 26th St., Brooklyn 14, N.Y.

HT-32, break-in keying, in gud condx, \$369.00 or your best offer. K9BFI, 125 Hillcrest, Hinsdale, Ill. 60521.

FOR Sale: Cleveland Institute of Radio Electronics Master Course: \$35.00. p.p. Val Johnson, R.R. 1, Box 803, Knox, Ind.

FOR Sale: Swan Tri-bander, with modified HP-10 dc and HP-20 AC supplies. Best offer. Also Rohm 60 ft. model 25 tower, AR-22 rotor, mounting plate, 2 el-Cushcraft 20 M beam, 100 ft. heavy coax. Best offer. L. Grinspoun, K1YOM, 1589B Beacon St., Brookline, Mass. RE 4-0491.

SELL: Sylvania Model 220 tube-checker, with pix. tube adapter, \$22.00. W2HFIM, 60 Lindgren, Merrick, N.Y.

FOR Sale: DX-100 with continuous loading and grid-block keying keying modifications, \$125.00; SX-99 bought new in 1960, \$80. Both in perfect condx. K1LNM, 1295 Bay Street, Springfield, Mass.

SELL: Berkeley 5510-2 counter, \$475; TS-174/U, \$90; LM-18, \$35, both with p/s; Weston 799 insulation tester, \$30. Robert Ireland, Pleasant Valley, N.Y. 12569.

SR-150, AC/DC supplies, mobile rack, Astatic 513H mike; New-Tronics Hustler, all stubs, sold as a set only. Shipped collect to best offer by end of January. WA4NLW, Robert Harris, 17 Goodall Ave., Daytona Beach, Fla.

HT-37, like new, \$295; NC-300 with xtal controlled osc.; calib. spkr, exclnt condx, \$195; Pilot 20-watt hi-fi monaural amplifier, Mod. AA-920, \$45. W81QN, Bill Davidson, 212 Victor Ave., Apt #11, Dayton, Ohio, 45405.

NYC Area Hams! Sell Clegg 99'er. Less than 2 months old and is in mint condx w/new Cush Craft halo: \$110.00. Pick-up deal only. Sry, no shipping! George Hawryko, WB2GWU, 115 So. Second St., Brooklyn, N.Y. 11211. Phone: EV 8-1893 after 5.

CONVERTED: ART-13, \$50; NC-173, \$70; HQ-129X, \$90. Will demonstrate. Sry, will not ship. W2VQD, John Moran, 90 Barister Rd., Levittown, L.I., N.Y.

SEND Want list for QST before 1950, other old ragio mass. Mrs. Conrad Beardley, 119 Wythburn Rd., South Portland 7, Maine.

FOR Sale: Clegg Zeus, \$525; SX-100, with R-48 spkr, \$225; Ameco 6 & 2 meter Nuvistor converters, \$35.00 each; Johnson 6 and 2 VFO factory-wired, \$35.00; AR-22 rotor, \$15; D-104 mike w/PTT stand, \$15.00. Tim Meaney, WA2SZY, 136 Pemberton Ave., Plainfield, N.J.

CLEANING House! Three paxes of gear, VHF, SSB, parts, etc. List for stamp. W4API, Box 4095, Arlington, Va. 22204.

P & H Linear, 800 P.E.P., \$160.00. Will consider swap. K3UOT, 5558 Florida, Bethel Park, Penna. 833-2838.

WANT QST's prior to 1927 and early ham and broadcast equipment, including parts and tubes. W4EDW, Sanders, 3596 Canadian Way, Tucker, Ga.

SELL: Courier Amplifier, 500 watt P.E.P., 200 watts AM, factory wired by Johnson, in exclnt condx, \$145.00. Tel: nyc 811-A, Gil Vazquez, 522 West 136th St., New York 31, N.Y. Tel: TO 2-6812.

CUSTOM-Building VHF gear, converters, transmitters, etc. 432 Mc. equipment. Free quotes. Frontier Electronics, Orr I., Minn. Everett, WOHPS, Frankie Hoad, WOPYC.

