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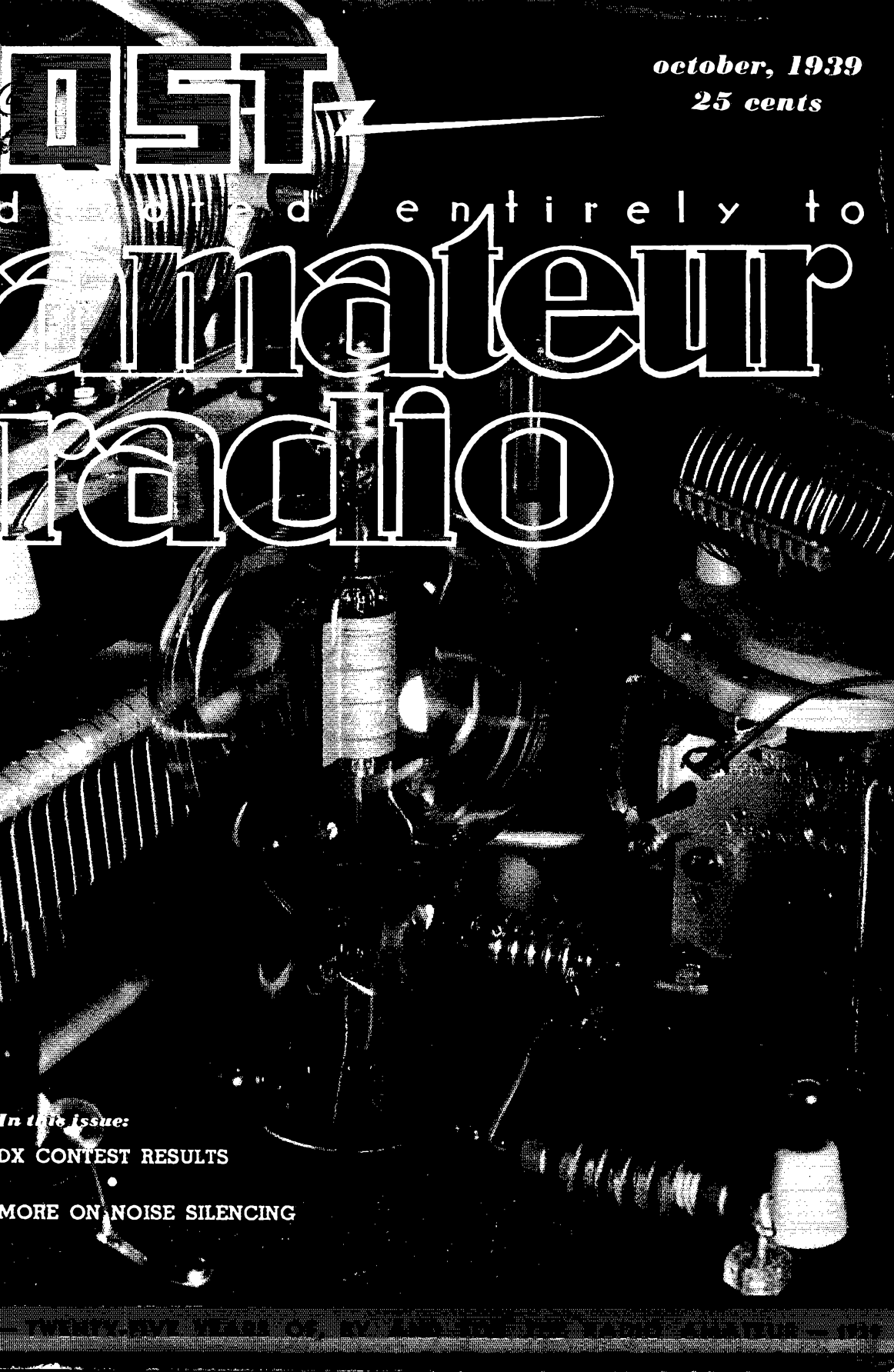
amateur radio



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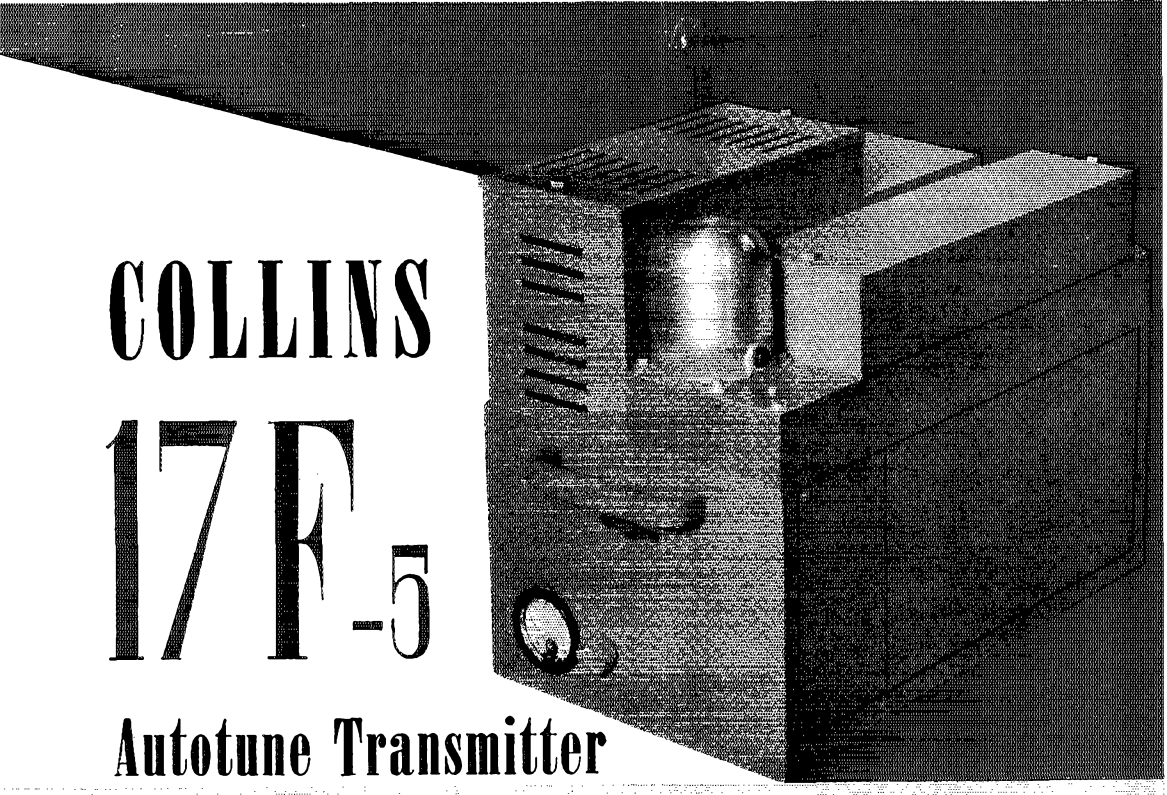

COLLINS 17F-5

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FORMERLY conventional multi-frequency transmitters contained a duplication of components and cumbersome frequency change equipment.

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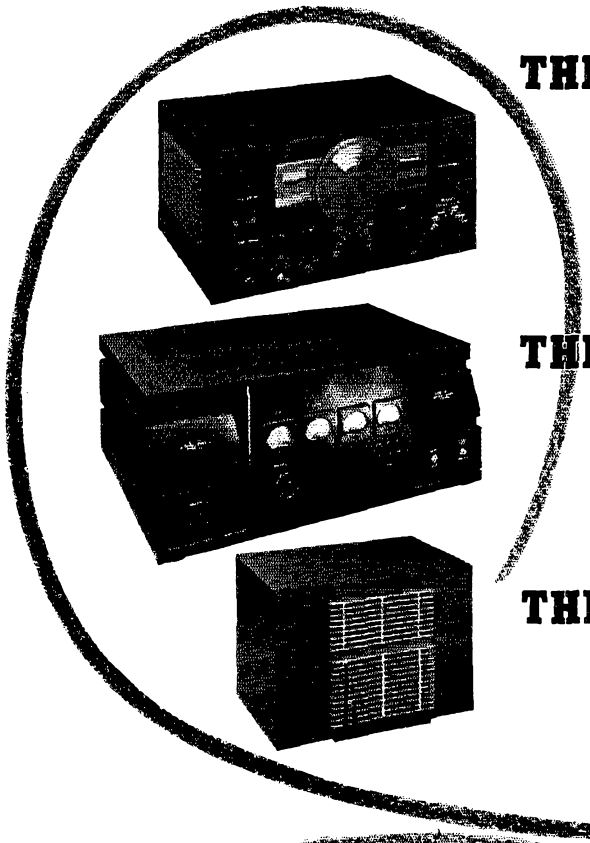

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QST *devoted entirely to*

AMATEUR RADIO

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THE AMERICAN RADIO RELAY LEAGUE

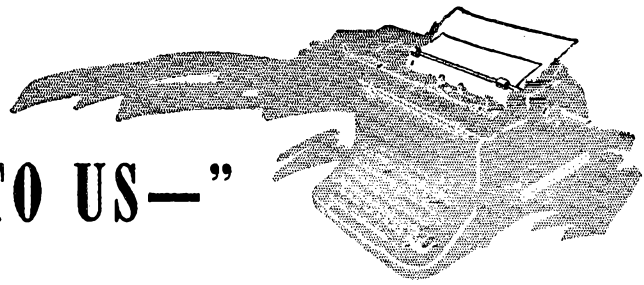
THE AMERICAN RADIO RELAY LEAGUE, INC., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation 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 non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

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

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

HIRAM PERCY MAXIM, FIRST PRESIDENT



"IT SEEMS TO US—"

BLACKOUT

IN EUROPE there is war again. After months of dread uncertainty our world is engaged once more in savage butchery, the lives of peaceful everyday folk transformed into a perpetual horror. The possibilities of modern warfare are so dreadful that there is room to wonder whether civilization itself can survive. The engineering and technical mind, accustomed to the complexities of modern science, must marvel that mankind, for all its skill in the technical arts, has not yet mastered its social and economic difficulties, and that its technical skill now only helps speed it to catastrophe.

This war means more to us radio amateurs than to people in most walks of life, for the simple reason that communication has been our raw material and we have all made countless friends in many foreign countries. The natural concern that friend feels for friend in such times as these is, in us, intensified many fold because of the multiplicity of our constant contacts. The statistics to-day are a dreary lot: The war is affecting amateur radio in about sixty per cent of the membership of the International Amateur Radio Union. In over half of the countries and dependencies in the "A.R.R.L. Country List" of the DX Century Club, amateur radio is suspended. In point of number of amateurs a hasty count shows that, outside of the United States, about seventy per cent of the world's amateurs have abruptly disappeared from the air. We who have devoted our skill and our time to the building of friendships and to the furthering of understanding between peoples are having this thing happen to us!

And now some of us are to be pitted against some others of us by those who pull the strings, some who are amateurs will be asked to try to kill others who are amateurs. This struggle is bigger than we are; the stakes are higher than amateur radio. *QST* of course will take no sides. We have no part whatever in the politics of nations and peoples. Amateur radio has been — *is* — a great democracy, made up of men of many walks of life, of all ages, estates, colors and creeds. The thing we have in common is the love of amateur radio. It is not possible to separate us in terms of white and yellow, or rich and poor, or in any other way, for we are all one in the peculiar fraternalism we have made our own. We hope we have no sticky sentimentalism in saying that; we mean it quite sincerely. We declare, therefore, that *QST*, organ both of the International Amateur Radio Union and of the American league, will endeavor to take no cognizance of nationalisms as such, and will continue to deal with the amateur of every land as a brother. For it cannot be said that some men are all good and some all bad. We who have been brothers together in amateur radio know better than that. The inescapable duties of nationalism may now summon some of us, but all of us will know that the common people of every country are decent and likeable people and that the fault is somewhere else in society's mechanism. We shall know that because we have as friends typical specimens of these common people, the amateurs of every land.

Is it out of order, then, for *QST* to hope for a higher order of understanding and tolerance amongst radio amateurs than characterize those in other walks? We trust not. Let us, with Spinoza, neither weep nor laugh but endeavor to understand. To those of our great fraternity who now enter national service *QST* expresses the earnest hope that, while giving without stint to their respective countries, they will carry in mind that knowledge gained as amateurs — that the ordinary people of other countries are a decent enough folk too. Perhaps, too, it will be given to some of them to help cement the broken pieces of our civilization. And we even hope that when warring ham meets ham of an opposing prefix, there will be room for chivalry — in the knowledge that both have been radio amateurs. And we pray that some starry night soon we may again all meet in peace and exchange our greetings from continent to continent as we have done in happier days.

AND now a word particularly to amateurs of the United States and its possessions. You have read the proclamation of American neutrality. It has particular significance for us because the pursuit of our art brings us international contacts which never fall to the lot of the ordinary citizen. Every citizen must observe neutrality in the present conflict. Easy for the average non-radio citizen, it requires a certain amount of care on our part. The amateurs of several neutral countries

have been put off the air, just as a precautionary measure. Our government does not intend to do that to us; it believes that it can trust us. The amateur bands these recent days have rocked with rumors that we may be piped down, that at the least our long-distance bands are to be taken away, and so on. There is no present truth in these rumors. We are to continue; we have only to be neutral.

What is neutral? There's no mystery about it. It means taking no sides, showing no partiality, keeping out of the quarrel. In particular — and this is the essence of it for us — it means passing no information that could conceivably be of military value to a belligerent. It requires only common horsesense to keep out of that kind of trouble. We should bear in mind that our international communications have always been confined to "messages relating to experiments and to remarks of a private nature for which, by reason of their lack of importance, the use of the telegraph service could not enter into consideration" and that we are already forbidden to transmit international communications emanating from third persons except under our special arrangements with certain countries in the Americas. Our understanding of the chief burden incumbent upon us as neutrals is that we do nothing in our radio operating that could be interpreted as "participating in the war" by giving any information to anyone that could be of military value to any belligerent. With these precautions we could even communicate with amateurs in the warring countries if any could be found. Of course they cannot; they have all disappeared from the air, so the point is a purely academic one. Let us not, however, be academic; let us not even strain our luck. It would be wise to lean a little the other way. It would be only the part of prudence to consider that the need for caution in our communicating dictates also that we use great care in the remarks that we pass between ourselves and which might be intercepted by belligerent stations.

The United States starts out its neutrality policy with only a warning to all citizens to be neutral. If we conduct ourselves properly we see no reason why we should suffer. But there will be government surveillance. If any amateurs abuse their freedom and violate the neutrality of the United States there will certainly be swift punishment — and perhaps on all the rest of us. The government hopes that no special radio restrictions will be necessary. As far as the amateur bands are concerned, it depends on us. We therefore recommend (1) that all international contacts be kept strictly to the basis of experiments and chit-chat; (2) that no intelligence of any sort be relayed from one country to another; (3) that we not discuss, even amongst ourselves, happenings that might have a military significance, remembering that our signals may be intercepted by belligerents; (4) that we keep our private feelings to ourselves and give no voice to unneutral thoughts on the air. Is free speech then being abridged? Yes, we understand that it is to that extent — by the presidential proclamation of the need to be neutral. Think what you want to, but keep it off the *international* ether. We're walking on eggs, so let us do no stumbling! We want no amateur blackout here!

FAREWELL, S.F. SYSTEM

A NOTE nearer home: We regret to announce that, after a decade of sterling service to the American amateur, the A.R.R.L. Standard Frequency Service is discontinuing. This, some of you moderns may not know, was the group of special experimental stations which regularly transmitted marker frequencies at 100-kilocycle intervals throughout our bands for the purpose of calibrating frequency-meters and receivers. With elaborate apparatus of the greatest precision, the staffs of these stations for years observed regular schedules several times a week. It was no fun. On the contrary, it was the hardest kind of work, and it has been done these years purely as a service to amateur radio.

Originally there were three stations. W1XP at M.I.T.'s Round Hill Research at South Dartmouth, Mass., dropped out some years ago, but the work was carried on by W9XAN, the observatory of the Elgin National Watch Company at Elgin, Illinois, and by W6XK, a special station of the Don Lee Broadcasting System at Los Angeles. Now W9XAN and W6XK have decided to discontinue their work. In all truth their work is substantially done. Time was when we fellows didn't even know where our bands were, much less where the edges of them were. During these many years these stations served as lighthouses in our fog, giving us fixes of a most satisfying accuracy. To-day (knocking wood as we say it) we pretty well know where we are, what with the almost universal employment of crystal control and our vastly improved frequency-measuring technique. We have, moreover, daily schedules from WWV. So the need for the A.R.R.L. S.F. System has disappeared and it is retiring from the scene, its pioneering job completed.

Never was a pioneering job better accomplished. Imagine the staffs of those stations getting up in a shivery dawn, morning after morning, and firing up the rig, not for the thrill of a two-way, not even for the fun of hearing themselves sending, but just to send us fellows long dashes on accurately-determined frequencies! It was real labor of love. Every year the League Board of Directors has adopted resolutions of appreciation for the work these stations have carried on so nobly and often so thanklessly. As W9XAN and W6XK now retire, we want to give a hearty vote of thanks, on behalf of the whole fraternity, to their companies, their directors and their staffs. Well done; our sincere thanks!

K. B. W.

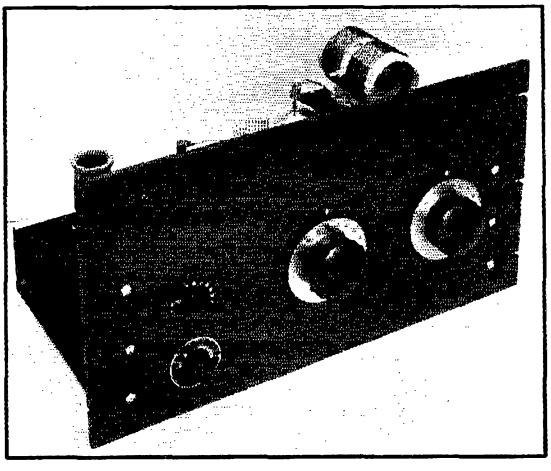
A Compact 1/4-Kw. Rig

An All-Band Transmitter Operating at Medium Plate-Voltage

BY DON MIX,* WITS

It is fortunate that extremely high voltages are no longer required these days for a medium high-power transmitter because a high-voltage installation not only costs more than one which will deliver the same amount of power at lower plate voltages, but it invariably involves greater space and longer r.f. leads. Tank condensers which will withstand high plate voltages always have much higher minimum capacities which add to the difficulties in attaining satisfactory tank-circuit efficiencies at the higher frequencies. If the constructor has had little previous experience with high voltages, frequent insulation troubles are not uncommon. There is also the factor of safety to be borne in mind. The chances of a fatal accident are reduced considerably when the plate voltage is limited to 1500 or less.

The Eimac 75T used in the final amplifier of the transmitter shown in the accompanying photographs is one of the more recently developed tubes in which the designers have succeeded in combining the desirable features of high power at medium voltage, low interelectrode capacities and reasonable driver requirements. It is well known that low interelectrode capacities not only facilitate operation at the higher frequencies but also reduce difficulties in maintaining neutralization of a single-tube amplifier over a wide frequency range.



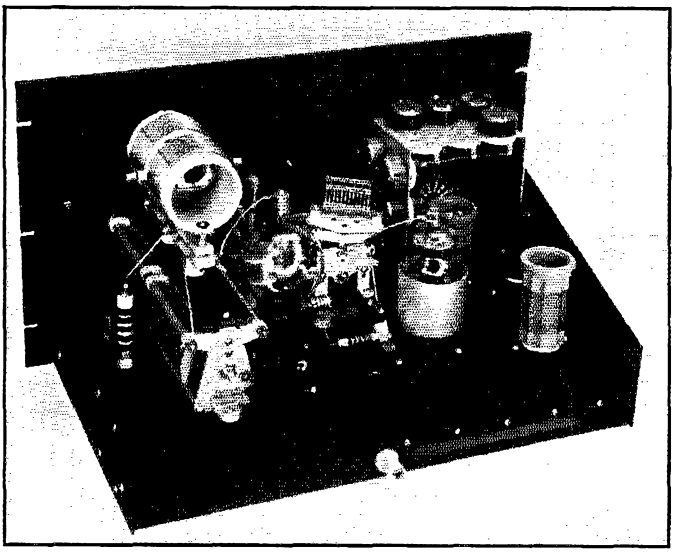
Front panel view showing position of controls. The oscillator plate tuning control is at the left below the crystal-selector switch. The panel is 10½ inches high.

Circuit Considerations

Referring to the circuit diagram of Fig. 1, a 6V6 Tri-tet oscillator, operating with 300 volts on the plate and 150 on the screen, supplies more than adequate driving power for the 807 buffer-doubler. The plate current is normally less than 20 ma. At this low power level there is no evidence of excessive crystal heating. It was found that the extra control invariably used for the cathode tank circuit in this type of oscillator might readily be eliminated by fitting each plug-in cathode coil with an adjustable condenser. Since the adjustment of this tank circuit is never very critical, inexpensive mica trimmer-type condensers do very nicely. Once set for crystals of a given band, no further adjustment is required in tuning the transmitter. An eleven-point crystal switch and multiple crystal holder for eleven crystals is used to provide ready selection of frequencies at several points in any of the five bands covered by the transmitter. While average requirements may be less, the arrangement serves as an illustration of one way of mounting several crystals to permit short leads. The idea may be easily modified to suit the number of crystals desired. The crystal switch is mounted on the panel at the center of the box-like arrangement. Parallel plate feed is used in the oscillator to permit mounting the tuning condenser directly on the under side of the chassis so that its shaft will come at a suitable level above the lower edge of the panel. A three-resistor voltage divider drops the voltage from 600 for the oscillator plate and screen.

The only unusual point in the 807 buffer-doubler circuit is the tapping of the plate down on the tank coil. This is necessary to provide a satisfactory match to the relatively high-impedance grid circuit of the 75T. Connecting the plate directly to the end of the coil results in a very appreciable reduction in drive for the final amplifier; the 807 does not load up properly. The tapping in this case also greatly reduced the annoying sort of performance frequently observed in operating the 807 in which the maximum output occurs at a

* Assistant Technical Editor.



Rear view showing arrangement of parts on top of chassis. The 75T and 807 sockets are spaced below the surface of the chassis to lower the plate terminals. The crystal switch is mounted on the panel inside the enclosure on which the crystal sockets are mounted.

tuning point considerably removed from the point of resonance as indicated by the plate-current dip. Screen voltage is obtained from a separate voltage divider to reduce fluctuations in oscillator plate voltage with tuning of the 807. Series plate feed is convenient in this stage because the tank condenser is elevated above the chassis level to shorten up the plate lead. In this stage, as well as in the oscillator plate circuit, the tank condenser specified has a sufficient capacity range to permit covering two adjacent bands without coil changing. This is a thoroughly practical and convenient method of band-changing between 1.7 and 3.5 and between 3.5 and 7 Mc. The L/C ratio becomes so low in covering 7 to 14 Mc. and 14 to 28 Mc., however, that high circulating tank currents cause excessive coil heating, except at very low power, unless unusually heavy coils are used. In this instance, separate coils for 14 and 28 Mc. are recommended for the buffer-doubler stage.

The input capacity of the 75T is sufficiently low so that there is no particular advantage to be gained by the use of more complicated link coupling. In the final amplifier, the rotors of the split-stator condenser are isolated from ground and placed at the same d.c. potential as the stators by direct connection to the positive high-voltage lead. This requires suitable insulation from the chassis and an insulated coupling for the control shaft. This connection, however, permits a reduction in tank-condenser-plate spacing of 50 per cent with a corresponding reduction in the over-all size of the condenser. The condenser spacing specified for C_4 is conservatively adequate for 100 per cent modulation at 1500 volts. No arc-over was experienced on c.w. with the load entirely removed. The condenser provides adequate capacity for all bands including the 1.7-Mc. band. (If the Johnson coil designed for this band is used, a single-section fixed air padding condenser connected directly across the tank coil will be required. This padder should have an air gap of 0.125 inch and a capacity of 80 $\mu\mu$fds.; the Cardwell type JD-80-OS or a similar condenser should be satisfactory.) For a lowest frequency of 7 Mc., a tank condenser of 100 $\mu\mu$fd. per section with the spacing specified could be used. (Johnson 100ED30.)

Series plate feed was found to be essential in the final amplifier because no available r.f. choke was found adequate at 28 Mc. If operation is to be confined to a highest frequency of 14 Mc., there is no reason why parallel plate feed may not be used and the tank condenser mounted directly upon the chassis. The revised tank circuit is shown in Fig. 2. The extra receiving-type r.f. choke will eliminate any possible trouble from the forming of a double tank circuit which might be the case should the rotors be connected directly to the center tap of the tank coil.

Keying and Metering

The diagrams of Fig. 3 show the terminal arrangement and connections for either oscillator or buffer-doubler keying. The latter is recommended whenever break-in operation is not required. Keying of the buffer-doubler eliminates the necessity for a source of fixed bias for the 807 and invariably results in superior keying characteristics.

It will be noticed that the plate meters are placed in the negative return leads for the purpose of reducing danger. These meters, of course, read total space current which includes grid and

This article describes a three-stage transmitter of simple construction and operation. Tuning controls have been reduced to a minimum. The single-tube final amplifier will handle an input of 250 watts for c.w. or plate-modulated 'phone at a plate voltage of 1500.

screen currents as well as plate current. The former are low enough to be of little consequence in all but the final stage. Here the grid current should be subtracted from the plate-meter reading to obtain the true plate current.

Constructional Details

A standard 10-by-17-by-3-inch chassis will accommodate all of the apparatus without crowding. Referring to the photographs, the size of the final tank condenser at the right-hand end of the chassis dictates the height of the top row of controls on the panel. It is mounted on a National XS-6 button-type feed-through insulator at each end. This brings the shaft 4½ inches above the lower edge of the chassis and that of the panel which is 10½ inches high. The center line of the condenser is 3 inches in from the right-hand edge of the chassis or 4 inches in from the edge of the 19-inch panel. Since there is not room to spare

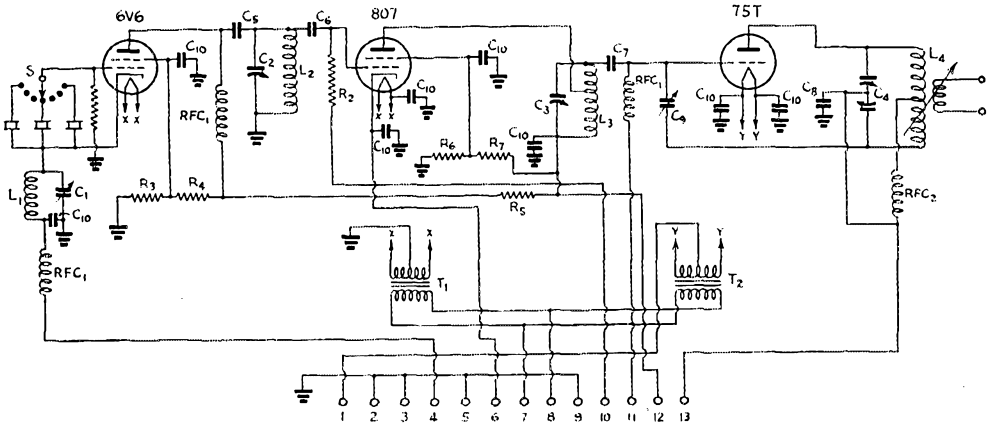


Fig. 1 — Circuit diagram

C_1 — 260 $\mu\mu$fds. max. mica trimmer-type cathode tuning condenser (mounted in coil form, see text) (Hammarlund CTS-160).

C_2 — 250 $\mu\mu$fds. max. midget variable (Hammarlund MC-250M).

C_3 — 260 $\mu\mu$fds. max., plate spacing 0.03 in. (Cardwell MR260-BS).

C_4 — 200 $\mu\mu$fds. max. per section, plate spacing 0.075 in (Johnson 200ED30) (see text suggestions for higher frequency-bands).

C_5 — 0.001-μfd. mica, 500 volts.

C_6 — 0.0001-μfd. mica, 500 volts.

C_7 — 0.0001-μfd. mica, 2500 volts (Aerovox).

C_8 — 0.001-μfd. mica, 5000 volts (Aerovox).

C_9 — Neutralizing condenser (National NC800).

C_{10} — 0.01-μfd. paper, 600 volts.

R_1 — 0.1-meg., 1-watt, non-inductive.

R_2 — 50,000 ohms, 1-watt, non-inductive (see text).

R_3 — 10,000 ohms, 2-watt.

R_4 — 10,000 ohms, 10-watt.

R_5 — 10,000 ohms, 25-watt.

R_6 — 30,000 ohms, 10-watt.

R_7 — 15,000 ohms, 10-watt.

RFC_1 — Receiving-type r.f. choke, 2.5 mh. (National or Hammarlund).

RFC_2 — Transmitting-type r.f. choke (National R-154U).

S — 11-point tap switch (Mallory type 1311L).

T_1 — Filament transformer, 6.3 v., 2 a. (Thordarson type T19F81).

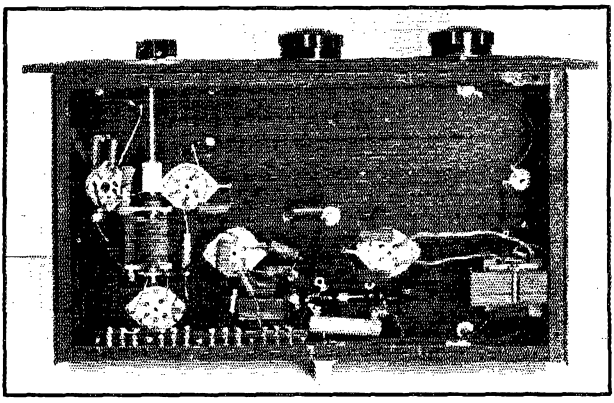
T_2 — Filament transformer, 5 v., 8 a. (Thordarson type T19F84).

L_1 — 1.7-Mc. crystal — 30 turns No. 22 enam., 1½ in. diam., turns close-wound.
3.5-Mc. crystal — 10 turns No. 22 enam., 1½ in. diam., 1 in. long.
7-Mc. crystal — 7 turns No. 22 enam., 1½ in. diam., 1 in. long.

L_2 — 1.7 to 3.5 Mc. — 30 turns No. 22 enam., 1½ in. diam., 1 in. long.
3.5 to 7 Mc. — 18 turns No. 22 enam., 1½ in. diam., 1½ in. long.
7 to 14 Mc. — 8 turns No. 22 enam., 1½ in. diam., 1¼ in. long.

L_3 — 1.7 to 3.5 Mc. — Barker & Williamson type M-80 with 15 turns removed, tapped at 10th turn from the plate end. Inductance — 27 μhy. Coil same as L_2 may be substituted. Tap at approximately 8th turn from plate end.
3.5 to 7 Mc. — B&W type M-40 with 8 turns removed, tapped at 5th turn from plate end. Inductance — 8 μhy. Coil same as L_2, tapped at 6th turn from plate end may be substituted.
14 Mc. — B&W type M-20, tapped at 3rd turn from plate end. Inductance — 2.8 μhy. Coil of 10 turns, 1½ in. diam., 1½ in. long, tapped at 3rd turn from plate end may be substituted.
28 Mc. — B&W type M-10, 1 turn removed, tapped 1 turn from plate end. Inductance — 0.6 μhy. Coil of 4 turns, 1½ in. diam., 1½ in long, tapped at 1 turn from plate end may be substituted.

L_4 — 1.7 Mc. — Johnson type 684 coil. (NOTE: This coil requires additional padder condenser as mentioned in text.) Coil of 50 turns No. 18 d.c.c., 2½ in. diam., 4 in. long including ⅜-in. space at center may be substituted, and will not require padder.
3.5 Mc. — Johnson type 663 coil. Coil of 34 turns No. 16, 2½ in. diam., 4 in. long including ½-in. space at center may be substituted.
7 Mc. — Johnson type 662 coil. Coil of 20 turns No. 12, 2½ in. diam. 4 in. long including ½-in. space at center may be substituted.
14 Mc. — Johnson type 661 coil. Coil of 10 turns No. 12, 2½ in. diam., 3 in. long including ½-in. space at the center may be substituted.
28 Mc. — Johnson type 660 coil. Coil of 6 turns No. 12, 2¼ in. diam., 3½ in. long including ½-in. space at the center may be substituted.
NOTE: Spaces above are for link windings.



Bottom view. The oscillator plate tuning condenser is mounted underneath near the oscillator tube and coil sockets. Space is available for both filament transformers. The terminal strip is mounted on angle brackets back of the opening in the rear edge of the chassis.

at this point, the condenser should be mounted as far to the rear of the chassis as possible. This leaves just enough room for a small Cardwell isolantite flexible shaft coupling between the front condenser bearing and the panel. The shaft hole in the panel should be a snug fit for the shaft to form a bearing.

The final tank-coil plug-in strip is supported by a pair of $\frac{5}{8}$-inch cone insulators fastened to a strip of $\frac{1}{4}$-inch Presdwood supported by the angle pieces supplied with the condenser. The isolating condenser C_8 is bolted to the rear end plate of the tank condenser. The plate-circuit r.f. choke and a feed-through insulator for the high-voltage line are to the right of the tank assembly, while the 75T and its neutralizing condenser to the left are easily identified. The wire grid and plate terminals of the tube are fitted with heat-radiating connectors. The sockets for both the 75T and 807 are set $1\frac{1}{4}$ inches below the chassis on long machine screws to bring the plate terminals down near the tanks.

The buffer-doubler tank condenser C_3 is located with its shaft running at the center of the chassis. To bring the shaft up level with that of the final tank condenser, and to bring its terminals up near the plate cap of the 807 to the left, it is mounted with the brackets furnished with the condenser upon $\frac{5}{8}$-inch cone stand-off insulators with $\frac{1}{4}$-inch spacers on top of the stand-offs. A feed-through insulator with a $\frac{5}{8}$-inch top replaces the stand-off at the right rear corner for making contact between the condenser rotors and the positive 600-volt terminal. The buffer tank-coil socket is mounted on top of the condenser. Here it was found necessary to use an older type of socket which accounts for the peculiar angle of the axis of the coil. The small plug-in coils do not fit easily in later-type sockets with smaller pin holes.

The grid coupling condenser C_7 is mounted on a small stand-off insulator between the 807 and the 75T. The grid-circuit choke of the final is suspended by its leads between the grid end of the coupling condenser and a small feed-through bushing.

The 6V6 and the oscillator cathode-circuit tank are side by side to the rear of the crystal mounting and the oscillator plate-tank coil is to the rear. As mentioned previously, each of the cathode tank-coil forms is fitted with an adjustable mica padder. The type of condenser specified is a dual-range affair. For our purpose, the two sections should be connected together. This is done by connecting the two adjacent terminal tabs together. Since it would be difficult to pass both wires for the ends of the coil and connecting wires for the condenser through the same pins in the coil form, a separate pair of pins is used for each purpose and the appropriate socket prongs connected together so that the condenser is connected across the coil when it is plugged into its socket. In mounting the condenser in the coil form, a piece of fairly stiff wire (the No. 22 with which the coils are wound will do) about 6 inches long should be soldered to each condenser terminal and the leads pulled out straight and the insulation scraped off from all but the last 2 inches or so nearest the condenser. The leads may then be fished down through the appropriate pins in the form, pulled tight and soldered fast. Although not required, a mounting is provided in the Hammarlund coil form for fastening the condenser in with a No. 4-36 machine screw.

Crystal Mounting

The crystal mounting is made from a strip of $\frac{1}{16}$-inch aluminum 3 inches wide and 15 inches long. Starting at one end of the strip, lines are marked across the strip at $\frac{1}{2}$ inch, $1\frac{5}{16}$ inches, $2\frac{3}{4}$ inches, $4\frac{3}{16}$ inches, $5\frac{1}{4}$ inches, $6\frac{1}{16}$ inches, $7\frac{1}{2}$ inches, $8\frac{15}{16}$ inches, $9\frac{3}{4}$ inches and $14\frac{1}{2}$ inches from the end. Longitudinal lines are then drawn the length of the strip $\frac{1}{4}$ inch, $\frac{23}{32}$ inch and $1\frac{3}{16}$ inches from each edge. This will serve to mark the centers of all required mounting and clearance holes for the Hammarlund crystal sockets. The mounting screws take a No. 33 hole and the clearance holes are $\frac{5}{16}$-inch diameter. After the holes have been drilled, the strip is bent at the $\frac{1}{2}$-inch, $5\frac{1}{4}$-inch, $9\frac{3}{4}$-inch and $14\frac{1}{2}$-inch lines which are scratched deeply to assist in the bending.

The 11-point crystal switch is wired to the sockets before mounting in the panel in a hole 4 inches from the left edge of the panel and $4\frac{1}{2}$ inches up from the bottom edge to balance the

shaft of the tank condenser of the final amplifier.

Referring now to the photograph of the under side of the chassis, we see the oscillator plate tank condenser mounted without insulation at the center of the three oscillator sockets with its shaft in a line below that of the crystal switch. The 6.3-volt filament transformer for the 6V6 and 807 is immediately behind the 807 socket and the 5-volt transformer for the 75T in the right rear corner. The various by-pass condensers, grid-leak resistors, and r.f. chokes are supported by their own wire leads wherever possible and are located at any convenient points as close as possible to the tube terminals to which they are connected. Voltage-divider resistances are mounted wherever a convenient mounting can be made. The grid leaks, r.f. chokes and C_5 and C_6 should be kept at least a half-inch away from the chassis.

Wiring

While any type of terminal strip might be used, the type shown in the photograph was chosen because the metal portions are not exposed to accidental contact. The strip is set back of a ½-inch wide opening cut in the rear edge of the chassis. The contacts are ¼ inch inside the rear edge and connections are made with small bakelite-insulated "'phone tip" plugs. The positive high-voltage terminal is a jack-top feed-through insulator taking a standard banana plug. A rubber-tubing sleeve should be pulled over the wire and the top of terminal after connection of the high-voltage wire has been made so that there is no metal exposed.

The positioning of the various components is such that all wiring of any special importance is quite obvious. It is necessary only to follow the oft-repeated rule to run the r.f. connections with fairly heavy wire (No. 14) directly from point to point in as straight lines as possible, keeping them well spaced from the chassis and other ground-potential points. The low-potential wiring, usually done first, is bunched where convenient and kept close to the chassis. Push-back wire will be satisfactory for all except the positive 1500-volt line. This should be run in well insulated high-voltage wire. The wiring should be checked

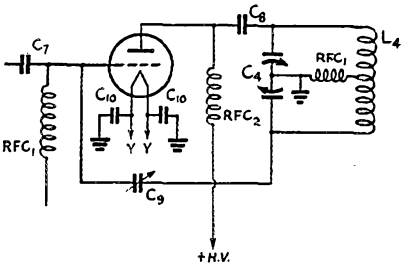


Fig. 2 — Parallel plate feed for the final amplifier will simplify construction and is suggested if 28-Mc. operation is not desired.

EXCITER TUNING TABLE

Xtal Freq.	*Output Freq.*	L_1	L_2	L_3	C_2	C_3
*1.7	1.7	1.7	1.7–3.5	1.7–3.5	high	high
1.7	3.5	1.7	1.7–3.5	1.7–3.5	high	low
*1.7	3.5	1.7	1.7–3.5	1.7–3.5	low	low
*1.7	7	1.7	1.7–3.5	3.5–7	low	low
*3.5	3.5	3.5	1.7–3.5	1.7–3.5	low	low
3.5	3.5	3.5	3.5–7	1.7–3.5	high	low
3.5	3.5	3.5	3.5–7	3.5–7	high	high
3.5	7	3.5	3.5–7	3.5–7	high	low
*3.5	7	3.5	3.5–7	3.5–7	low	low
3.5	7	3.5	7–14	3.5–7	high	low
*3.5	14	3.5	3.5–7	14	low	low
3.5	14	3.5	7–14	14	high	low
7	7	7	3.5–7	3.5–7	high	low
*7	7	7	3.5–7	3.5–7	low	low
7	7	7	7–14	3.5–7	high	low
7	14	7	3.5–7	14	low	low
*7	14	7	7–14	14	high	low
7	14	7	7–14	14	low	low
*7	28	7	7–14	28	low	low

carefully before any voltages are applied to the transmitter.

Biasing Requirements

Before setting the transmitter up for test and use, some thought must be given to the biasing problem. The 807 requires 90 volts of fixed bias if the oscillator is to be keyed for break-in operation and the 75T requires approximately 150 volts for plate-current cut-off with excitation removed and 300 volts under recommended operating conditions. Adjustment is simplest when batteries are used for bias but, unfortunately, the initial cost of four 45-volt units is rather high and the life to be expected with high grid currents short. If batteries are used, the biasing is simply a matter of connecting a 4000-ohm leak in series with the negative-terminal connection of 150 volts of battery to the grid return circuit of the 75T and tapping the 807 grid return on at 90 volts. However, a bias pack will be more practical in most instances. The pack should preferably be one delivering any voltage from 175 to 300 volts. If the voltage does not exceed 300 volts, nothing more than a 10,000-ohm bleeder will be required to make it satisfactory. An r.f. choke should replace R_2 and the return connected to a point about ⅔ of the way up on the bleeder from the positive end. The lower end of the choke should be by-passed to the chassis with a 0.01-μfd. condenser.