SELL: Bud relay rack CR 1772, \$35.00; cabinet rack CR 1741, \$10; Simpson DC milliameters 0-50, 0-150, 0-500 $\frac{1}{2}$ rect. case, \$6 ea; rotary inductor B&W 3852, 1-10; Groth turn counter TC-3 w. spinner, \$2; variable capacitor 150 mmfd, Johnson 153-12, \$8.00; Millen 10009 dial, \$1; screen overload relay P&B, KCPS, \$3; fixed micas 2.5 kv., 100, 200 (2), 300, 500 (2) mmfd; 30 kv, 500 (2) mmfd, the lot for \$10, Turner carb, mike 350R, unused, \$8.00; Dow-key elec. TR switch DKC-TRP 110V AC, \$8; also D-K coax ant. relay w/aux contacts 110 V AC, \$6; QST's 1946 run to present. Sry, won't ship cabinets or meters. Write only Fred Bailey, 10 Midwood St., Brooklyn 25, N.Y.

SILICON Rectifier diodes, power studs, 400 piv, 2 amp, 39¢; 4 for \$1.39; 600 piv, 2 amp 45¢; 4 for \$1.59. Also 1N2096 diodes, 600 piv, 750 Ma., 35¢ 4 for \$1.29. All tested and guaranteed. Send SASE for list of relay racks, power supplies and highgrade components. All items f.o.b. Newton Lower Falls, Mass. James Kuiper, Box 35.

SELL: 6 meter Lafayette HE-35A plus HE-16, \$35; Hallicrafters spkr R-46, \$10 K2ORN, 357 Plymouth Rd., Union, N.J.

SELL: DX-100, \$150; SB10, \$70, both for \$200. John Kenny, M-J House, C.I.L., Pasadena, Calif.

COLLINS 32S-1, 516F-2. Both in exclnt condx and yours for \$450.00. K8HYD, 428 East Early Dr., Miamisburg, Ohio.

FOR Sale: Ranger with push-tact relays and rotary switch to use either as a driver or barefoot. Gud condx, \$150.00. Also BC-221, without power supply. Has all charts, \$50.00. W9QPF, Dunlap, Ill.

WANTED: Hammarlund MLW-125 capacitor, 125 mmfd variable, vintage 1932. Restoring early Collins transmitter. WA0EJC, 1101 Longview, Marion, Iowa.

BARGAIN: Eldico SSB-100A transmitter, exclnt condx, with built-in linearity scope, \$210. K2KJU, MO 6-8513 NYC.

WANTED: Tri-band beam, SWR Bridge, T-R switch, and AR-22 rotor. Must be in gud condx. WA8DVX, 619 Sugar St., Celina, Ohio.

NEED money for college: Must sell HQ-180C and manual. Four years old and in v. gud condx. Asking \$275. Address all inquiries to Phil Passero, P.O. Box 589, Lafayette College, Easton, Penna.

SALE: NC-300 recvr, less spkr, \$195.00; Globe Scout 680A xmttr, \$55.00; Heath VF-1, VFO, \$16.00 f.o.b. Pittsburgh, Penna. W3OZU, Al Burkett, 4842 So. Pioneer Rd., Allison Park, Penna.

FOR Sale: Heathkit receiver MR-1, \$65.00; Eldico transmitter 720 \$50; 40-meter Cliffdweller antenna, P&H 400C linear kit, mobile antenna. W9OKM, 1207 Oneida St., Joliet, Ill.

4-1000A Deluxe linear kit, all parts, amplifier and power supply; Write, Morrow 5BR-1 converter, mint condx, \$25.00. Transformers, filters, dials, meters, switches, cleaning shack, stamp for list. W9LWZ, 1030 So. Dudley, Denver, Colorado.

COLLEGE Expenses, force sale: Central Electronics 20-A with VFO, \$40; Drake 2B, 2B-C and calibrator, \$45.00; Globe LA-1 linear, \$60; Globe Chief, \$35.00; Edd Cheffetz, K1MYM, 39 Mountain Ave., Bloomfield, Conn. K1MYM/1, 26 Lincoln St., Worcester, Mass.

10-Meter Lafayette HE-50A and VFO, new condx. \$65.00. K2-UVM, 124-37th St. Union City, N.J.

FOR Sale: Gonset GSB-100 SSB xmttr, never used, \$250.00; Apache in mint condx, \$200; Hammarlund receiver HQ-170C with I.F. noise silencer. Can't be told from new, \$225.00. All items guaranteed. Ernest A. McCall, 10004 E 34th St., Independence, Mo.

VALIANT, factory-wired, operate like new, \$225.00; new T-104 mike with G stand, p-t-t, \$20; Johnson 10-pass filter, \$8.00; Heath SWR bridge with indicator, \$8; CDR-22 with 100 ft. wire and control box. Used one month, \$15.00; 60 ft. RG-8/U cable, \$5.00; Going SSB. Want HT-37 or equivalent for cash or otherwise. Prefer local deal. Willing to demonstrate. Will deliver. Ted Petrucci W2EYJ, 3637 Willet Ave., Bronx 67, N.Y. Tel: FA-4-4818.

HALLICRAFTERS SX-101 Mark II, exclnt condx, \$195.00; Lafayette KT-174 VFTM, new, \$35.00; Meissner 150B transmitter, 275 watts AM/phone and 2B-C VFO; 80, 40, 20 meters final double to 15 and 10. No shipping. Sry! Make an offer. Want 10, 15 and 20 meter VFO coils, W1ONC, Harold E. Brown, 4 Ward St., Woburn, Mass. 617-933-0502.

SELL: Polycrom 6 & 2 meter, complete transmitter: 110V AC, 12V DC. Built-in pwr. and VFO, 16 watt input. In exclnt condx. N. Finerman, W2SDI, \$200.00, 516-SE 2-8443.

75A-2, in v. gud condx, \$220.00. W6KEV, 3088 Greenoak, San Mateo, Calif.

NEED Cash! NCX-3, like new condx, 2 hours on-air time; comp. with mobile pwr. supply, new New-Tronics Hustler mobile ant. comp. with 80, 40, 20 meter. resonators, mast and bumper mount: \$337.75 value. All to go for \$479.00 cash. Telrace, 489 S. Washington, Wichita, Kans. Phone AM-2-3625.

FOR Sale: DX-60, VF-1, \$50; NC-98 w/ 12 xtal calibrator, \$85. Write Dale Jensen, 4127 Gartield, Lincoln, Nebr.

WANT General Radio PI oscillator. Amplifier used in 650A bridge. W9UE.

EICO 720 Transmitter, \$65.00; Eico 730 modulator, \$35.00. Both used v. little and in exclnt condx. Douglas Patterson, 1912 1/2 John Ave., Superior, Wis. 54881.

SALE: RME-45 revr, Eico 720, VF-1, QF-1, 6 M conv., 10 m. preamp. xtal calibr. All for \$150.00. KN3YQC, RD 3, Box 474, Lewistown, Penna.

***CRYSTALS Airmailed: Kits, MARS, Nets, SSB, CD, CAP, etc. Custom finished FT-243, .01% any kilocycle, \$500 to \$600 \$1.75 (Five or more mixed or same frequency \$1.50) (Ten or more same frequency \$1.25). 1700 to 20,000 Kilocycles \$2.25. Overtones supplied above 10 megacycles. Add 50¢ each for .005%. HC-6/u miniatures above 2000 add 65¢ each. Kits, FT-243; "DCS-500", "Three Band Converter", "IMP", \$9.95/set. Write regarding specific needs. Airmailing 10¢/crystal, surface 5¢. Crystals since 1933. C-W Crystals, Box 2065-Q, El Monte, California.

CHEYENNE, Gonset Super #12, mike and mount, \$119; SX-62 and spkr, \$124.00; Knight T-150 and SX-99, \$199 or trade for A-1 Pawnee (HW-20), Want clean (HP-20), W2PWF, 78-42 264th St., Floral Park, N.Y. 212-FI-3932.

400 Watt 220-440 Mc xmt convertible without major change to 2 meters. #P4X150As driven by 4X150A, driven by 3-12A7 xtal osc, multipliers. Brand new with all new tubes. Silver-plated tank circuits and compact 5" x 10" RF tight cabinet with schematic and conversion instructions, less p/s and blower, \$125.00. G. R. RF impedance bridge, \$350.00; G-76 w/ACPS, \$275; Tektronix 511 scope, \$135.00; Kepco PS, \$75; 375-1000 Mc. superhet receiver, \$75. All exclnt cond. Tom Perera, K2-DCY, 410 Riverside Drive, New York City, N.Y. 10025.

SELL: Hallicrafters HA-1 T.O. keyer, \$55. K8EBR, 5266 Maryland, Detroit, Michigan.

DRAKE 2B, 2bQ, calibrator, perfect, \$225. Don, 702 N. Myrtle, College Park, Georgia.

RECEIVER Heathkit HR-10 hamband only, contains half-lattice xtal filter. In exclnt condx. \$60. WA4BBY, 8 Braddock Circle, Durham, N.C.

FOR Sale: SX-101A, half-year old, \$290.00; HT-41, used only five hours, \$240.00. B&W 381 TR switch, \$30.00. WA0BJV, Mayville, North Dakota.