If the voltage of the pack exceeds 300 volts, the bleeder should have a resistance of about 3000 ohms per 100 volts and should be provided with three sliders for adjusting the biasing voltages under operation. One slider should short-circuit a portion of the negative end of the resistor while the other two provide bias taps for the 807 and final. For initial trial, tap the return of the final amplifier at about 6000 ohms and the 807 at

about 3500 ohms from the positive end with the third slider set at the extreme negative end.

If the buffer-doubler is to be keyed, the grid leak R_2 is connected through the meter to ground and no fixed bias is required for this stage.

Testing

After making the external connections as shown in Fig. 3, the next step is to select an appropriate set of coils. From the coil table, it will be seen that a separate cathode tank is required for crystals of each frequency band from 1.7 to 7 Mc. Each oscillator plate tank coil is designed to cover two adjacent bands for convenience in changing bands. Only two coils, the first and last, need be wound if frequent change between 3.5 and 7 Mc. is not required. Likewise, in the buffer-doubler stage, each of the two lowest-frequency coils covers two bands. All of these are required, however, if all bands are to be covered. A separate coil for each band is required for the final amplifier.

Several coil and tuning combinations are possible for most output frequencies. The oscillator will double frequency as well as the doubler itself, so that it is possible to go to 7-Mc. output from a 1.7-Mc. crystal, 14 Mc. from a 3.5-Mc. crystal or to 28 Mc. from a 7-Mc. crystal. The table shows various combinations which may be used. Certain combinations should be selected (such as those marked with an asterisk) until the operator is thoroughly familiar with the transmitter. Later, it will be a simple matter to swing the exciter from one band to another with the most appropriate coils in place.

With a set of suitable coils plugged in, C_2 and C_3 should be turned near minimum or maximum capacity, depending upon the frequency desired in these circuits. Make certain that the crystal switch is turned to connect in the desired crystal and turn the adjusting screw of the cathode-circuit condenser as far as possible in a clockwise direction. The filament supply, the bias pack and the 600-volt plate supply may now be turned on in that order. If the key is the oscillator circuit (recommended for initial test), none of the meters should indicate current flow with the key open. With the key closed, the oscillator plate current should be 20 to 30 ma. if the circuit is not oscillating, dropping to about 15 ma. when oscillating. Adjusting the oscillator plate tank condenser should cause a slight dip in oscillator plate current and a high swing in plate current to the 807 at some point. If this is not obtained at any setting of C_2, the oscillator plate current will probably be running high. With the key closed, the adjusting screw of the cathode condenser should be turned slowly counter-clockwise until the oscillator plate current takes a sudden drop. Tuning the plate condenser should then develop two points where plate current will flow to the 807, one near maximum capacity of C_2 and one near minimum capacity. If only the former is found, a turn or so should be removed until both are found. If, on the other hand, only the one near minimum is found, a turn or two should be added. The key should be closed only for short intervals until the tank circuit of the 807, L_3C_3, is tuned to resonance as indicated by a dip in plate current.

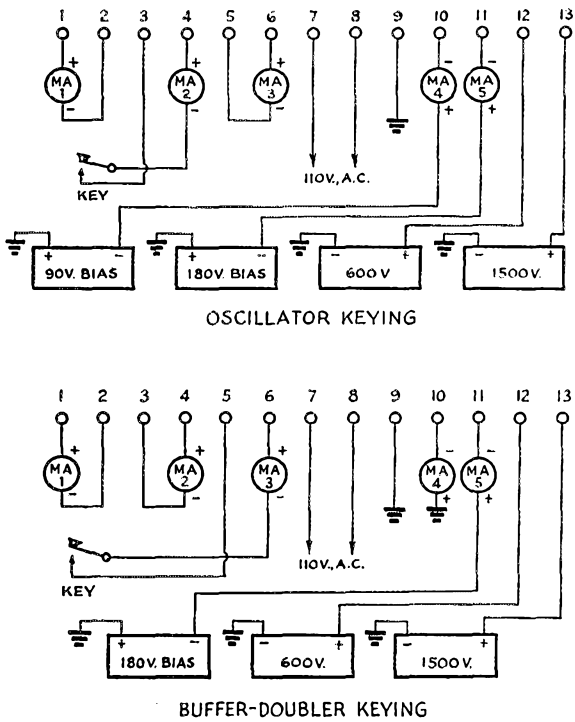


Fig. 3 — Terminal and meter connections. A — For oscillator break-in keying. B — For buffer-doubler keying.

Adjusting the Cathode Tank

Now tune the plate circuit of the oscillator to the second harmonic of the crystal frequency, making sure that a coil tuning to this harmonic frequency or double this harmonic frequency is in the plate circuit of the 807. (In the case of 3.5-Mc. crystals, either coil covering 7 Mc. will do.) Tune the plate circuit for maximum 807 grid current and then adjust the cathode condenser also for maximum grid current. Any grid current value between 2 and 5 ma. should be satisfactory. With the oscillator cathode circuit tuned correctly, the off-resonance plate current of the 807 will run between 125 and 150 ma., dropping to 60 to 100

(Continued on page 116)

The Series-Valve Noise Limiter

A New Type of Circuit for Chopping Noise Peaks

BY DANA H. BACON,* WIBZR

One diode plus a couple of resistors equals one noise-peak-limiting circuit when combined as described in this article. Besides simplicity, it has theoretical and practical advantages over many previously-described circuits. It does an excellent job of reducing QRM from auto ignition and similar peaky noise.

EVER since early 1936, when James Lamb presented the first of a series of articles dealing with noise silencers as applied to amateur communications receivers,[1] innumerable new silencer or limiter circuits have appeared in the various popular radio magazines. The majority of the schemes presented had little merit for, although they appeared to be good theoretically, they failed to work out because one or more of four fundamental considerations were overlooked.

These factors have been pointed out before but will be listed here and discussed briefly:

1. A good noise silencer must be practically instantaneous in its action.
2. It must have a very definite, adjustable level at which the silencing, or limiting, action starts.
3. The limiting action must be complete after the threshold level has been reached.
4. The silencer should not have any effect upon the signal being received.

Analysis of the silencers used heretofore will show that in many cases they do not fulfill all of the above requirements. For instance, an a.v.c. type of silencer may be too slow in its action and a strong noise pulse will "chop a hole" of appreciable duration in the carrier, in violation of Principle 4 above, and producing a similar effect on the loudspeaker as the original noise pulse.[2]

Other examples of limiters that fall short of theory in practice are the shunt diode types which are intended to short either the i.f. amplifier or audio circuits when noise pulses exceed a certain level. Such devices do not, in general, have a sharply defined cutoff action, nor do they adequately short the circuit when a noise pulse is impressed upon them.

The circuit shown in Fig. 1[3] was devised after an investigation of the more meritorious silencer arrangements. As may be seen, it is very simple and it has been found to be extremely effective. The action is as follows. An adjustable voltage from the potentiometer R_3 is connected to the diode elements through resistors R_1 and R_2, the polarity being such that a current is maintained between the diode plate and cathode. The diode elements are, therefore, in a conducting condition and will allow audio voltages to pass *backwards* from cathode to plate, and the circuit between input and output will be complete as long as the diode plate remains positive with respect to the cathode. If, however, a noise peak of sufficient amplitude is impressed upon the input circuit, the diode immediately becomes non-conducting and prevents the noise pulse from reaching the audio amplifier.

It can easily be seen that this arrangement fulfills the four fundamental characteristics outlined above, since it is instantaneous in action, has a sharp adjustable level where silencing action begins, limiting action is complete, and the signal itself is unaffected.

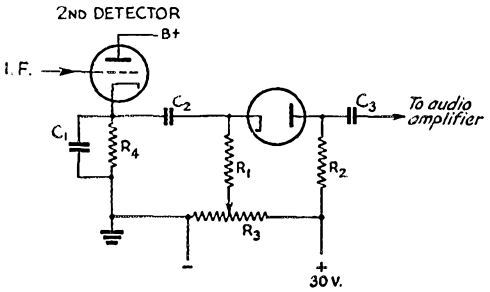


Fig. 1 — The series limiter circuit, with infinite-impedance detector.

R_1 — 0.25 megohm. C_1 — 250 μμfd.
R_2 — 50,000 ohms. C_2, C_3 — 0.1 μfd.
R_3 — 10,000-ohm potentiometer.
R_4 — 20,000 to 50,000 ohms.

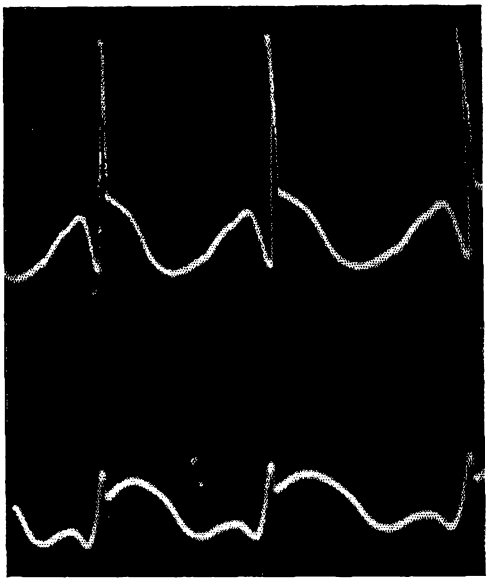
* Chief Electrical Engineer, National Co., Inc., Malden, Mass.

[1] J. J. Lamb, *QST*, February, 1936; April, 1936.

[2] Obtaining a small time constant is an important consideration in the i.f. type of silencer. However, with sufficiently rapid action in a silencer installed at the input end of the i.f. amplifier, the "hole" will largely disappear by the time the signal reaches the second detector, because of the low decrement of the intervening tuned circuits. This is particularly observable when a crystal filter follows the silencer.

The lengthening of the noise pulse also is an argument for applying the silencing or limiting action ahead of all highly-selective circuits, although this leads to a considerably more complicated arrangement than the simple circuit described here. See *QST*, April, 1936, page 16. — EDITOR.

[3] Patent applied for.



Photograph of oscilloscope patterns showing the audio signal and an accompanying noise pulse, limiter out, and the same signal with the limiter adjusted to cut the noise peak above the signal.

The fundamental difference between this limiter and others employing diodes is that the diode elements are connected in series, passing the desired signal and eliminating noise peaks, whereas the shunt-connected diode is intended to pass noise peaks without passing the signal. There is, of course, some audio attenuation in the series limiter but this is easily taken care of by increasing i.f. and audio gain.

The sketches shown in Fig. 2 illustrate the action of a detector and the series limiter when a modulated signal attended by noise is being received. It should be noted that the detector automatically eliminates one side of the noise peak, along with one side of the carrier envelope.

It must also be realized that a limiter, no matter how perfect, cannot remove that portion of the noise which has the same amplitude as the signal without introducing serious distortion. In the case of 'phone reception, the limiter will be adjusted so that all desired audio peaks will just pass under the threshold; when receiving c.w. signals, however, the limiter threshold can be lowered considerably, further reducing noise peaks. Such an adjustment will, of course, cut down the audio volume of the c.w. signal slightly and will change its quality, but both changes are small as compared to the gain in noise reduction.

There are a few more points which should be considered by the amateur who would like to install the series limiter in his receiver. The first thing to consider is the type of second detector which the receiver employs. The so-called infinite impedance diode appears to be most satisfactory for use with the series limiter, since it delivers the positive side of the signal envelope to the limiter diode, and will supply ample voltage without danger of overload. The values shown in Fig. 1 have been found satisfactory.

Most of the common diode detectors, wherein the audio voltage is developed across a high resistance in the plate return circuit, eliminate the negative half of the signal envelope but the remaining positive half builds up negative voltages, with respect to ground, across the load resistor. These negative voltages will not actuate the series limiter in the manner previously described unless the circuit is rearranged. This can be very easily accomplished by following the circuit of Fig. 3, which shows the diode elements interchanged. In this case, the limiter will pass negative voltages up to the point where the plate is negative with respect to the cathode, i.e., up to the threshold, after which the diode becomes an insulator, as previously explained.

The arrangement shown in Fig. 1 is not self-adjusting, since it was developed primarily for use with receivers having flat a.v.c. systems which automatically maintain the detector output level at the proper value. In any case, it is usually advantageous to be able to adjust the limiter control to provide best noise suppression for the particular operating conditions which exist at any given time.

It is important that the second detector be able to supply an audio signal of about ten volts to the limiter circuit. A signal of this magnitude makes possible a good range of control with a sharply defined limiting threshold and avoids the necessity for using a high-gain audio amplifier. Such considerations are, of course, in agreement with the best accepted design practice in communications receivers.

The reader who is familiar with the problems encountered when working with limiter circuits

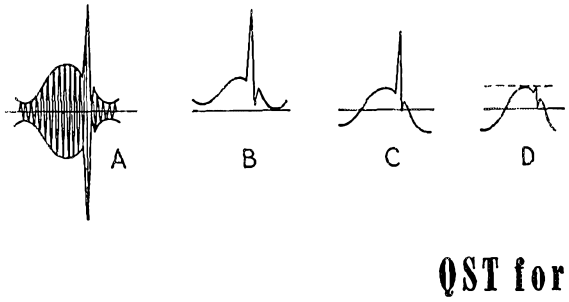


Fig. 2 — Illustrating the action of the detector and limiter. (A) modulated carrier, with noise pulse; (B) rectified output of detector; (C) audio input to limiter; (D) limiter output.

has probably wondered about the blocking effect of strong, steady, noise pulses when they are impressed upon the a.v.c. system. This is, of course, a drawback to a limiter which is connected in the audio circuits, rather than in the i.f. amplifier, but it has been found possible to overcome a.v.c. blocking to a considerable extent by using a separate a.v.c. tube coupled to the i.f. line with a condenser-and-resistor combination, which renders the circuit insensitive to voltage impulses of high amplitude. This feature, together

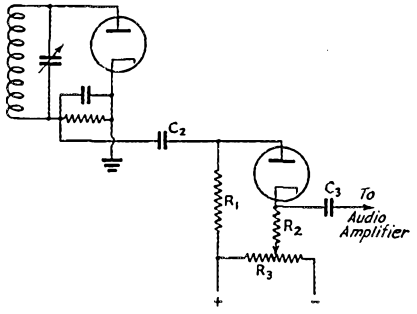


Fig. 3 — Series limiter as used with detectors such as the ordinary diode, delivering "negative" audio signals. Components have equivalent values given in Fig. 1. The diode load circuit constants are conventional.

with correct adjustment of the time constant of the a.v.c. system as a whole, has been found to constitute a satisfactory solution.

One other point: The c.w. oscillator should not deliver to the second detector any more voltage than is necessary to provide a satisfactory c.w. beat note. If the oscillator voltage at the detector is too great, it will provide a carrier of considerable amplitude for the noise pulses to modulate and, obviously, under such conditions the limiter will have considerably more work to do. As previously stated, however, this difficulty is avoided when the proper amount of c.w. oscillator voltage is employed.

Although the installation of the series limiter itself in a receiver is very simple, it should be evident from reading the last few paragraphs that the work must be done with care and that results will be satisfactory only if the several factors mentioned above are taken into consideration.

★ SPLATTER ★

How did you come out on the historical quiz? Fred Elser, W6GVU, sends the following answers to the questions he put forth on page 10 of September *QST*:

1. "Curkoids": trade name for a type of coil: (Full name, "curtate epitrochoids.")
2. "Sorsinc" was the trade name of Ship Owners Radio Service, Inc., a firm which sold coils and B-batteries popular with hams 16 years ago.
3. "KiloHertz" is a German term meaning the same as Kilocycle sec.
4. Picofarad was a high brow term for micro-microfarad.
5. Myriacycle — 10,000 cycles or 10 kc.
6. Radiotelescopograph — *QST*'s name (in a cartoon) for television receiver.
7. WNP — Wireless North Pole. WNP was the call of the "Bowdoin," MacMillan's polar ship. Ask Don Mix for further details.
8. OT — Not "Old Timer," but "oscillation transformer."
9. "Modulascope" — Reinartz' combination Tesla Coil-&-Pinwheel device for determining the amount of ripple in the plate voltage supply.
10. First advertised price of UV-201-A was $9.00!!

★ ★ ★

Just before we went to press we received the following letter:

"Paris, France
"August 16, 1939

"*QST* Magazine
"West Hartford, Conn.

"*Editor:*

"I hope that you shall find the enclosed article interesting. I further hope that you shall find space for it in an issue in the near future. It has been delayed in reaching you because I have spent the intervening months (since it was written and now) in countries which are world-famous for censoring mail. On general principle they would not let such a story pass, so I was forced to refrain from mailing it until I arrived in Paris. . . ."

This all refers to the "Cruise of the Pang Jin," which was enclosed with the letter. It served to answer many questions in our minds and we rushed it to press, knowing it will do as much for many readers.

★ ★ ★

Our Cover

This month we are showing in almost life-like fashion a portion of the innards of Don Mix's latest creation. He shows how a few coils, crystals and tubes should be put together to produce a quarter kilowatt — in our lead article this month.

★ ★ ★

Proof that DX Contests must be getting bigger and better is evidenced by the results of the 1939 struggle. This year we are shooting it complete in one issue because there is so much interest in knowing "what the other guy did," be it in Hide-out Junction or Timbuctoo. Particularly of interest should be Ev Battey's résumé of the gear that section- and country-winners used this year. Maybe therein lies the answer to the oft-asked query, "How did he ever roll up that score?"

The shack at VS6BF. On the walls can be seen examples of Chinese art intended for exhibition at the New York World's Fair.

George W. Polk, ex-K7HDW and XU8GP (Shanghai), is a footloose news correspondent who roams the world at will and can usually be found wherever there is trouble and excitement. It was months ago, in Aden near the mouth of the Red Sea, that he met Rex Purcell of the crew of the *Pang Jin*. Since then he has been in countries where the fear of censorship prevented his dispatching this yarn. But in August he finally reached Paris, and now here is the story.

The Cruise of the "Pang Jin"

By **REX PURCELL, VS6BF,**

as Told to **GEORGE W. POLK***

"QST de VS6BF, QST de VS6BF, QST de VS6BF, AR K." Over and over I pounded my call. The heavy crashing of the junk sounded dangerous and labored down in the shack. Waves cascaded over the deck, thundering and smashing. The barometer was dropping alarmingly and had already passed a figure lower than I had ever seen before.

I tuned through the 20-meter band in the hope that someone had heard my call; traffic was heavy. Suddenly the mounting tone of a strong carrier whistled into the headphones. I tuned into it, heard nothing, and then gradually dialed past. Slowly I tuned back. Sharply a voice was saying, "Hello VS6BF, calling VS6BF, Venezuela-Spain-six-Boston-France. ZS6DY, Johannesburg, South Africa, is answering your QST and standing by. Go ahead, please."

I flipped my generator switch and keyed out my reply. "ZS6DY de VS6BF. Chinese junk *Pang Jin* in severe storm off east central coast Madagascar. Urgently need weather reports and forecasts on direction of cyclone this vicinity. Can you arrange? AR K."

The 'phone came right back. "ZS6DY to VS6BF. Will try to obtain weather info for you immediately. Please QRX while I check."

The sea was so rough that my receiver would not hold its frequency setting steadily, but I heard bits of ZS6DY's rapid fire calls for weather data. There was one to Durban, another to Cape Town. Then he asked a station in Delagoa Bay to telephone the local coast guard and weather stations. I did not hear the answers, for I was afraid of losing ZS6DY, constant tuning being necessary. Overhead the shouts of the men battling with wind and waves were dimly audible. Conditions were undoubtedly becoming worse. After what seemed hours but was actually only minutes, I heard my call, "Calling VS6BF, VS6BF, VS6BF. ZS6DY is calling and standing by."

I immediately answered. This message came through: "Cyclone off east central coast Madagascar plotted as progressing east to west, speed 28 miles per hour. Weather bureau advises you proceed northwest in order to escape danger zone. Can stand by for you long as necessary or will arrange sked for later contact. Go ahead, please."

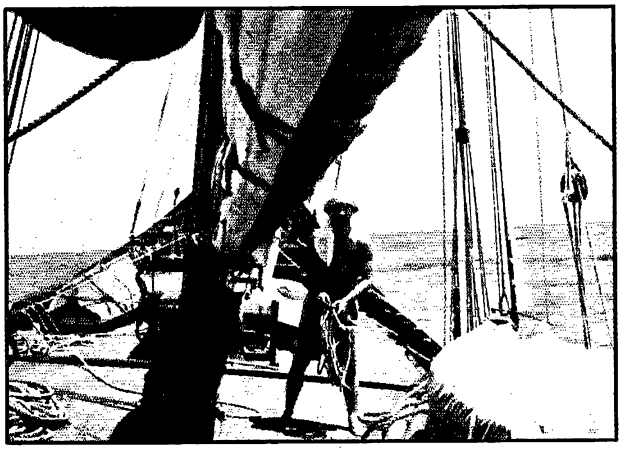
A few seconds later my thanks had been acknowledged by ZS6DY and he had agreed to a contact for that evening, at which time he would furnish me with further storm reports. Twelve hours later we had sailed far enough to the northwest to be in much calmer waters. Thus was our Hongkong-to-New York voyage interrupted. We had planned on exhibiting the *Pang Jin* at the New York World's Fair by July 1st; the cyclone was but the first of a series of misadventures which threw us farther and farther behind schedule.

Eight months before, Jim Peterson, Homer Merrill and I had met in Hongkong to build the *Pang Jin*. Months of planning and preparation had gone into the making of our ship. We personally selected each piece of timber, coil of rope, and bucket of paint used in its construction. While we were building, another junk was on the ways in a nearby shipyard. This second junk was the *Green Dragon*, owned by Richard Halliburton. The *Green Dragon* sailed from Hongkong on March 8th carrying a crew of twelve Americans,

*Care of American Express, Paris, France.

her destination the San Francisco World's Fair. Since March 24th, when her radio failed during a storm, the *Green Dragon* has been unreported. She is now given up for lost.

When plans for our trip to New York had become definite, I appealed to Leroy Lewis, radio engineer for the Philippine Aerial Taxi Company, for technical advice and practical assistance on the radio equipment we planned to install. He designed a compact portable transmitter which operated on 'phone or c.w. from a 110-volt a.c. 300-watt Johnson Iron Horse motor-generator; output was 45 watts. A storage battery, which furnished power for the receiver, was charged by the generator. The single-wire antenna was stretched from mast to mast, but since the booms rose above the mast tops it frequently broke as the sails were shifted. To Leroy go the compliments of all crew-members of the *Pang Jin*, for under the most trying difficulties his rig operated consistently and well.



Rex Purcell on the deck of the Chinese junk *Pang Jin*.

Although I hold no amateur license in the United States, I was familiar with radio communication, both 'phone and c.w., because of my experience in the U. S. Army Air Corps. For the past four years I have been flying for the Philippine Aerial Taxi Company, and, as much of our communication was handled through the medium of aircraft radio, I felt capable of assuming the role of operator aboard the *Pang Jin*.

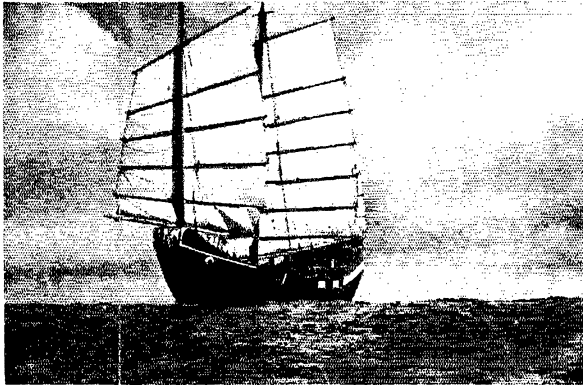
The British Government agreed to grant me a special license, assigning the call VS6BF. Power was limited to 50 watts, and the license was to become void on arrival in New York. Little did any of us imagine how important those 45 watts at work on 14,136 kc. would be during a cyclone in the Indian Ocean.

An interesting side light on the cruise has been the granting of a second call to the *Pang Jin*. This occurred in the Seychelle Islands, where we landed for a rest soon after the storm. On several occasions there were wild accusations hurled at me when I called "CQ de VQ9AA." Hamdom refused to believe that such a call was supposed to exist. Those ops who were not too hasty in their judgment of the VQ9 prefix added a QSL to their collection which may not be duplicated in the near future.

Eric Lowe, ZS6DY, Johannesburg, was our close companion and tireless helper for the two months since our first QSO during the cyclone. Contacts have also been established with stations scattered in India, Australia, the Philippines, the United States, the Malay States, China, Japan, the Dutch East Indies, and various other countries. Among the hams whom the *Pang Jin* has relied on for more or less regular communication are: VS6AG, Hongkong; KA7EF, Fabrica, Negros, Philippines; J2MI, Tokyo; VK5CS, South Australia; KA1JP, KA1BH and KA1AF, all in Manila; KA2OV, Buang, Philippines; PK2WL, Java; VU2FU, Bombay, and ZS1AN, Cape Mowbray, South Africa.

An amusing feature of a few of these QSO's has been the sounds of civilization which have been heard yet not experienced. As we roll and dip our way across various oceans and seas towards America, the noise of an auto's horn or the ringing of a telephone bell, emanating from the loudspeaker, sound strangely out of place. So long unheard are they that they are practically forgotten. Our longest at-sea stretch has been 77 days. Almost at the end of this period we heard Lowe talking with his wife and family. Again we recognized the splash of a tub being filled. How we longed for a hot bath, we of the dirty fingernails and long, flowing beards. The unattainable pleasures of civilization can be trying at times.

Originally our route had been planned to take us from Hongkong to Singapore, thence through the Straits of Malacca and on to the southern tip of the island of Ceylon. Here we expected to take advantage of the northeast monsoon season and sail to the southwest across the Indian Ocean to



Under full sail in the China sea.

the Cape of Good Hope. From Good Hope we were to continue to New York over the waters of the Atlantic. These plans have been altered, however, because of the cyclone which drove us from our course, and because of the change in the monsoon season.

The monsoons of the Indian Ocean are steady winds which blow from the northeast to the southwest from December to June, and then turn and blow in the opposite direction for the next six months. A sailing ship finds beating against a monsoon all but impossible. We took the chance of completing our passage to Cape Town before the change in season, although we realized how late our start had been. We figured without the gale off Madagascar. The monsoon turned and blew against us after the storm. We then decided to attempt reaching the United States via the Seychelle Islands, Aden, the Red Sea, the Mediterranean and the Atlantic Ocean.

Here in Aden, at the southern tip of Arabia, we are still faced with adverse winds in the Red Sea. New York is yet thousands of miles distant, but we are determined: It is New York or bust!

* * *

NEWS BULLETIN: Five days out of Aden, Arabia, the Chinese junk *Pang Jin*, bound Hongkong to New York, sank in the Red Sea. All members of the crew were saved by the Greek freighter S.S. *Olga E. Embiricos*. Due to extremely rough seas and high winds the survivors were unable to salvage anything but a few personal belongings. (From the *London Times*.)

Kansas State Convention

(Midwest Division)

Topeka, Kansas, October 7th–8th

THE 12th Annual A.R.R.L. Convention sponsored by the Kaw Valley Radio Club will be pitched October 7th and 8th at the Kansan Hotel, Topeka, Kansas. New speakers; new features; new laughs. A "bang-up" program all around with prizes for hams and the ladies, too. What more could be desired?

Make reservations now. Write, call or wire Earl Johnson, 624 Roosevelt Street, Topeka, Kansas.

Navy Day Receiving Competition

To Be Held on October 27th

A MESSAGE to radio amateurs from the Secretary of the Navy will be transmitted on Navy Day, October 27th. In connection with this message A.R.R.L. will conduct the Fifteenth Annual Navy Day Receiving Competition. All amateurs are invited to take part in this activity, which constitutes amateur radio's participation in the celebration of Navy Day.

Two messages will be transmitted, one from Radio Washington (NAA), the other from Radio San Francisco (NPG). These messages will be substantially the same in thought but will vary slightly in wording. A letter of appreciation from the Navy Department will be sent to *every amateur* who makes perfect copy of the text of one message. Both messages may be copied, but only the best copy should be submitted in the competition. It is not necessary to copy both stations, and no extra credit is given for so doing. However, if both stations should be copied, please mention the fact when submitting your *best* copy so that the number of operators copying each station may be ascertained. Only the *text* (including any punctuation therein) of each message will count (not the preamble, break signs, and the like). Copy what you hear. Do not guess! Credit will of course be deducted for logging anything that was not actually transmitted!!

Mail copies for grading to the A.R.R.L. Communications Department, West Hartford, Conn. Send your original copies — recopying invites errors. An Honor Roll of letter winners and all other participants will appear in *QST*. The relative standings of the various Naval Districts will be determined by comparing the number of letters awarded with the number of copies submitted from each District. In submitting copy please mention it if you are a member of the Naval Communication Reserve.

Transmissions will be at approximately 25 words per minute and will be preceded by a five-minute CQ call on the following schedule: From Washington: NAA, 9:00 P.M., E.S.T., simultaneously on 4045 and 8090 kcs. From San Francisco: NPG, 7:30 P.M., P.S.T., simultaneously on 4045 and 9090 kcs.

The Infinite Impedance Detector

Some Uses of Cathode-Coupling in Superheterodyne Receivers

PRACTICALLY all of the broadcast and short-wave receivers available to-day use a diode second detector, primarily because it is capable of handling large signals and offers a convenient source of a.v.c. voltage. The diode is, however, far from the ideal type of second detector. During the positive portion of each i.f. cycle, current flows through the diode and by-pass condenser C_1 (Fig. 1-A) which has a low impedance to the intermediate frequency. This has the same effect as putting a resistor across the secondary of the transformer, the equivalent resistance value being determined by the internal resistance of the diode, which is quite low in most cases. Thus the transformer no longer works into the practically infinite resistance normally offered by the grid circuit of a vacuum tube (as it does in the i.f. amplifier) but into a low resistance load determined by the operating point of the diode. The effect is called "loading" of the transformer, and it destroys the selectivity of that transformer. The loading can be reduced somewhat by using a high value of load resistor (which changes the operating point of the diode), but as this is done the audio distortion increases and the percentage of modulation that the detector can handle without distortion decreases. If the audio voltage is taken from a tap on the load resistor, the modulation capability is improved but the available audio voltage is decreased in proportion to the tapping-down on the load resistor. The fact that the diode contributes no gain (actually a slight loss) is unimportant in modern applications, where double tubes that incorporate a triode amplifier as well as the diode rectifier are used.

The ordinary "plate" detector consists of a vacuum tube (usually a triode) with its control grid biased very nearly to cut-off and an audio load resistor or transformer in the plate circuit. Because of the lack of symmetry about the grid operating point, an incoming signal will cause an increase in plate current in accordance with the average value of the positive half-cycles of radio frequency. This variation corresponds to the signal, as represented by the envelope of the r.f. The plate current therefore consists of a d.c. current, determined by the carrier strength, upon which is super-imposed the audio signal. Ordinarily the audio signal is obtained for the following amplifier by placing an audio load such as a choke or high resistance in the plate circuit and coupling the audio signal that develops across this load to the amplifier through a large condenser. However, since the plate current also appears in the cathode current the load resistor can just as easily be put in the cathode circuit. It will then serve as a load resistor and, in addition, the steady d.c. drop through this resistor will supply the necessary grid bias, automatically adjusting it to different carrier levels. This is exactly what is done in the "infinite impedance" detector.

Recent publicity given to the "infinite impedance" detector has prompted a number of inquiries about the system. We present some of the pros and cons.

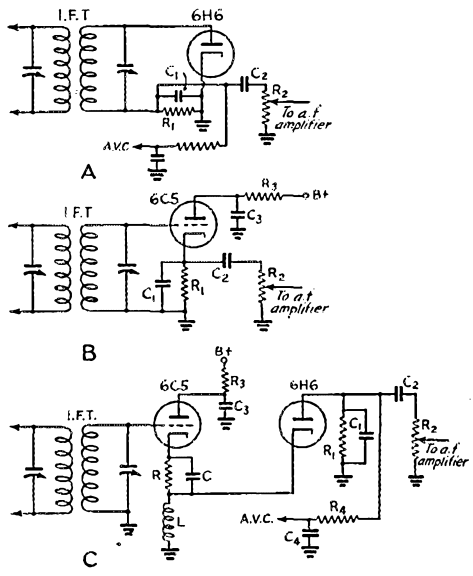


Fig. 1 — The second detector circuits under discussion. The conventional diode rectifier is shown at A, while B shows the "infinite impedance" type of detector. C is the diagram of a cathode-coupled i.f. amplifier.

Although the infinite impedance detector is at least several years old, it is just recently that it has been incorporated in some of the new receivers, giving rise to speculation as to its possible advantages in amateur work. In its simplest form, as shown in Fig. 1-B, the load resistor R_1 is by-passed for the intermediate frequency by C_1 and the plate is by-passed for audio frequencies by C_3. The rectified audio component is coupled to the audio amplifier through C_2. The input impedance is nearly a pure capacitive reactance which becomes part of the tuned circuit without loading it, and thus the gain and selectivity are

(Continued on page 110)

★ WHAT THE LEAGUE IS DOING ★

ELECTION NOTICE

To ALL members of the American Radio Relay League residing in the Dominion of Canada and in the Atlantic, Dakota, Delta, Midwest, Pacific and Southeastern Divisions:

You are hereby notified that, in accordance with the constitution, an election is about to be held in each of the above-mentioned regions to elect both a member of the A.R.R.L. Board of Directors and an alternate thereto. In the case of the Dominion of Canada the election is to choose a Canadian General Manager and an alternate Canadian General Manager, for the 1940–1941 term. In the case of the United States divisions, the election is to choose a division director and an alternate division director for the 1940–1941 term. Your attention is invited to Sec. 1 of Article IV of the constitution, providing for the government of A.R.R.L. by a board of directors; Sec. 2 of Article IV, and By-Law 12, defining their eligibility; By-Laws 13 to 24, providing for the nomination and election of division directors and their alternates; By-Laws 28 to 35 providing for the nomination and election of a Canadian General Manager and an alternate thereto. Copy of the Constitution & By-Laws will be mailed any member upon request.

Voting will take place between November 1 and December 20, 1939, on ballots that will be mailed from the headquarters office in the first week of November. The ballots for each election will list, in one column, the names of all eligible candidates nominated for the office of director by A.R.R.L. members residing in that region; and, in another column, all those similarly named for the office of alternate. Each member will indicate his choice for each office.

Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one of the above-named regions may join in nominating any eligible member of the League residing in that region as a candidate for director therefrom, or as a candidate for alternate director therefrom. No person may simultaneously be a candidate for the offices of both director and alternate. Inasmuch as the by-laws were recently amended to transfer all the powers of the director to the alternate in the event of the director's death or inability to perform his duties, *it is of as great importance to name a candidate for alternate as it is for director.* The following form for nomination is suggested:

Executive Committee
The American Radio Relay League
West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the ..... Division (or in the Dominion of Canada), hereby nominate ....., of ...., as a candidate for DIRECTOR (or for Canadian General Manager); and we also nominate ....., of ...., as a candidate for ALTERNATE DIRECTOR (or for alternate Canadian General Manager); from this region for the 1940–1941 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must have been both a member of the League and a licensed radio amateur operator for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination, except that a lapse of not to exceed ninety days in the renewal of the operator's license and a lapse of not to exceed thirty days in the renewal of membership in the League, at any expiration of either during the four-year period, will not disqualify the candidate. He must be without commercial radio connections: he may not be commercially engaged in the manufacture, selling or renting of radio apparatus normally capable of being used in radio communication or experimentation, nor commercially engaged in the publication of radio literature intended, in whole or part, for consumption by licensed radio amateurs. Further details concerning eligibility are given in By-Law 12. His complete name and address should be stated. The same requirements obtain for alternate as for director. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon E.S.T. of the 20th day of October, 1939. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of alternate. To be valid, a petition must have the signatures of at least ten members in good standing; that is to say, ten or more members must join in executing a single document; a candidate is not nominated by one petition bearing six signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominators are frequently found not to be members in good standing. It is not necessary

that a petition name candidates both for director and for alternate but members are urged to interest themselves equally in the two offices.

Present directors and alternates for these regions are as follows: Dominion of Canada: Canadian General Manager, Alex Reid, VE2BE, St. Lambert, P. Q.; Alternate Canadian General Manager, Alex Lariviere, VE2AB, Quebec, P. Q. Atlantic Division: director, Walter Bradley Martin, W3QV, Roslyn, Pa.; alternate, Raymond E. Macomber, W3CZE, Washington, D. C. Dakota Division: director, Fred W. Young, W9MZN, Mankato, Minn.; alternate, none. Delta Division: director, E. Ray Arledge, W5SI, Pine Bluff, Arkansas; alternate, E. H. Treadaway, W5DKR, New Orleans, La. Midwest Division: Floyd E. Norwine, jr., W9EFC, St. Louis; alternate, none. Pacific Division: director, J. L. McCargar, W6EY, Oakland, Calif.; alternate, Elbert Amarantes, W6FBW, San José, Calif. Southeastern Division: director, Bennett R. Adams, jr., W4EV, Homewood, Albama; alternate, S. J. Bayne, W4AAQ, Birmingham.

These elections constitute an important part of the machinery of self-government in A.R.R.L. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. Members are urged to take the initiative and to file nominating petitions immediately.

For the Board of Directors:

K. B. WARNER,
Secretary

August 1, 1939

WASHINGTON NOTES

F.C.C. HAS a new chairman, James L. Fly, of Texas, former general counsel of the T.V.A. Mr. McNinch was obliged to resign because of continued bad health. . . . On July 21st the Senate consented to the ratification of the Cairo regulations, no opposition being expressed. . . . The Santiago Inter-American Conference has been called for January 17th, and preparatory work has been expected to begin soon. Whether it (and the Stockholm C.C.I.R.) will now be postponed because of the war, we don't yet know. . . . Maybe 1715–2000 will get shifted to 1750–2050 after all. . . . Some trivial amendments of our regs are under way. Only one of significance is granting us carrier-on operation above 112 Mc. . . . Nothing has yet been done about revising the examination questions. . . . B.c.l. QRM complaints run 92½% against 'phone. Early in 1936 they were running 38% c.w. 1.7-Mc. 'phone causes more than half the complaints. . . . F.C.C. has a general campaign mapped out against diathermy and ignition QRM, and some progress is being made.

FINANCIAL STATEMENT

BUSINESSWISE, A.R.R.L. had a relatively excellent second quarter this year, accumulating only a small operating loss and entering the second half of the year somewhat ahead of the corresponding position last year. The operating statement is published below for your information, at the instructions of the Board of Directors.

STATEMENT OF REVENUE AND EXPENSES EXCLUSIVE OF EXPENDITURES CHARGED TO APPROPRIATIONS, FOR THE THREE MONTHS ENDED JUNE 30, 1939

REVENUES		
Membership dues	$10,253.16	
Advertising sales, *QST*	21,054.17	
Advertising sales, Handbook	6,475.55	
Newsdealer sales, *QST*	10,510.33	
Handbook sales	5,953.34	
Spanish edition Handbook revenues	2,518.00	
Booklet sales	2,472.64	
Calculator sales	286.15	
Membership supplies sales	1,812.37	
Interest earned	398.08	
Cash discounts received	222.40	
Bad debts recovered	13.80	$61,969.99
Deduct:		
Returns and allowances	$ 3,008.39	
Exchange and collection charges	14.05	
Cash discounts allowed	470.01	
	$ 3,492.45	
Less decrease in reserve for newsdealer returns of *QST*	437.83	3,054.62
Net Revenues		$58,915.37
EXPENSES		
Publication expenses, *QST*	$15,690.04	
Publication expenses, Handbook	3,763.74	
Publication expenses, booklets	948.55	
Publication expenses, calculators	144.51	
Spanish edition Handbook expenses	1,089.65	
Salaries	23,799.83	
Membership supplies expenses	1,145.76	
Postage	1,348.43	
Office supplies and printing	1,094.47	
Travel expenses, business	1,438.53	
Travel expenses, contact	437.36	
QST forwarding expenses	1,137.19	
Telephone and telegraph	500.60	
General expenses	1,215.86	
Insurance	85.54	
Rent, light and heat	1,112.00	
General Counsel expenses	278.89	
Communications Dept. field expenses	172.71	
Headquarters Station expenses	370.73	
World's Fair exhibit expenses	182.70	
Bad debts charged off	2,697.63	
Provision for depreciation of:		
Furniture and equipment	302.26	
Headquarters station	448.88	
Total Expenses		59,405.86
Net Loss before expenditures against appropriations		$ 490.49

QSL BUREAUS

WHILE the A.R.R.L. QSL Bureau is supposedly a one-way system, distributing foreign cards to W-K amateurs, many American amateurs have also sent their foreign cards to us for

(Continued on page 112)

How to Figure Grid-Bias Requirements

BY HARNER SELVIDGE,* W9BOE

One of the most confusing problems that crops up with new-comer and old-timer alike is that of calculating the grid-bias resistor. Here's a clear and simple explanation that should clean up that problem in no more time than it takes to read these pages.