SELL: Mohawk receiver for \$195; new condition. WA2LCD, 203 Keats Ave., Elizabeth, N.J.

SELLING Mobile unit, Elmac A-54-H, PMR6A, xtal mike, change-over relay, spotting switch; Heath HP-10 power supply, cables and all manuals, \$140. W. M. Staudenmaier, 1229 Chanteloup Drive, Hendersonville, N.C.

INVADER 2000 recently returned from Johnson plant with all modifications and adjustments, given regular test and 2 hour heat run, new condition, no scratches, \$850.00. All replies will be answered. WITF, Elmer Turner, 2 Virginia Circle, Reading, Mass.

HELP! Still looking for General Radio Synchronometer (not Synchroscope as erroneously reported), also Comparison Oscilloscope, teletype tape reels and transmitter-distributor parts. Sell Model 14 typing reperforators, Model 5 bases and keyboards and synchronous motors. W4NYF.

DX-100B for sale: includes Heath's grid-block keying as only modification. In exclnt condx. \$155.00; EB-6 meter transmitter, \$763 final, cabinet, p/s, metered cathode and wrid, outboard VFO, a dandy, \$50. K9JOO, 5141 Deborah St., Indianapolis, Ind.

CLEGG 6-meter 99'er: like new condx. with xtals. Astatic mike, \$105; 6M Lafayette HE-35, exclnt, \$39.00; GM "Long John" beam, \$14.00; 4 ring halo, \$5.00. All F.o.b. Harms, WA4FJY, 905 Fernald, Edgewater, Fla.

150 Amp. Leeco-Neville alternator, \$40; 50 amp. L.N. rectifier, \$5.00; 110V selsyn, \$2.00. Trade dual beam oscilloscope or dictaphone for gud SSB generator. B. J. Kucera, 10615 So. Highland, Cleveland, Ohio.

QST In binders, 1931 to present, \$3.50 per year for the entire run. Only 50¢ more than the cost of binders alone. F.o.b. Morton's, 11114 Cedar Lane, Beltsville, Md.

WANTED For cash: Collins 312B-4 console and MM-1 mike. W0DVZ, Box 475, Ottumwa, Iowa.

WANTED: E-Z Way tilt-over tower (40 ft.—50 ft); ground post. Don Hanson, 37 Lake Avenue, Eatontown, N.J.

EICO 720, \$65, in exclnt condx. WB2GDN, CA 6-6283. W. Caldwell, N.J. 07007, 252 Westville Ave.

SELLING Whole station: NC-300, exclnt condx; Eico 720 xmt-r in gud condx; Eico 722, exclnt condx. All for \$300 or sell separately. Write for details. M. Bess, WA2OYG, 169 Main St., Ridgefield Park, N.J. 07660.

BARGAIN: Chokes, transformers, meters; send SASE for free listing.

HAMMARLUND HQ-100AC revr, matching S-100 speaker; Hallicrafters HT-40 transmitter; xtals, new (unused) mike. Station in use 6 months. Exclnt condx. \$225.00 or your best offer. Mel Saltzberg, RD #3, Pocomoke, Md.

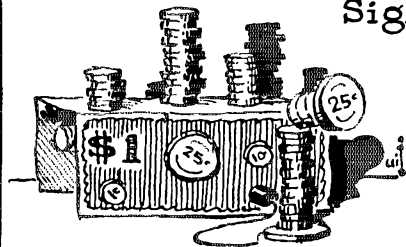
COMPLETE Station: SX-101A, HT32A, Johnson Matchbox with separate SWR Bridge and meter; D-104 mike on G-stand, all in like new. mint. condx original instructions and cartons. Shipped at your cost and instructions: \$675.00. Addl. individual equipment for SASE. K0QVX, Brown, 1610 Kitchener Dr., Sunnyvale, Calif.

POLYCOMM 62-B, completely updated by factory, including new extra ventilated cabinet. Has not been in air since alignment. \$259.00. Freight collect. G. Houdreaux, P.O. Box 2480 Customhouse Station, New Orleans, La.

FOR Sale: Drake 2-B, 2BQ, 2AC, \$225.00. Gonset G-76 and supply for 115 VAC or 12V DC, \$250. L-1001A, new, \$175.00; KWS-1 No. 449, \$700. H.V. transformer and choke for 30S-1 (or KWS-1), new, \$75.00; PS-2V supply for AF67/63, new, \$15.00. Par-Metal cabinets for 834" and 12 1/2" panels, new, \$8.00 and \$10 Maj. J. Craig, 1646-B Sycamore Dr., Blytheville AFB, Ark. 72317.