JUDGING from the amount of mail received on the subject by tube manufacturers, the problem of figuring out the bias voltage requirements for a transmitting tube has a lot of amateurs guessing. The object of this article is to describe how the value of bias is found for three different cases. First, when grid leak bias is used. Second, when a combination of grid leak and battery or fixed bias is used. Third, when cathode bias is used. No attempt will be made to discuss the construction of bias supplies, but rather the computation of how much bias is required.

We are going to assume that the proper value of total grid bias for the tube, or tubes, is known. The tube manufacturer specifies in his tube ratings the proper amount of total grid bias appropriate for each kind of operation of his tubes, so this figure should be available. If you are going to operate the tube at some other value of bias than that specified by the manufacturer, we will assume that you know that value, and incidentally hope that you knew what you were doing when you arrived at it. In either case, these remarks will apply. For purposes of illustration we shall use data taken on an actual tube which we shall call the OK-73. These values are shown in Table 1. We shall consider only the case for Class-C telegraph operation. Computation for other methods of operation would be made in a similar fashion.

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Grid-Leak Bias

The simplest case to consider is that of grid-leak bias alone. If the tube or tubes are connected as shown in Fig. 1, and r.f. voltage is introduced into the grid circuit from the driver stage, the grids will be driven alternately positive and negative. When they are negative with respect to the filament, no current will flow in the grid circuit, but when they swing positive, electrons will be attracted to them and current will flow thru the grid resistors, R_1 and R_2, to the filament. This will be a pulsating d.c. and will appear as a steady current on the d.c. milliammeters shown in the grid return circuits. This current flow thru the resistors causes a d.c. voltage drop across them, with the grid end negative. For the single-ended case of Fig. 1A, we wish the grid to have a negative potential of 130 volts, when the grid current is 25 milliamperes. The size of the necessary resistance R_1 is found by applying Ohm's Law, the volts drop across the resistor (E_c) being equal to the product of the current in amperes (I_g) times the resistance in ohms (R_1).

$$E_c = I_g R_1$$
$$130 = 0.025\ R_1$$
$$R_1 = \frac{130}{0.025} = 5200 \text{ ohms}$$

In Fig. 1B we want the grids to have the same potential, — 130 volts, but here the current flowing through the resistance R_2 is the *sum* of the two grid currents and is 50 milliamperes. Thus we can find R_2 by Ohm's Law:

$$E_c = I_g R_2$$
$$130 = (0.025 + 0.025) R_2$$
$$R_2 = \frac{130}{0.050} = 2600 \text{ ohms}$$

It will be seen that the amount of grid leak required for two tubes is just half that required by one tube.

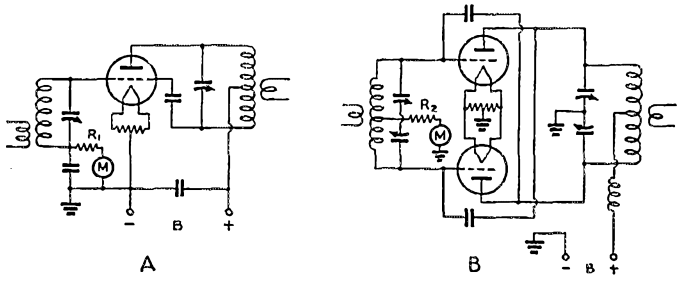


Fig. 1 — The fundamental wiring for amplifiers with grid-leak bias only.

The situation described in the above paragraph is very nice as long as the rectified current is flowing in the grid circuit. But if we suddenly remove the excitation to this particular stage, either by keying a previous stage or because of some failure in the exciter, this source of bias is removed because the d.c. grid current no longer flows. If we have the 1000 volts on the plate of the tube, and zero voltage on its grid, unhappy events take place. Let us look at a section of the characteristic curves of the OK-73 shown in Fig. 2. What is the value of the plate current, with 1000 volts on the plate and zero volts on the grid? On this set of curves we find one labeled $E_c = 0$. Looking along the bottom line where the plate voltages are given, we find 1000 volts and then go up to where this line crosses the curve marked $E_c = 0$. Then go to the left, parallel to the bottom line and we find the value of plate current given on the left vertical axis. This value is 80 milliamperes, considerably under the rated value of 120 milliamperes. However, since there is no r.f. being fed into the tube, there is no output, and all energy fed into the tube must be dissipated at the plate. We find then that we have a power input to the plate of $1000 \times 0.080 = 80$ watts. This is twice the power that the plate is supposed to dissipate, and it will at once blush a rosy red at this unexpected token of your confidence in its ability. An overload of this kind is not conducive to long tube life, and usually steps are taken to avoid it. One of these is to use tubes with high amplification factor, the so-called "zero bias" type. In these tubes, practically no plate current flows with zero grid volts, so they automatically take care of themselves in case of loss of excitation.

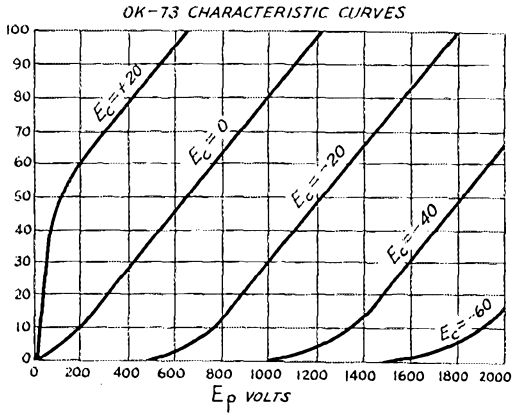


Fig. 2 — The characteristic curves of the OK-73.

Fixed and Grid-Leak Bias

For the lower-μ tubes, a combination of fixed- and grid-leak bias is sometimes used to protect the tube. Included in series with the grid leak is a fixed source of grid voltage such as a battery or a small power supply. This extra voltage is made sufficient to either cut off the plate current entirely, or keep it to a safe value in the event that the part of the bias supplied by the grid leak should be lost due to lack of excitation. The problem is, how large must this extra source be? The value of negative bias that is necessary to cut off the plate current is easily found by dividing the plate voltage of the tube by its μ, or amplification factor. In this case that would be

$$E_c \text{ (cut-off)} = \frac{E_p}{\mu} = \frac{1000}{25} = 40 \text{ volts}$$

This value can be checked by referring to the characteristic curves shown in Fig. 2. The cut-off bias is the value of grid voltage for zero plate current at a plate voltage of 1000 volts. This spot is on the horizontal axis at $E_p = 1000$, and the curve that passes through this point is the one for $E_c = 40$ volts, which checks the computation just performed. It would be quite safe to put a 45-volt battery in series with the grid leak, as shown in Fig. 3. If an a.c.-operated power supply is used, remember that its bleeder resistance will also be in the grid circuit and must be considered as part of the grid leak. The method of figuring the necessary resistance values in such a case is well presented in the A.R.R.L. *Handbook*,[1] in the section on power supplies. In any case, the fixed bias must be added to the grid-leak bias to get the total acting in the circuit, so if we are going to have 45 volts fixed bias on our OK-73, we need $130 - 45$ or 85 volts supplied by our grid resistance. Applying Ohm's Law as before, we find our new value of grid leak necessary to supply 85 volts with 25 milliamperes current for the case of the single ended amplifier.

$$E_c \text{ (grid leak)} = I_g R_3$$
$$85 = 0.025\ R_3$$
$$R_3 = \frac{85}{0.025} = 3400 \text{ ohms}$$

As before, the two-tube case will need half this value, or $R_4 = 1700$ ohms.

The tube can be amply protected from excitation failure by the use of nothing but fixed bias, with no grid leak at all, but this is usually more expensive, and does not give good linearity if the

TABLE I

TYPE OK-73

Class C Telegraph, Typical Operating Conditions	
DC Plate voltage	1000 volts
DC Plate current	120 milliamperes
DC Grid voltage	−130 volts
DC Grid current	25 milliamperes
Plate dissipation	40 watts
Amplification Factor	25

[1] Page 355, 1939 edition.

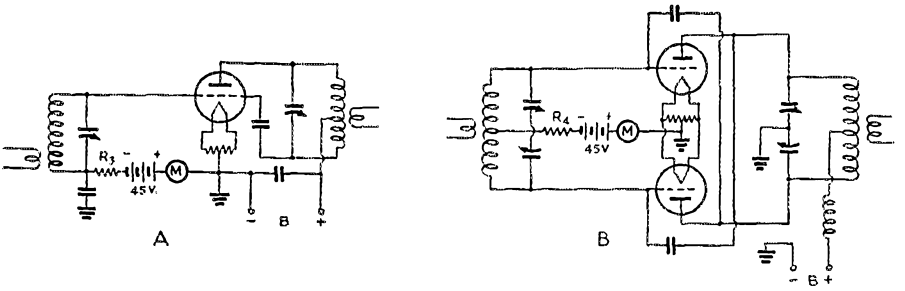


Fig. 3 — Battery or other fixed bias can be combined with grid-leak bias.

amplifier stage is modulated, and for these reasons this method is not often used.

Cathode Bias

There is a third method of tube protection sometimes used to prevent overloads, and that is cathode, or filament, bias. This is obtained by placing a resistance R_7 or R_8 in series with the lead going from the grounded negative high voltage to the filament center tap, as shown in Fig. 4. The plate and grid current both flow through this resistance, giving rise to an additional negative bias which will be added to that supplied by the grid resistance R_5 or R_6. The idea is that, if the grid current stops due to excitation failure, the plate current will continue to flow through R_7 or R_8 and supply enough grid bias to keep the tube from being overloaded, since the more plate current that flows, the higher will be the negative bias it builds up, and this in turn will tend to reduce the plate current. The size of this bias resistor can easily be determined by referring to the curves of Fig. 2. We want enough bias to keep the plate current at, or below, 40 milliamperes, which at 1000 volts gives the rated plate dissipation of 40 watts. Draw a horizontal line from $I_p = 40$ across until it intersects the vertical line rising from $E_p = 1000$. We wish to know the value of grid bias that will give these conditions. There is no curve shown which actually passes through this point, but the curve for $E_c = 20$ volts passes just below it, so we can estimate that a curve for a grid voltage of about 18 volts would pass through this point. This means that we need a bias of at least 18 volts. The size of R_7 is then found by Ohm's Law:

$$E_c = I_p R_7$$
$$18 = 0.040\ R_7$$
$$R_7 = \frac{18}{0.040} = 450 \text{ ohms}$$

This value of resistance will hold the plate current down to a safe value in case of loss of excitation, and now we must find out the value of R grid to go with it. When there is excitation, the rated plate current plus the rated grid current will both be flowing thru this 450-ohm resistor. Thus the amount of bias developed across R_7 is different under these conditions, since more current is flowing. The value of the cathode bias is found again by Ohm's Law:

$$E \text{ (cathode)} = (I_p + I_p)R_7$$
$$= (0.120 + 0.025)\ 450$$
$$= 65 \text{ volts}$$

For proper Class C operation we require 130 volts, so we need an additional 65 volts supplied by the grid resistance R_5 to make this total amount. The value of R_5 required is found in the familiar way.

$$E_c \text{ (grid leak)} = I_g R_5$$
$$65 = 0.025\ R_5$$
$$R_5 = \frac{65}{0.025} = 2600 \text{ ohms}$$

(Continued on page 41)

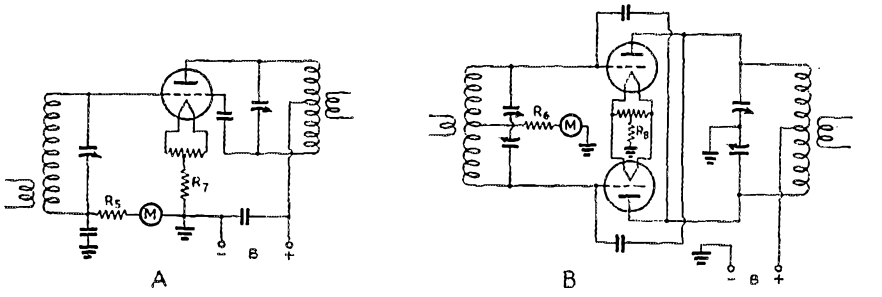


Fig. 4 — The connections for combinations of grid-leak and cathode bias.

The Band-Edge Locator

A 100-kc. Crystal-Controlled Oscillator with Multivibrator and Amplifiers

BY D. REGINALD TIBBETTS,* W6ITH

A neatly-constructed unit for establishing with a high degree of accuracy the edges of the various amateur bands and 'phone sub-bands. Not unduly expensive, despite its "commercial" appearance.

To MOST operators the present F.C.C. regulation about frequency checking (Sec. 152.44) means simply, "How close to the edge of the band can I get?" To get really close requires a precision piece of equipment installed alongside the receiver to check the edges of the bands and to make good accurate measurements.

Let us see what is needed. First, we need strong harmonics every 100 kc. to check the edges of the bands that fall on the even 100-kc. points, such as 2000, 3500, 7000, 14,400, 28,000 and 56,000. Since the 20-meter 'phone band edges fall at 14,150 and 14,250 kc., it is also necessary to have strong harmonics every 50 kc. to check these points.

Several methods can be used to get these harmonics, but first the primary frequency source must be chosen. The most stable source is the 100-kc. bar. There is at least one crystal manufacturer who can supply such a bar mounted with an inductance in the same dust-proof shielded case. The bar is a thick crystal with two sides silver-plated and mounted between two wedge-shaped electrodes. The temperature coefficient is very low and, by means of a variable condenser built into the circuit, adjustment of the crystal frequency to exactly 100 kc. is easily and quickly possible.

Modern design dictates that the new "single-ended" tubes be used. These tubes give higher gain, eliminate long leads to grid caps, and make a much neater wiring layout possible because all leads are under the chassis. Also, they cost exactly the same as the old grid-on-top types.

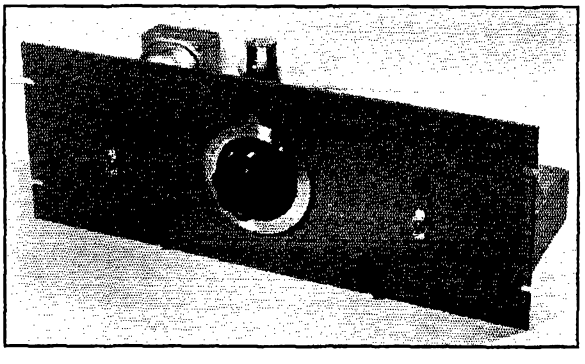
The oscillator is a 6SJ7 with the screen of the tube acting as the plate. The circuit gives some feedback to aid crystal oscillation and also provides variation of the oscillator frequency over a range of approximately 16 cycles by means of the tuning condenser. The frequency can therefore be brought exactly to 100 kc. when an accurate checking source such as the WWV transmissions is available.

The circuit may oscillate independently of the crystal at the high-capacity end of the condenser, but this is not an abnormal condition. The crystal will control over the useful range, and correction to the frequency can always be made near the center of the scale.

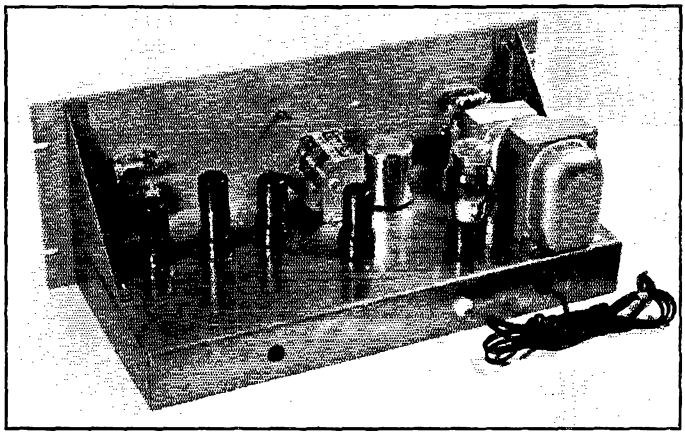
The oscillator alone produces harmonics useful to about 5000 kc., the 50th harmonic. We are interested in getting harmonics strong enough to beat with received signals up to and including 60,000 kc., so some form of amplifier is required. The output of the oscillator is capacity coupled to another 6SJ7 amplifier. For 100-kc. harmonics this amplifier is in turn coupled to an 1852. The two stages of amplification produce strong harmonics even on 60,000 kc., the 600th harmonic.

Since we need the 50-kc. harmonic series, a multivibrator is incorporated in the unit. This stage uses a single 6N7, and follows the 6SJ7 first amplifier. A multi-position rotary switch is

* 165 Purdue Ave., Berkeley, Calif.



This unit gives either 50- or 100-kc. points from a 100-kc. crystal oscillator throughout the frequency spectrum up to 60 Mc. The main dial provides fine adjustment of the crystal frequency. An output attenuator is provided to regulate the strength of the signal.



In this rear view, the power supply is at the right, oscillator in the center, and output tubes at the left. From left to right, the tubes are the 1852 output amplifier, 6N7 multivibrator, 6SJ7 first amplifier and, behind the tuning condenser, the 6SJ7 oscillator. Single-ended tubes keep all wiring below the chassis.

used to switch the output of the first amplifier either to the 6N7 for 50 kc. or to the 1852 for 100 kc. The 1852 second amplifier is used in both cases. The first amplifier not only serves as an amplifier but also as a buffer stage to isolate the oscillator from the multivibrator. The second amplifier also serves to isolate the multivibrator from the output circuit.

The output circuit is coupled to the receiver through a built-in attenuator using a 500,000-ohm potentiometer. This attenuator is necessary to effect a balance between the harmonic being used and the signal measured. Otherwise the output of the unit might "swamp" the signal being measured and observation of the beat note would be difficult.

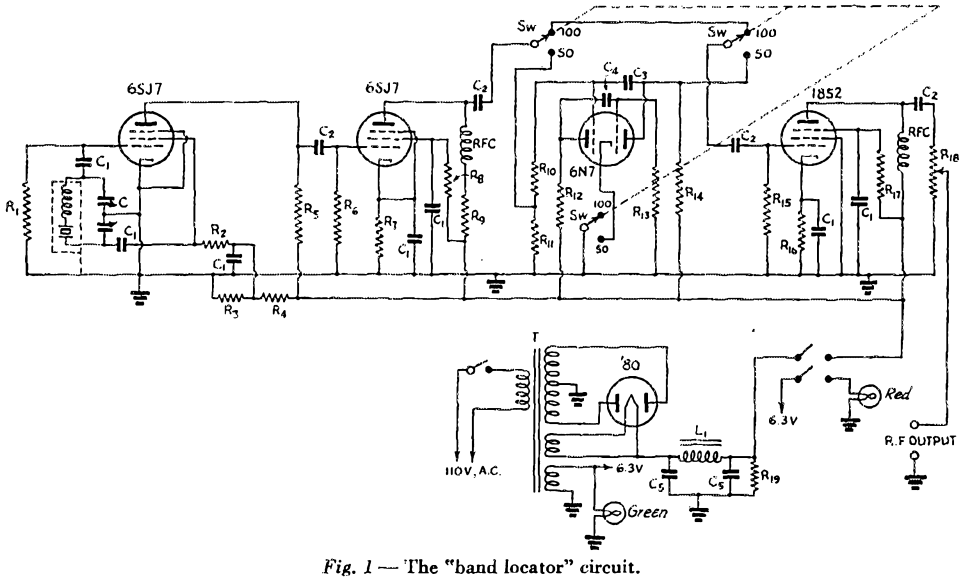
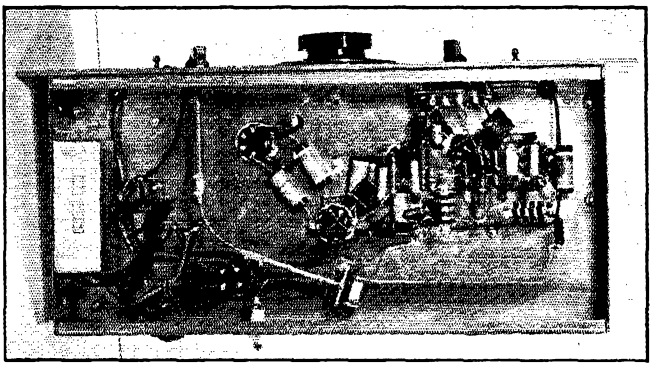


Fig. 1 — The "band locator" circuit.

C — 365-$\mu\mu$fd., two-gang variable (Meissner No. 21-5214).
C_1 — 0.01-μfd., 400-volt paper.
C_2 — 0.001-μfd. mica.
C_3 — 250-$\mu\mu$fd. mica.
C_4 — 500-$\mu\mu$fd. mica.
C_5 — 8-μfd., 450-volt electrolytic.
R_1 — 1.5 megohms, 1-watt.
R_2 — 0.5 megohm, 1-watt.
R_3 — 0.1 megohm, 1-watt.
R_4 — 1.5 megohm, 1-watt.
R_5 — 0.5 megohm, 1-watt.
R_6 — 0.75 megohm, 1-watt.
R_7 — 3000 ohms, 1-watt.
R_8 — 1 megohm, 1-watt.
R_9 — 75,000 ohms, 1-watt.
R_{10}, R_{11} — 5000 ohms, 1-watt.
R_{12} — 20,000 ohms, 1-watt.
R_{13} — 10,000 ohms, 1-watt.
R_{14} — 0.2 megohm, 1-watt.
R_{15} — 0.75 megohm, 1-watt.
R_{16} — 3000 ohms, 1-watt.
R_{17} — 0.5 megohm, 1-watt.
R_{18} — 0.5-megohm variable.
R_{19} — 25,000 ohms, 10-watt.
RFC — 2.5-mh. r.f. choke.
Xtal and tank inductance — Bliley SOC-100.
T — Power transformer, 700 volts c.t. at 50 ma.; 5 volts at 2 amp.; 6.3 volts at 2 amp.
L — "30-henry" receiving-type filter choke.
Sw — 3-pole double-throw non-shorting switch (Yaxley No. 1313L).



Besides the wiring, this view shows how the output attenuator is controlled by a flexible shaft connecting it to the panel knob, so that the control itself may be placed near the r.f. output circuit.

Constructional features are quite obvious from the photographs. The chassis is 17 by 8 by 2 inches, mounted to a standard 19 by 7 by 3/16-inch relay rack panel with brackets. The power supply is of conventional design; the amount of filter required is dependent upon the purity of the signal desired. A fairly low-resistance bleeder is desirable to help stabilize the voltage. Two switches with associated panel lamps are used, one for the a.c. primary and the other for negative "B." The negative "B" switch is needed to check whether a received signal is actually from the unit or from outside. Also note that the "B" switch is placed on the equipment side of the power supply, after the bleeder. This is done so that the filter condenser does not discharge, causing a "bloop" from unlocking of the multivibrator when the oscillator stops.

Needless to say, best quality parts should be used, and careful attention should be given to the layout to prevent long leads.

Checking and Measurement

To make measurements the operator should first find either WWV[1] or a broadcast station whose frequency falls on an even 100- or 50-kc. point. Nearly all broadcast stations keep their frequency deviation within a few cycles and many keep within less than a single cycle. This station selected is tuned in on the receiver. Next the frequency unit is turned on and the switch set to give either the 100- or 50-kc. harmonics. The correction dial is then moved and the beats can be counted and brought to a standstill, or zero beat. This is quickly and easily done, and can be back-checked before and after a measurement without any trouble. Thus any drift due to temperature, humidity or circuit changes can be corrected very easily. Next, say we wish to find the 14,150-kc. point. We set the receiver to approximately this frequency and, using the 50-kc. harmonics, get a signal from the unit. This is tuned to zero beat. To check if it is actually a 50-kc. point, the selector switch is turned to the 100-kc. position, and if we have the 14,150 point the signal from the unit will stop. Naturally we might get 14,050 or 14,250 kc., but it is assumed anyone can "get located" much more closely than that with the receiver or the transmitter crystals.

For frequency measurements a point on the receiver bandspread is chosen to represent some even 50-kc. point as a reference, and then readings are taken throughout the band every 50 kc. A curve is next plotted giving frequency vs. dial settings. From this curve measurements can be made as closely as the receiver dial can be read and the points plotted. For future work the selected point can be always lined up with the unit and the main tuning dial of the receiver. The edges of the band can be noted and checked at any time. For locating a station whose frequency is known, the receiver dial setting can quickly be determined by means of the curve.

Should 10-kc. points be required either for more accurate plotting of the curve or because there is no broadcast station available on either an even 100- or 50-kc. point, it will be found that the unit produces them. They are weak, but found by disconnecting the antenna from receiver to eliminate pickup of outside signals.

Normally the output of the unit is left connected to one post of the receiver antenna at all times. If desired, another multivibrator can be added to give 10-kc. harmonics; in fact, this process can be carried down to 1 kc. or even to 50 cycles, amplified to four or five watts and be made to run a 50-cycle clock. If this electric clock is then compared with standard time signals we have an inexpensive and useful primary standard.

Exact measurements also can be made by checking the beat note between the unit and the signal under observation. The audio frequency can be measured in several ways: by an audio bridge, a piano note or by an oscilloscope.

The cost of all parts of the unit, at amateur prices, is in the vicinity of $35.

[1] Since early May the 5000-kc. transmissions from WWV (with 440-cycle modulation) have been broadcast 24 hours per day except during the regular weekly broadcasts on the schedules given regularly in *QST*. Thus the 5000-kc. service is now practically continuous. Although to date no official announcement of this schedule has been given, it is expected to be made permanent in the near future. — EDITOR.

The Oscilloscope Shows—What?

Analyzing Some Common Troubles With Oscilloscope Patterns

BY T. M. FERRILL, JR.,* W1LJI

WHILE valuable reference material on interpretation of the patterns obtained with various transmitter modulation adjustments has been published during the past five years,[1] there still are many 'phone operators who find it difficult to obtain an accurate picture of transmitter performance with even a factory-built oscilloscope. Indeed, it sometimes happens that such unusual patterns appear on the screen of the cathode-ray tube at the first adjustments that the bewildered user knows not which way to turn for correction of the queer shapes. What clues show whether the cause of an unusual figure lies within the transmitter itself, or whether it is the result of improper application or adjustment of the oscilloscope?

Trapezoid vs. Wave Envelope

In general, patterns of two types — wave-envelope and trapezoidal — are used for checking the performance of 'phone transmitters. Each of the two patterns tells much about the characteristics of the modulated output of the transmitter, and the two together give an even more complete report of the operation. One large difference in the two patterns is the fact that the wave envelope picture is changed by a change of the speech amplifier input wave, while the trapezoidal figure remains essentially constant if the modulation percentage is constant. Thus, if an audio-frequency oscillator with constant sine-wave output is used to feed a signal into the audio system of the transmitter, the output pattern,

We all know how oscilloscope patterns should look to show modulation percentage, audio distortion, non-linearity, and other conditions, good and bad, that commonly exist in 'phone transmitters. But what to do when the pattern strongly resembles the handiwork of an imaginative wood-turner? Here are some of the reasons for screwy 'scope pictures.

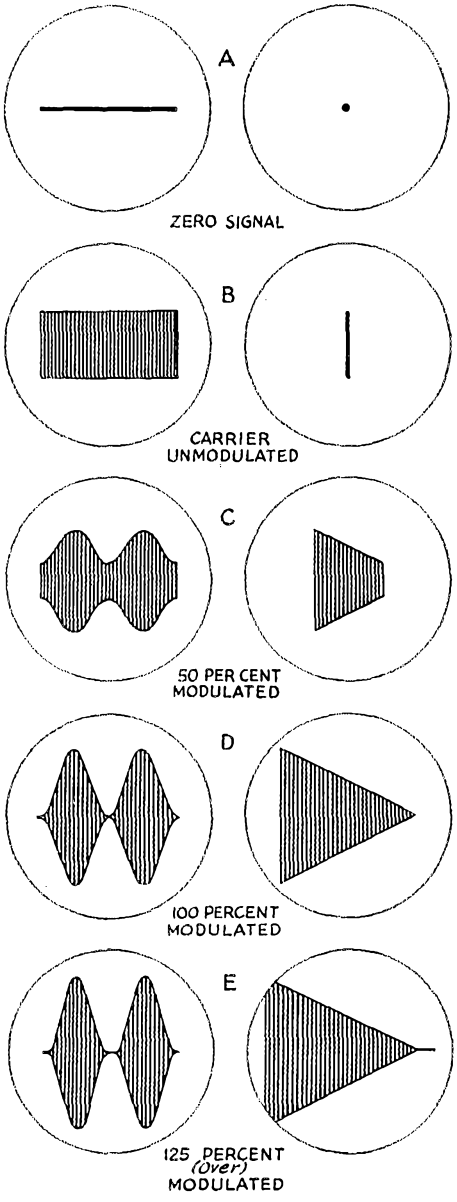


Fig. 1 — Wave-envelope (left) and trapezoidal (right) oscilloscope patterns.

* Technical Department, *QST*.

[1] L. C. Waller, "A Practical Cathode-Ray Oscillograph for the Amateur Station," *QST*, March, 1934.
"The Cathode-Ray Tube at Work," J. F Rider, Publisher, 1935.
"Cathode-Ray Tubes and Allied Types," R.C.A. Radiotron Division, 1935.

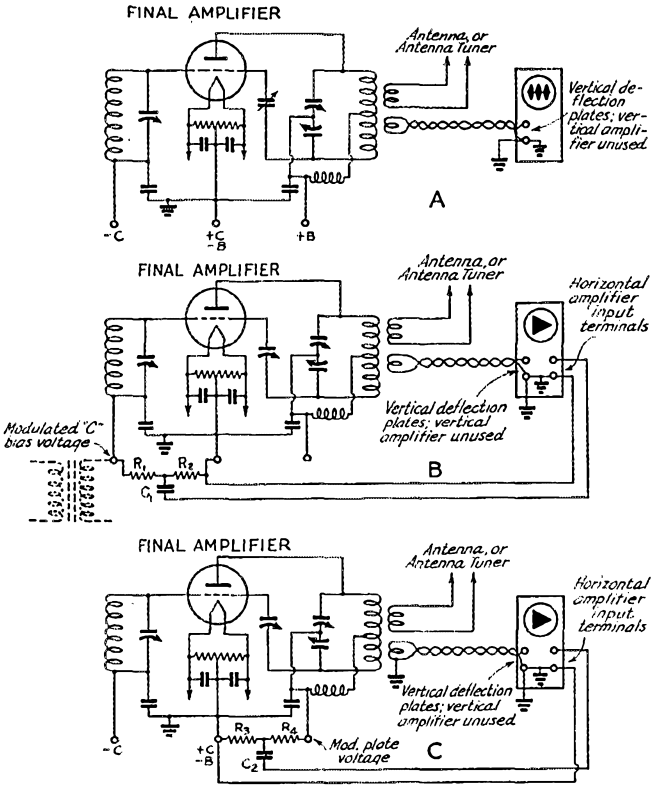


Fig. 2 — Oscilloscope connections for wave-envelope (A) and Trapezoidal (B and C) modulation patterns.

with proper operation of the transmitter and best adjustment of the oscilloscope, should resemble one of the two patterns of Fig. 1-D. A change in either frequency or waveform of the audio oscillator output makes a change in the wave-envelope pattern (shown at left in Fig. 1-D), while the trapezoidal pattern (at right in Fig. 1-D) is practically unaffected by the change. With the modulation level remaining at 100 per cent, a change in sine-wave frequency makes no change at all and a change in wave shape causes only a slight change within the light area of the triangular figure. Because of this difference in the two patterns, the wave-envelope figure gives at once a picture of the over-all performance of the audio amplifier stages, the modulator, and the modulated amplifier, since any distortion contributed by an audio amplifier stage changes the wave shape of the modulating signal, and thus of the envelope of the oscilloscope pattern. If the envelope obtained with a sine-wave input is not sinusoidal, it may be because of distortion in the audio amplifier or non-linearity of modulation, or a combination of the two distortions. The trapezoidal figure, on the other hand, indicates only modulation and linearity of the r.f. amplifier.

Wave-Envelope Patterns

Oscilloscope patterns which show the conditions of zero r.f. output, and a carrier with zero, 50 per cent, 100 per cent, and 125 per cent modulation, respectively, for each of the two systems are given in Fig. 1. Before application of the carrier, the oscilloscope (connected for a wave-envelope pattern) has horizontal sweep voltage applied, making a line across the middle of the tube. When the carrier is on, r.f. voltage applied to the vertical plates sweeps the spot up and down the screen as it moves across, so that a rectangular light area is formed. The height of this light area should be approximately ⅓ of the screen diameter. Now with a sine-wave input of 1000 cycles and sweep frequency of 500 cycles, patterns similar to the sketches at the left in Fig. 1-C and -D should be obtained with 50 and 100 per cent modulation. With a change of the audio-frequency signal to 2000 cycles, or with a change of the sweep frequency to 250 cycles, four narrower cycles should replace the two broad ones shown in the sketch. For most critical examination, however, the proportions shown here usually prove best.

With the settings mentioned in the above paragraph — 500-cycle horizontal sweep and 1000-cycle signal — a.c. hum of 60 cycles will not be shown in the oscilloscope pattern, and 120-cycle power supply ripple will hardly be detected. Thus, a wave-form closely approaching that at the left in Fig. 1-D may be obtained from a carrier having quite noticeable 60-cycle modulation in addition to the higher-frequency audio signal modulation. If the operator whistles before the microphone to provide a brief and fairly sinusoi-

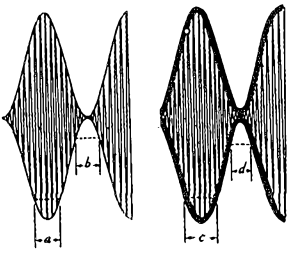


Fig. 3 — Effect of spot area on outline of wave-envelope pattern.

dal input signal, and sets the horizontal sweep frequency to make only two or three cycles in the pattern, he may be overlooking low-frequency hum modulation. Thus, to make a more complete test of the transmitter performance, he should set the horizontal sweep oscillator of the 'scope to give a sweep frequency of 20 or 30 cycles and observe the pattern resulting with the gain control at normal setting and no signal applied to the input of the speech amplifier. If the oscilloscope pattern is that of the sketch at the left in Fig. 1-B,

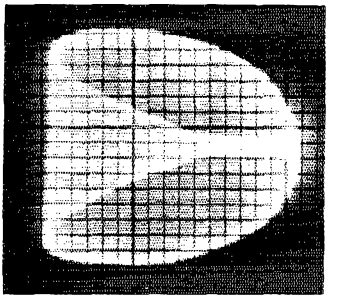


Fig. 4 — Pattern showing effect of phase shift which results when sweep voltage for trapezoid is obtained from intermediate speech amplifier.

the hum level of the transmitted signal is likely to be satisfactorily low. If the number of cycles (the number of full humps at the top of the pattern) is three for 20-cycle sweep or two for 30-cycle sweep, the hum present is 60-cycle hum and may be found to result from an ungrounded chassis, a poorly located tap on a filament resistor, a bad tube, or induction from power lines. If the number of cycles is six for 20-cycle or four for 30-cycle sweep, the hum is probably the result of insufficient power-supply filter in one of the plate or grid power supplies for a.f. or r.f. stages.

Trapezoidal Patterns

Since the trapezoidal pattern depends on audio voltage from the modulator stage for its horizontal sweep, and on r.f. output voltage for vertical deflection, the beam of the cathode ray tube is stationary when the transmitter plate switches are open, and an intense spot on the center of the screen results. The sketch at the right of Fig. 1-A represents this condition. When the r.f. portion of the transmitter is running, unmodulated, the vertical line of Fig. 1-B (right) is formed. As in the case of the wave-envelope pattern, the height of the unmodulated figure should be approximately ⅓ the screen diameter. With 100% modulation the width of the pattern should become roughly ⅔ screen diameter, and the shape should become a true triangle, as sketched in Fig. 1-D. With 50 per cent modulation, the width should be half of the 100 per cent modulation width, and the shape should be the trapezoid of Fig. 1-C.

In contrast to the wave-envelope pattern, the trapezoidal figure shows immediately whether there is appreciable hum or noise modulation of the carrier before a signal is applied to the speech amplifier input. Furthermore, since the figure retains one general shape, speech input to the audio system results in a clear and meaningful pattern. Herein lies the most important advantage of the trapezoidal figure — it gives a constant and easily interpreted indication of the modulation percentage. As the operator talks, the figure should expand and contract horizontally, forming a point on 100 per cent modulation peaks. During the greater part of the time, with speech, the wave-envelope pattern is an almost meaningless jumble, with occasional brief moments of appearance of the form for sine modulation. Bright, sharp dashes occurring in a horizontal line across the middle of the screen usually indicate modulation at or above 100 per cent, depending on their length. Experience indicates that usually when these bright dashes become noticeable, the carrier is already heavily overmodulated. Some relief on this jumbled pattern of the wave-envelope system on speech may be provided by use of either very low-frequency sweep (with only a small portion of the sweep voltage cycle carrying the spot completely across the screen), or a strong synchronizing voltage applied to the oscilloscope to control partially the frequency of the horizontal sweep

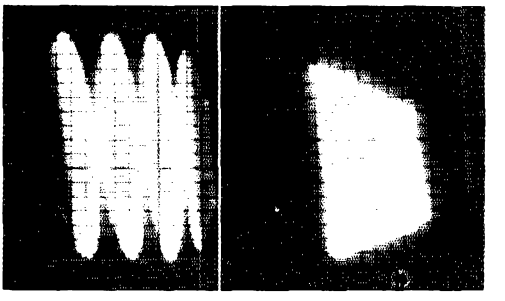


Fig. 5 and Fig. 6 — Wave-envelope and trapezoidal patterns which lean because of r.f. coupling between vertical and horizontal deflection circuits.

oscillator. Nevertheless, purely from the standpoint of a convenient constant speech indicator, the trapezoidal figure is much to be preferred to the wave envelope pattern.

Methods of Connection

The oscilloscope connections for the wave-envelope are usually simpler than those for the trapezoidal figure, if the oscilloscope is already provided with a sweep oscillator or an a.c. transformer winding and sweep control. The vertical deflection plates are coupled to the amplifier tank coil or an antenna coil by means of a 1-, 2-, or 3-turn pickup coil connected to the oscilloscope through a twisted-pair line, and the position of the

pickup coil is varied until the proper height of the vertical deflection is obtained with the transmitter in normal operating condition, unmodulated. This completes the installation for an oscilloscope provided with 60-cycle transformer horizontal sweep supply. This connection is independent of the application of the modulating voltages — it applies for plate, grid, screen, plate-and-screen, or suppressor-modulation of the final amplifier. If a class-B linear r.f. amplifier is used following the modulated stage, provision for r.f. pickup from both the modulated stage output and the output of the final amplifier should be made — the pattern from the output of the final r.f. amplifier must be regarded as the criterion of operation of the transmitter, since the modulation percentage of this stage may not be that of the modulated stage.

If the oscilloscope is provided with a sweep oscillator and connections for synchronizing voltage, a connection should be made between the synchronizing terminal and a grid of one of the first audio power amplifier tubes in the speech amplifier system. To insure against upsetting a d.c. circuit, a 0.01-μfd. tubular paper condenser should be connected in series with this connection. Since both the transmitter and the oscilloscope should be grounded, the return path for the synchronizing circuit is automatically completed.

If a trapezoidal pattern is desired rather than the wave-envelope, the r.f. input must be connected and adjusted just as outlined in the above paragraphs. In addition, a voltage divider must be connected across the voltage being used to modulate the final amplifier — that is, between ground and the modulation connection of the r.f. amplifier, and a small fraction of the modulator audio output voltage must be obtained from a tap on this divider.

In Fig. 2-B and -C connections are given for obtaining trapezoidal patterns from grid- and plate-modulated r.f. amplifiers, respectively. These two circuit diagrams merely illustrate the connection of the horizontal sweep voltage divider between the modulated terminal of the r.f. stage and ground. For oscilloscopes equipped with internal amplifiers for the horizontal sweep, it is desirable to get a voltage divider arranged to supply only about 5 audio volts between ground and the tap,

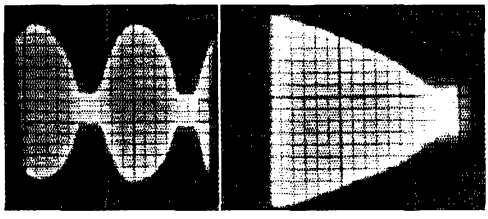


Fig. 7 and 8 — Wave-envelope and trapezoidal patterns obtained from modulated r.f. amplifier which was not properly neutralized.