POLYCOMM 2-meter transceiver, \$250.00; Lafayette RK-126 Technicorder, \$60.00; Utica 30 to 174 Mc receiver, \$100; Alliance-20 rotator, \$15. All exclnt. Lucascio, 8420 51st Ave., Elmhurst 73, N.Y. 11373.

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92200

No. 92200 TRANSMATCH

Allows a transmitter to work into the 50 ohm unbalanced load for which it was designed. Converts a multi-band antenna to 50 ohms at all amateur frequencies between 3.5 and 29.7 MC. Matches 10 to 500 ohm unbalanced loads. Handles a KW.

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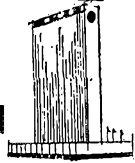
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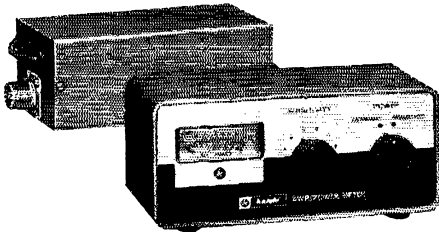
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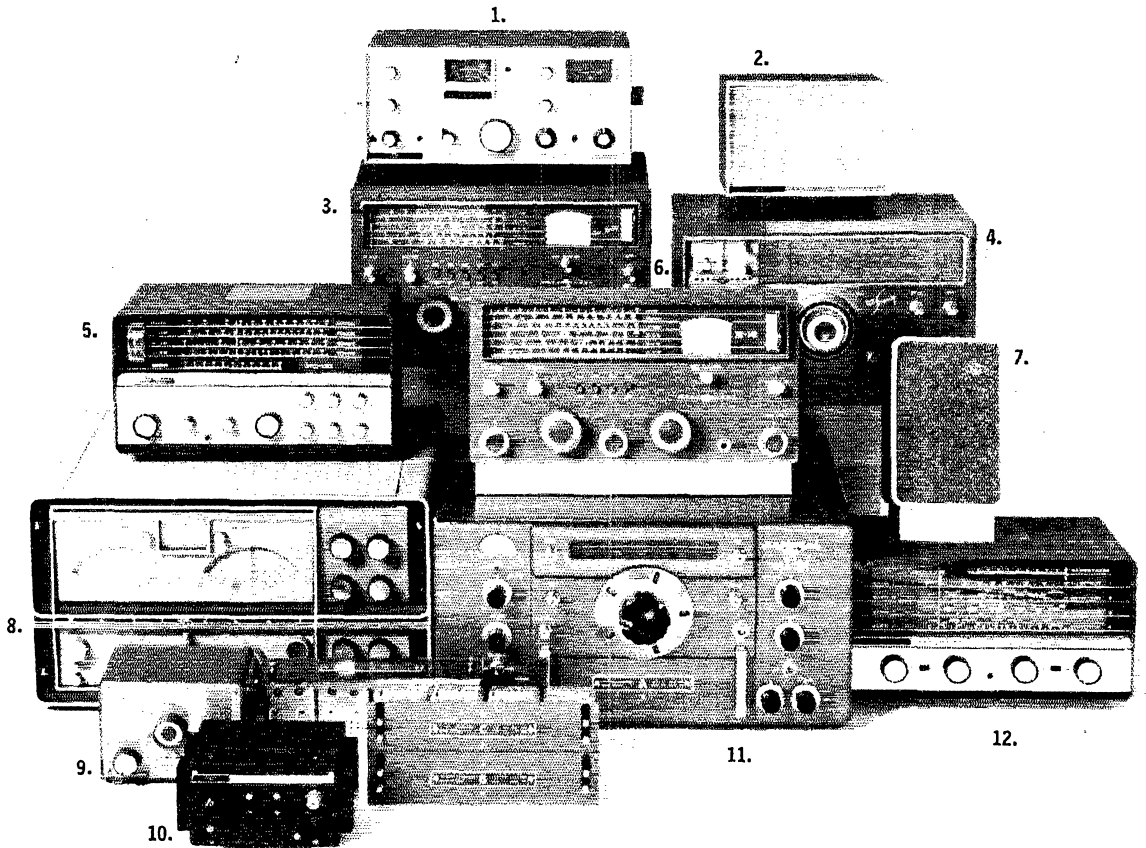
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