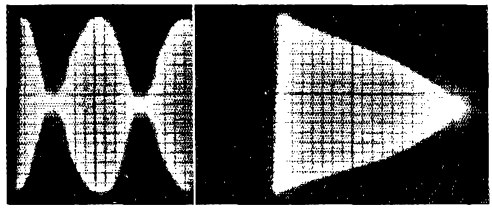


Fig. 9 and 10 — Patterns obtained from modulated r.f. amplifier with properly coupled oscilloscope — these patterns actually show the nature of the modulated r.f. output of the transmitter.

and to feed this low voltage to the input of the horizontal amplifier. This makes possible use of the gain control on the horizontal deflection amplifier for adjusting the width of the trapezoidal pattern. If such an amplifier is not available in the oscilloscope, the voltage divider should be made conveniently variable so the pattern width may be made satisfactory. For grid, suppressor, or screen modulation, resistor R_1 of Fig. 2-B (the resistor between the modulated post and the tap for the horizontal sweep voltage) should be a 0.5-megohm 1-watt carbon resistor. For amplification of the horizontal sweep voltage, resistor R_2 should be approximately 50,000 ohms for low- and medium-power transmitters, and approximately 10,000 ohms for high-power transmitters. Not more than two trials should be required to determine a value of R_2 suited for the oscilloscope used. For audio voltage to apply directly to the horizontal deflection plates, R_2 should be a potentiometer between R_1 and ground, with the connection from the oscilloscope through C_1 attached to the moving tap of R_2. For high power transmitters, the resistance of the control R_2 should be roughly 0.2 megohm, for medium-power transmitters it should be 0.5 megohm, and for low-power transmitters it should be 0.5 megohm with resistor R_1 shorted from the circuit (R_2 connected between ground and the modulated terminal), with the oscilloscope voltage taken from the tap of the potentiometer through C_1. The potentiometer referred to above for each of the three cases may be a carbon-element volume control resistor.

The voltage divider for horizontal sweep voltage from a plate-modulated amplifier presents a slightly different problem from those just mentioned, since the importance of safety here should be given full regard. To begin with, resistor R_4 of Fig. 2-C should be a 0.5-megohm 1-watt carbon resistor for low-power transmitters; and for medium- and high-power modulated amplifiers, should consist of a group of series-connected 0.5-megohm 1-watt carbon resistors — one resistor for every 500 volts of the d.c. potential applied to the modulated amplifier. Thus, an amplifier operating with 1500-volt d.c. plate supply would require three series resistors, each having the specifications given above, con-

nected in series. In any case, R_4 should be located within the modulator unit, so that the voltage carried to the oscilloscope will be isolated from the plate terminal of the modulated amplifier by this high resistance. For amplified horizontal sweep, the values of R_3, all applying to 1-watt carbon resistors, should be roughly 25,000 ohms, 10,000 ohms, and 3,000 ohms for low-, medium-, and high-power modulated amplifiers, respectively. For directly supplying the deflection voltage to the horizontal plates, resistor R_3 should be a carbon-element volume control potentiometer having a 0.5-megohm, 0.1-megohm, or 50,000-ohm resistance value, for low-, medium-, or high-power transmitters, respectively. The connection of C_2 should be removed from the junction of R_3 and R_4 when R_3 is a variable resistor, and should be then replaced on the variable tap of R_3.

Trouble in Obtaining Patterns

Although many common faults in oscilloscope use are avoided by careful attention to the proper connections for use in obtaining a desired type of pattern, the figure appearing on the screen of the cathode-ray tube may bring dismay to the operator because of its unusual shape.

When the wave-envelope pattern is used, compression of each cycle into too narrow proportions (with four or six audio cycles visible on the screen when the height of the unmodulated r.f. signal is ⅓ screen diameter as recommended above) causes the outline of the pattern to become noticeably non-sinusoidal though the modulation of the r.f. carrier is in reality perfectly sinusoidal. In order to understand this, it must be remembered that the apparent diameter of the spot on the screen is appreciable compared to the length of a cycle horizontally across the screen. This meaning is better explained by the sketch of Fig. 3. One audio modulating cycle is shown in this sketch, and the envelope is first drawn as it would be if the spot on the screen were only a fine point of light. Then, allowance for a noticeable spot diameter is made for the positions at which the spot travel stops and reverses, and the outline of these spots is drawn on the figure, increasing the area of the modulation pattern, and, more important, making the crests of the wave broader and the troughs narrower. It will be seen from the above that the cycles of the wave envelope should be spread out so that if the height of the modulated pattern nearly fills the screen, not more than two or three audio cycles occupy the length of the screen area.

A point given much emphasis in most references on oscilloscope modulation checking — and justifiably so — is the importance of obtaining sweep voltage for a trapezoidal pattern from the output of the modulator rather than from a preceding stage of the audio system. Fig. 4 is a photograph of the pattern which resulted when the sweep voltage for a trapezoidal pattern was obtained from the output of the driver stage instead of the output of the modulator. Figures 5 and 6 are photographs of a wave-envelope pattern and corresponding trapezoidal pattern which might cause doubts about the operation of the audio system and the modulated amplifier. Actually, though, the leaning pattern is produced by coupling between the horizontal sweep circuit and vertical deflection circuit of the oscilloscope. An r.f. voltage thus results across the horizontal plates, and this voltage acts to carry the spot across the screen a short distance at the same time that the higher r.f. voltage moves it vertically. The result is diagonal travel of the spot with the r.f. signal, instead of vertical travel. This trouble is most common with carrier frequencies of the 14-, 28-, and 56-mc. bands. Experiment with some of the more popular factory-built 'scopes indicates that a satisfactory cure for this trouble results from inserting an r.f. choke (one of the popular pigtail connection pie-wound receiving chokes rated at 2.5 mh inductance, 125 ma.) in series with the ungrounded horizontal deflection plate at the base of the cathode-ray tube.

Another source of confusing patterns is r.f. vertical deflection shown on the screen of the tube when the plate voltage is removed from the final r.f. amplifier. This may result from lack of neutralization of the final r.f. amplifier; in this respect, the oscilloscope may be used as a convenient and fairly sensitive neutralization indicator. If the final amplifier is properly neutralized, the vertical deflection may indicate r.f. pickup by the line connecting the pick-up coil to the vertical plates of the oscilloscope. To minimize this undesired pickup, some type of compact twisted-pair or parallel-pair line should be used for bringing the r.f. signal voltage to the 'scope. A third cause of the zero-plate-voltage r.f. signal on the oscilloscope is often troublesome on the 10- and 5-meter bands, where it is difficult to use the oscilloscope at an operating position removed from the transmitter and keep the ground circuits of the two at the same potential. This difficulty simply requires experimentation to remove the r.f. signal from the 'scope when the plate voltage is off the final amplifier. Figures 7 and 8 show the wave-envelope and trapezoidal pattern of an unneutralized modulated r.f. amplifier — much similar results are obtained when r.f. voltage is found across the vertical plates of the oscilloscope for reasons other than improper neutralization adjustment.

With the above difficulties removed from the 'scope picture of the transmitter modulation, the patterns of Figs. 9 and 10 are obtained. While these pictures do not show ideal patterns, they do give a picture of the actual transmitter operation. From pictures such as these, an intelligent start may be made toward obtaining the best possible performance of the equipment at hand.

"The Compleat Experimenter"

Some Suggestions on Transmitter Construction

BY H. L. BUMBAUGH,* W6HI

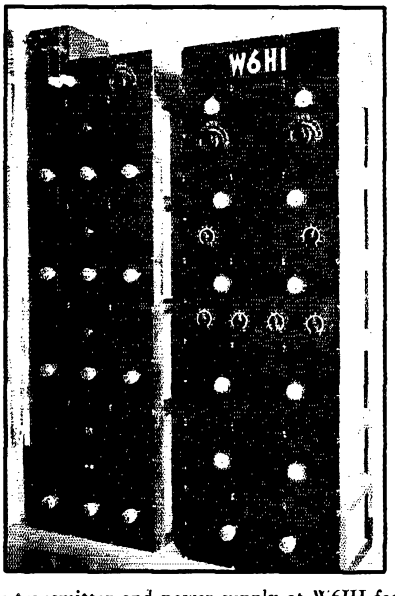
HAD Izaak Walton been a ham he would probably never have been able to write a "compleat" book on his favorite hobby. One of the fortunate things about amateur radio is the fact that nothing is ever "compleat." There is always something new to learn.

Our first rig contained such "late" technical advancements as an electrolytic interrupter in the power end and an electrolytic detector in the receiving end. One always forgot to remove the wire from the acid, with Wollaston wire 25¢ per inch! This outfit was no sooner working and an eventual crosstown QSO consummated than the "era of change" set in. This condition of "Caution — Man at Work" has prevailed ever since, with the result that the present rig is always being rebuilt or changed in some manner.

Convenience and Appearance

Through the years, we have discovered a number of short cuts which greatly accelerate the process of demolition and reconstruction and still allow the front of the rig to look something like a normal transmitter, with the "development" work hidden from the general public.

* 724 North Crescent Heights Blvd., Hollywood, Calif.



The transmitter and power supply at W6HI feature "breadboard rack" construction, for ease in servicing and experimenting. Copper-screen windows allow proper ventilation and add to the safety of the rig.

The operating position includes overmodulation and carrier-shift meters, as well as a keying and 'phone monitor, housed in the box on the left side of the table. The key-switch at the upper left closes the keying circuit for c.w. operation in the "down" position and puts the rig on the air for 'phone in the "up" position. The key-switch at the upper right controls the antenna relay.

Breadboard layouts are undeniably easy to get at, but when the "shack" is a part of the owner's house certain physical and — on the part of some members of the household — esthetic limitations are present. Normal rack and panel construction is very nice to see but is hard to work with unless the stage in question is removed from the rack. Racks, 6 feet or so in height, are not only heavy but expensive. In addition, the nineteen-inch width dimension is often too much of a limiting factor in the laying out of experimental stages with well-spaced parts. The answer seems to be a sort of "breadboard rack" type of construction using wooden members and with somewhat larger dimensions than are standard for relay racks.

Construction

Our two racks are made of oak, stained and varnished, and stand 6 feet high. The shelf spaces measure 18 by 24 inches. One rack is used as a power bay and houses the plate supplies for each stage — both radio and audio — of the transmitter as well as the bias supply for the whole transmitter. The other rack houses the r.f. and control equipment as well as the voltage amplifier and modulator.

By using finished material that is all 1- by 2-inches net and having it cut to length at the mill, the matter of assembly becomes a simple one, as may be seen from Fig. 1. It will be noted

that proper placement of the side members automatically provides shelf rests. Each shelf is of 5/16-inch three-ply veneer and is free to slide out at either the front or back of the rack.

The power equipment is placed directly on these wooden shelves in the power bay. In the transmitter rack each wooden shelf forms the support for a metal sub-panel of cadmium-plated body steel. The shape can be seen in the photograph of one of the units. It permits all wiring to be exposed and readily accessible for slight changes, while the whole stage may be slid out of the rack merely by loosening the nuts holding the cabled feed wires at the rear. All of each stage may be seen from the rear of the transmitter, and minor changes can be made readily without disturbing the rest of the set-up.

Small "windows" of copper window screening mounted on narrow wooden forms are fitted into each opening on the sides of the racks. These serve to keep dust — and fingers — out of the rig, besides adding greatly to its appearance. Only friction holds them in place, and thus the windows are readily removable.

The Transmitter

The transmitter that occupies the racks at the moment is hardly in keeping with the usual amateur practice of getting as much out of each tube as physical laws and good luck will permit, since it was designed with the idea of providing a very considerable factor of safety everywhere throughout the rig. It is granted that many other ham transmitters put out the same power with fewer or smaller tubes, and perhaps at slightly lower original cost, and also that many lower-powered rigs cover as great distances in DX work. However, it cannot be denied that continued stable operation, reliability, and almost limitless

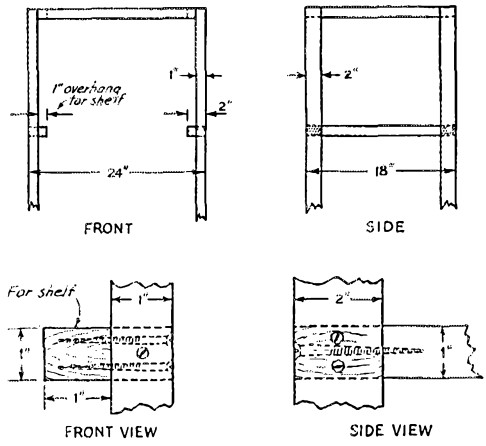


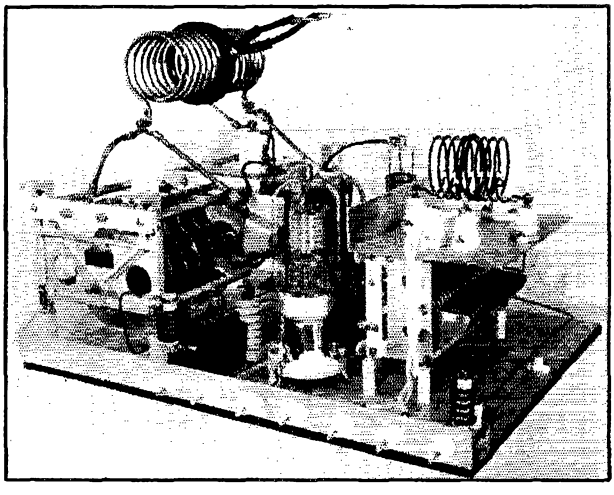
Fig. 1 — Construction details of the "breadboard rack." All wood is finished 1- by 2-inch oak.

tube life (for amateur use) result when no component in the rig is working beyond its rating. This applies as well to rectifier tubes and all power supply components.

As the rig stands at the moment, each stage has its own power supply. This feature has proved to be of great value in an experimental layout. The supplies have been designed for a good ratio of available to required power and also to satisfy broadcast ripple requirements. The output is very clean.

All bias voltages for the r.f. power stages are furnished by a 1000-volt supply and individual isolating rectifier tubes patterned after Friend's [1]

[1] Friend, "Self-Regulating Grid Bias Supply for Multi-stage Transmitters," *QST*, December, 1935.



Each unit is built on a 16-gauge cadmium-plated body steel chassis which is supported by a piece of 5/8" three-ply. All parts and wiring are readily accessible for modifications or trouble-shooting.

arrangement. The diagram is shown in Fig. 2. This arrangement is such that with no excitation a protective bias is furnished the tubes, while with excitation the pack and its associated small rectifier tubes drop out of the picture and the stages are then automatically grid-biased. This action is obtained because the flow of rectified grid current in the bias resistor sets up a voltage which will reverse the polarity of the elements in the 5Z3 rectifiers and render the tube non-conductive, hence no bias voltage from the bias pack reaches the grids of the several stages when excitation is applied. However, should excitation fail, the bias pack picks up and supplies a protective bias to the stage.

A relay for "no bias" protection is provided. In this arrangement, if no current flows through the grid resistor — either from the bias pack or from excitation — the transmitter is taken off the air. Since under normal conditions one or the other of these sources is causing current to flow in this resistor continually, the device offers protection against both bias pack failure and an open grid resistor.

A separate small power pack furnishes the keying and blocking voltages for the vacuum-tube keying system.

Means have been provided to put the transmitter on the air merely by pressing the key. The transmitter is automatically taken off the air approximately three quarters of a second after keying ceases. All this is accomplished by a small relay and a 1500-μfd. condenser shunted by a 10,000-ohm variable resistor, in the arrangement described some time ago.[2]

The same antenna is used for transmitting and receiving. A change-over switch is employed, and a small mercury switch in the keying line and attached to the change-over switch prevents the transmitter being put on the air, by the key, unless the antenna is connected.

The exciter unit is the familiar "bi-push"[3] arrangement, using a 6A6-6A6-p.p. 6L6 combination. It can be easily removed from the big rig and used as a 40- to 45-watt portable. A vacuum-tube keying system is used in the cathode circuit of the push-pull 6L6's, although for portable work this keying system is replaced by a "straight" key.

The buffer stage following the exciter consists of pair of Gammatron 54's in push-pull and requires only 12 watts for proper excitation. Since the exciter is capable of furnishing in excess of 40 watts, adequate excitation is always available.

The 354's in the final amplifier handle a kilowatt on both c.w. and 'phone. According to the manufacturer's ratings, they require only 68 watts for proper excitation on c.w. and, since the buffer stage can furnish up to 200 watts, no trouble is experienced with lack of excitation, even on 'phone. This stage is shown in an accompanying photograph.

The audio end of the rig uses a Brush BR2S microphone working into a conventional pre-amplifier using 6C6's pentode- and triode-connected. A 500-ohm line connects the pre-amplifier at the operating desk with the speech amplifier in the transmitter rack. In line with modern trends in 'phone transmitters, an automatic modulation control system with a 6L7 is used, similar to that described by W2BRO some time ago,[4] except that an 879 rectifier is used instead of an 836. This type of control is to be preferred to the ordinary type of volume limiter because with automatic modulation control the range of action is extended downward and a smoothly tapered action results. With the older type of volume limiters no effect was to be had below a certain level, while anything above that level was summarily chopped off.

The modulator uses a pair of 354 E's in Class B with a UTC VM 5 modulation transformer feeding the Class-C final amplifier. Since these tubes require only 37.5 volts bias in Class B, with 2000 volts on the plates, small "B" batteries are used for bias. With the exception of these batteries, the entire rig is a.c.-operated and controlled from the operating position.

The accompanying photographs give an idea of the general layout and, I hope, hide the fact that the whole thing may be — and frequently is — taken down at a moment's notice.

[2] Jackson, "A 500-Watt Transmitter in the Modern Manner," *QST*, May, 1934.

[3] Smith, "The 'Bi-Push' Tri-Band Exciter or Transmitter," *Radio*, April, 1937.

[4] Waller, "Negative-peak Control with 6L7 Speech Amplifier," *QST*, October, 1937.

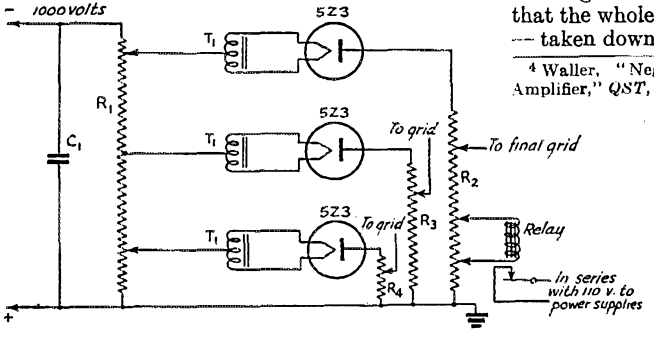


Fig. 2 — The bias supply uses separate rectifier tubes to keep the bias from "backing up."
C_1 — 4-μfd., 1500-volt.
R_1 — 5000 ohms, 200-watt.
R_2, R_3, R_4 — As required for proper grid-leak bias.
T_1 — 5-volt secondaries of filament transformer.

A Compact Unit-Type Amplifier

Push-pull HK24's Without Conventional Chassis

BY GEORGE W. SHUART,* W2AMN

TIME was when a rig had to be big in order to be good. Now, with smaller and more efficient tubes as well as other transmitting components, the amateur is striving to build more compact and presentable apparatus. In building the amplifier unit shown in the photograph, no particular effort was made to keep the dimensions small, but after it was completed we were quite aware of its compactness and that it might be of interest to other amateurs who like to conserve space. The overall dimensions are 11½ by 8 by 5½ inches, exclusive of shafts which would normally project through the panel.

Considering that this amplifier will deliver approximately 175 watts, it becomes quite a husky little fist-full. The rotor of the plate tuning condenser is connected to the high voltage lead to take the d.c. potential from across the condenser plates. This method of wiring up the plate circuit of an amplifier was thoroughly discussed in a past issue of *QST*[1] and is highly recommended for a number of good reasons. It permits the use of a condenser with smaller plate spacing, and as a result the overall physical dimensions of the condenser can be reduced for a given plate voltage. The only drawback is the fact that the rotor has full d.c. voltage on it, while in other circuits the rotor is grounded. Because of the design of the condenser used in the amplifier shown here, the danger element due to the high voltage being present on the rotor is reduced considerably, since an insulated shaft extension is an integral part of the condenser, and the rotor is insulated from ground by the isolantite end plates. For mechanical reasons the grid and plate condensers in this amplifier have the same physical dimensions as well as plate spacing and capacity, although a lower-voltage unit could be substituted in the grid circuit. Voltages up to 1000 can be used with plate modulation, or to 2000 volts unmodulated.

The method of assembly is quite evident from

(*Continued on page 114*)

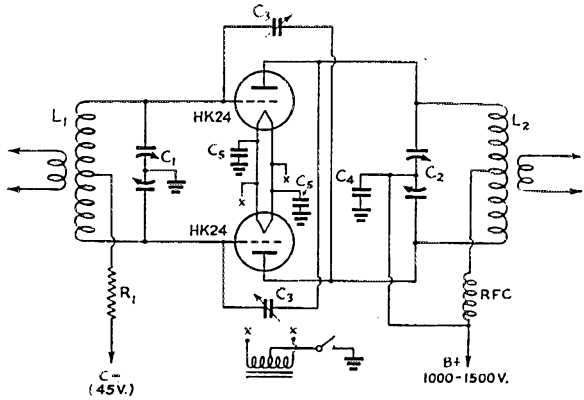
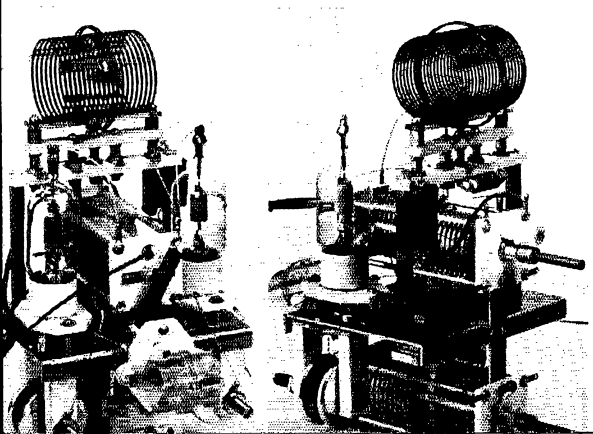


Fig. 1 — Circuit diagram of the HK24 amplifier.
C_1, C_2 — 100-$\mu\mu$fd. per section, 0.05" spacing (Hammarlund HFBD-100-C).
C_3 — Disc-type neutralizing condenser (Hammarlund N-10).
C_4 — 500-$\mu\mu$fd. mica, 5000-volt.
C_5 — 0.01-μfd. paper, 1000-volt.
RFC — 2.5-mh. r.f. choke (125-ma. size satisfactory).
R_1 — 3000 ohms, 10-watt.

Not the least interesting feature of this compact unit is the new type of tuning condenser soon to be made available. Its insulated rotor construction solves mechanical problems when the rotor is to be connected to plus high voltage.



Left — The grid coil plugs into a socket mounted vertically on the strap joining the two condensers. The grid leak is just above the grid-coil socket.

Right — Ready for mounting to a panel, by means of the cylindrical standoffs on the tuning condensers. The plate coil mounting is supported by 5/16th inch square rod, tapped at both ends, 3½ inches long. The mica condenser in the foreground just below the plate coil mounting is the plate blocking condenser.

* Hammarlund Mfg. Co., New York City.

[1] Ferrill, "How Much Condenser Spacing?" *QST*, December, 1938.

An R.F. Matching Network for General Use

Simplified Matching of Lines of Different Impedances

BY WARREN M. ANDREW,* W9IVT

Here is the simplified dope for tying into low impedances from medium-impedance lines. It will help you a lot if you have been confronted with the problem (which so often occurs with close-spaced antenna arrays) and still lack a practical solution.

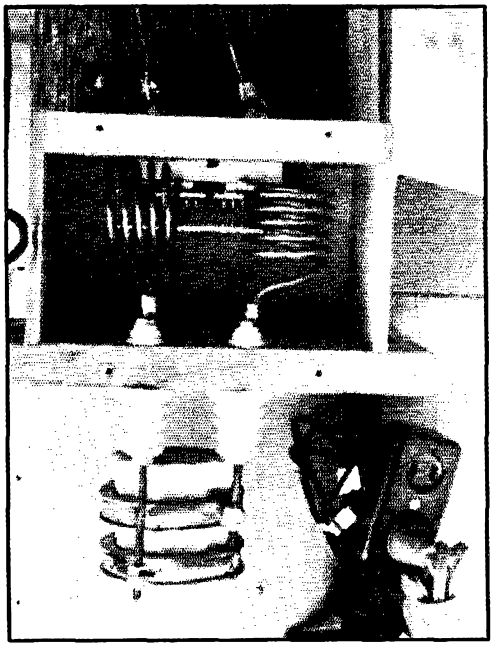
THE network to be described came about as a result of the need of the writer to provide some means of continuously rotating a beam antenna with motor drive. The help of Professor Cassell, W9YL, of the Electrical Engineering Department of the University of Colorado, was largely responsible for the solution. The network is simplicity in itself, and no one should be scared out because of the mathematics in evidence, as everything is quite easy to figure and the results more than pay for the effort.

The object of the network is to match two lines of different impedances. It can be used to match a line of one impedance to a line of different impedance, or it can be used to couple an untuned line to a load that is not the exact impedance of the line. In the writer's case the need came about because of a rotary beam that had to rotate continuously, and must be fed by an accepted open line of an impedance in the neighborhood of 500 ohms. To do this it was necessary to run the feeders inside the driving mechanism before it was possible to couple to the antenna, causing the feeders to come closer than the spacing allowable in a 500-ohm line. It was therefore necessary to reduce the dimensions of the feeder system in order that it could go in the ⅞-inch hole available. This, of course, necessitated a line of lower impedance than 500 ohms, and a method of coupling it to the 500-ohm line. Experiments were conducted in transforming 500 ohms to anything from 8 ohms to 240 ohms, and a transformation efficiency of better than 90% was found on all output loads. Efficiencies were figured using a battery of Ohmite dummy antennas, the impedance of which could be varied from 8 to 500 ohms.

The network consists merely of a condenser across the line and an inductance in series [1] with the line as shown in Fig. 1. The series inductance is figured as a lump sum, then split and half put in each side of the line, mounted so that there is no inductive transfer between the coils, that is, the coils are mounted either at right angles or are shielded from each other. Coils and condensers on the high frequency bands work out to be small in physical size and the network is light and takes up little room. It is necessary to figure the reactance of both the coil and the condenser, and from this, the capacity and inductance needed at the working frequency. The negative sign means merely that the reactance is capacitive, and the positive sign shows that the reactance is inductive.

Design Formulae

The necessary equations for a network of this type, where the input and output impedances are resistive, are



The network-coupling system as used on the rotatable antenna at W9IVT. The 500-ohm line can be seen coming up to the bottom of the box which houses the network. The slip rings above the box are mounted on a large Isolantite coil form and the 240-ohm line runs up through the coil form and to the antenna proper.

* 935 Eleventh Street, Boulder, Colo.

[1] This is derived from the fundamental T matching network for different impedances. When both input and output impedances are resistive, one series branch can be eliminated and the other two branches become reactances of opposite signs. — ED.

Capacitive reactance

$$X_1 = -R_1\sqrt{\frac{R_2}{R_1 - R_2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Inductive reactance

$$X_2 = \sqrt{R_1R_2 - R^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where R_1 = input impedance in ohms
R_2 = output impedance in ohms

The necessary capacity and inductance values are found from

$$C_{X1}\ (\text{microfarads}) = \frac{1}{2\pi f X_1} \quad \ldots\ldots\ldots\ldots (3)$$

$$L_{X2}\ (\text{microhenries}) = \frac{X_2}{2\pi f} \quad \ldots\ldots\ldots\ldots (4)$$

where f = frequency in megacycles

Substituting our values of input and output impedance (500 and 240 ohms) in (1) and (2), we arrive at

$$X_1 = -500\sqrt{\frac{240}{500 - 240}} = -480.4 \text{ ohms}$$

$$X_2 = \sqrt{(500 \times 240) - 240^2} = 249.8 \text{ ohms}$$

Calculating the values of capacity and inductance from (3) and (4), for a frequency of 14.2 Mc.,

$$C_{X1} = \frac{1}{2 \times 3.1416 \times 14.2 \times 480.4}$$
$$= 0.0000233\ \mu\text{fd} = 23.3\ \mu\mu\text{fd}.$$

$$L_{X2} = \frac{249.8}{2 \times 3.1416 \times 14.2} = 2.80\ \mu\text{h}.$$

In a symmetrical network such as the one shown here, the value of $\frac{L_{X2}}{2}$ is used in each leg.

With a Lightning Calculator on hand, it is easy to find a coil that will give the necessary value of $\frac{L_{X2}}{2}$. It is good practice to make the coil diameter approximately equal to the length.

Ratings

It is a good idea to figure the ratings of the parts involved since, with a correct match, the only losses in the system are I^2R losses and it is well to design the parts so that there is a minimum of heating. In Fig. 2 the ratings are computed for a transfer load of 300 watts through the network.

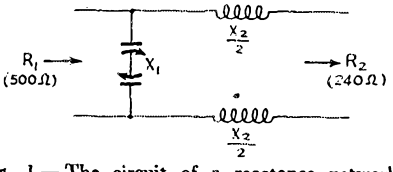


Fig. 1 — The circuit of a reactance network for matching two resistive impedances of different values.

$$\text{Input } I = \sqrt{\frac{W}{R}} = \sqrt{\frac{300}{500}} = \sqrt{0.6} = 0.775 \text{ amperes}$$

$$\text{Voltage across line, } E = IR = 0.775 \times 500 = 388 \text{ volts}$$

$$\text{Current through condenser, } I = \frac{E}{R} = \frac{388}{480.4} = 0.807 \text{ amperes}$$

$$\text{Current through coil, } I = \sqrt{\frac{300}{240}} = \sqrt{1.25} = 1.118 \text{ amperes}$$

It will be seen that for these currents it is not necessary to make the coils out of heavy material, and the condenser can be any of the common midgets. It will be noticed, also, that the current in the coils increases as the ratio of input to output impedance increases. A split-stator condenser precludes the possibility of losses through poor rotor contact by eliminating any flow of current through the contact and also adds to the voltage-breakdown rating. It must also be remembered that, if the transmitter is to be modulated, there is a voltage and current increase throughout the system on modulation peaks.

Experience here has shown that the computed values are close enough for all practical purposes. The network works quite well, allowing operation over the entire 14-Mc. band, with load mismatches as high as 2-to-1 on either side of the computed load impedance, with efficiencies on the order of 90%. It was found that the system worked better with slightly less capacity than the calculated value, the amount apparently depending upon the distributed capacity between coils, wiring, etc. The installation here consists of a split-stator, 40-$\mu\mu$fd. per section, midget condenser set at full capacity and two self-supporting coils of ⅛-inch copper tubing wound to 1½-inch diameter. The 500-ohm line runs 65 feet from the transmitter to the network, and the network feeds, through the slip-rings, a 10-foot length of 240-ohm line which is fanned out and connected to the driven element of the antenna in the usual "Y" match fashion.

A somewhat similar network has been made up by one of the local hams to connect to a full-wave antenna one-quarter wavelength from one end, and he matches a 500-ohm line to the 80-or-so ohms of the antenna with excellent results, the network hanging from the antenna in place of a "Q" section.

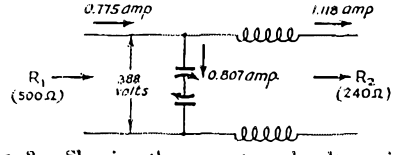


Fig. 2 — Showing the currents and voltages in the network for a 300-watt load.

It is possible to work the network in either direction, and a low-impedance line can be matched to a higher-impedance one. In this case, the output as figured above becomes the input, and the condenser is on the output side. In coupling two concentric lines, it will be found that the inductance will all have to be in the interior conductor, that is in the line at a potential above ground. It will also be found that in coupling to an unbalanced load, the entire amount of inductance will have to be in the side of the line above ground.

Relative to removing standing waves, if any are found, it can be assumed that the trouble is in the terminating load and not in the network. It seems that the network always shows the same reactance on the output side as shown on the input side, or vice versa, as the case might be. That is, if the 240-ohm line looks into a capacitive load, the 500-ohm line will present a capacitive load to the final. If the load is inductive, the 500-ohm line will present an inductive reactance to the final. By adjusting the load to zero reactance, it will be found that standing waves will disappear on both sides of the network, within the limits given previously, and not until there is an error in figuring line impedances on the order of fifty percent or more will there be any more standing waves on one side of the network than on the other. Since the formula for figuring line impedances is relatively simple, a mismatch of this order should never occur.

The writer is feeding a three-element close-spaced array Y-matched to the 240-ohm line. Adjustment is made as though the network were not in the circuit, and coupling is made to the antenna by sliding the 240-ohm line terminals away from, or toward the center, until the 500-ohm line presents a pure resistive load to the final. At this point no standing waves occur on either the 500- or the 240-ohm line. The full-wave antenna mentioned above was pruned until the feeders presented a pure resistive load. This removed all standing waves from the line.

To simulate the most adverse circumstances the writer first strung up 30 feet of 500-ohm line, followed by 10 feet of 13-ohm line, then 15 feet of 600-ohm line, and finally ten feet of 240-ohm line, with proper networks between each section. When the proper terminating resistance was presented to the 240-ohm line all standing waves on all lines disappeared. By manipulating inductance and capacity in the terminating load, the standing waves could be made to come and go at will, but it was never possible to have them on one section and not on the others.

How to Figure Grid Bias

(Continued from page 26)

We find that under normal operation it takes 2600 ohms in the grid circuit and 450 ohms in the filament circuit to supply the necessary 130 volts for Class C telegraph operation and still keep the plate current no greater than 40 milliamperes under conditions of no excitation. It is only a coincidence that the bias obtained from the grid resistance R_5 was the same as that obtained from the filament resistor R_7. The values of R_6 and R_8 for the push-pull case are figured the same way and will come out to be half the sizes of R_5 and R_7.

It is possible to have the filament resistor supply all the bias for the tube. The value necessary for 130 volts is found as usual, by Ohm's Law.

$$E_c = (I_p + I_g)\, R_{\substack{\\ cathode}}$$

$$130 = (0.120 + 0.025)\, R_c$$

$$R_c = \frac{130}{0.145} = 895 \text{ ohms}$$

In this case there would be no grid resistor. In the event of loss of excitation, the plate current will be held to a small value. It can never cut itself off, as there must be some plate current flowing to develop the negative bias to keep it down. If you normally develop all your bias in the filament circuit you need not worry about the plate current in the event of excitation failure, but the equilibrium value it will finally reach can be found by a trial and error method on the curves of Fig. 2. Move up along the 1000-volt line and take a safe value of current, 30 milliamperes for example. This occurs with a grid bias of -20 volts. The filament resistance necessary to give this is

$$R = \frac{E_c}{I_p} = \frac{20}{0.030} = 667 \text{ ohms}$$

This is less than we have in the filament circuit so that point is not the one we are looking for. If we try again with a plate current of, say, 25 milliamperes, the indicated grid voltage is about 22 volts. The required resistance is

$$R = \frac{E_c}{I_p} = \frac{22}{0.025} = 880 \text{ ohms}$$

This value is very near the resistance we actually have of 895 ohms, so we can see that the equilibrium point that the plate current will finally reach would be about 25 milliamperes. This would correspond to a plate input of 25 watts, well under the rated value of 40 watts.

Cathode of filament bias as described above is not very commonly used because the plate voltage on the tube is reduced by the amount of bias that is developed across the filament resistor. However, this method of bias is quite handy, if you have a slight excess of plate voltage and wish to reduce it.

East and West from Old Sol and True North for Night Owls

Another Crack at Setting Up Direction Marks

BY LIEUT. H. C. OWEN,* W6JPQ

IN THE present day of directional antennas, orientation of these systems requires that, first of all, some direction be known definitely at the location of the proposed system, to be used as a base line from which to ascertain other desired directions.

It is the purpose of this article to show, first, how east and west may be found at any place where the sun is shining, without books, mechanical aids or watches. A string, a stick, or anything with which to determine a length is all that is needed. It is unnecessary to know whether one is in Europe, Africa or the United States. Second, for those of nocturnal habits living in the northern hemisphere, a method of comparable simplicity for determining true north from Polaris will be given.

The set-up for the first requires a vertical pole, anything from a match stick up, a level surface at the base of the pole, and the sun. The string, as a plumb-bob, is used to make the pole vertical and to level the surface at its base. The latter may require some explanation. From the base of the pole, lay out on the surface any three points equidistant from the base and not on the same side of the pole, using the string as the measuring device. Then, using the string again, level the surface by making these three points also equidistant from the top of the pole. Now we are ready to go.

After breakfast, when the sun is fairly low, mark the end of the pole's shadow on the surface. Measure, with the string, the distanec from this mark to the base of the pole. Then, run along about your day's business and plan on returning in the afternoon when the sun will be about as low again as it was at the morning observation. While you are gone, the shadow will become shorter and shorter until local apparent noon; then it will start lengthening. When it grows as big as it was in the morning you want to be there so you can mark the end of it again. (I hope you saved the string.)

Simple, isn't it? Oh yes, you're all done, those two marks determine an east and west line, and that is what you wanted. (See Fig. 1.) Other directions may be found from this base line.

Question: "*I live in Slugville. Will it work there?*"
Answer: "Yes, anywhere on earth the sun shines, with two exceptions; the North and South poles."
Question: "*What about this business of latitude and longitude, standard time and the sun being fast or slow, etc.? Don't you have to worry about that?*"
Answer: "No, because we are not concerned with the sun's position with relation to time, but rather with two equal angles whose values are purely arbitrary as long as they are equal."
Question: "*Is the method exact?*"
Answer: "Theoretically, no, except twice a year. Practically, yes. The precision depends upon inaccuracies in the initial set-up of the pole and surface, and observational errors. These more than mask the method errors which depend upon the geographical location, the time of year, and the elapsed time between morning and afternoon observations. The latter will be minimum at any location in summer and winter."

The principal advantages of this method as compared with that previously published in *QST*,[1] are its universal geographical application and its simplicity. Aside from the requirements of knowing one's longitude, applying corrections to standard time for positions off the zone meridian, and for the equation of time in finding the exact moment of local apparent noon whence the sun bears north of south, there is the additional disadvantage in the latter method that when the sun is nearly overhead at noon, its azimuth or bearing changes very rapidly. As pointed out in the previous article, that method is impractical under

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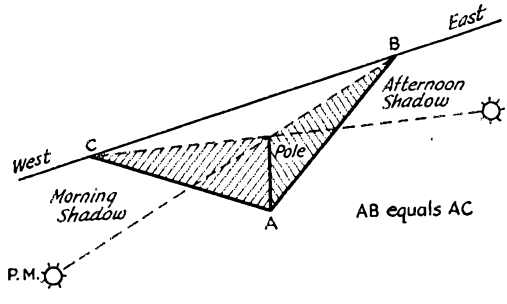


Fig. 1 — The simple method for determining an east-west line from the sun uses a vertical stick or pole on a level surface. A line drawn between the extremities of equal morning and evening shadows gives the desired direction.

[1] Budlong, "True North from Old Sol," *QST*, Jan., 1938.

some circumstances. No such limitations hold for the East-West method. Observations are taken when the sun's bearing is changing slowly and its shadow length is changing rapidly, a desirable condition for observational accuracy, except as hereafter noted.

The principal disadvantage of the method is the requirement of a level surface. Because the observations are taken when the shadow makes an acute angle with the surface, a tilt, other than a north-south one, may produce a large error. This can be minimized by taking the observations nearer midday, but if carried to extreme, we again run into the difficulty of a rapidly changing bearing and a slowly changing shadow. In high latitudes, during winter, nothing can be done about it because the sun remains low all during the day, and a level surface *must* be had.

The following expedient may be adopted to insure a level surface. Set the pole in the ground and construct a glorified mud-puddle of suitable size around it for the surface. Have the water good and muddy in order that the shadow falling on it will be well defined.

True North from Polaris

Now for the night owls. If living in the northern hemisphere above about 10 degrees latitude, and knowing how to find it, one can see the North Star (or *Polaris*) any night when the clouds do not prevent it. Were the earth's axis extended out into space, it would almost run into this star. However, because *Polaris* is not exactly overhead at the North Pole, the star appears to travel in a small circle about the earth's extended axis as the earth revolves. Consequently, if at any time two objects are lined up on this star, a north or nearly north line will be determined, the error depending upon the position of *Polaris* in its apparent orbit relative to the observer's position on the earth.

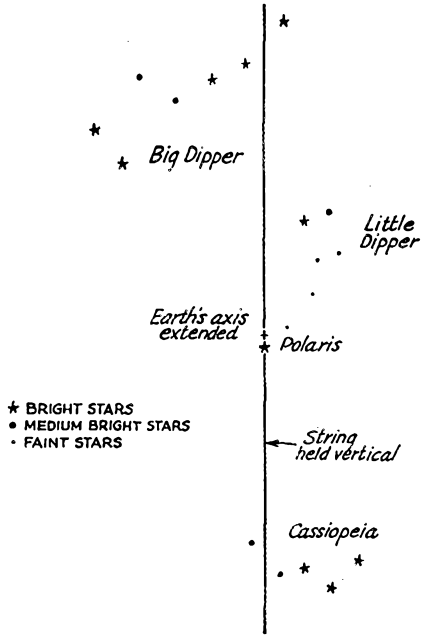


Fig. 3 — Polaris bears true north when the constellations are in this position. This is also true if the diagram is inverted.

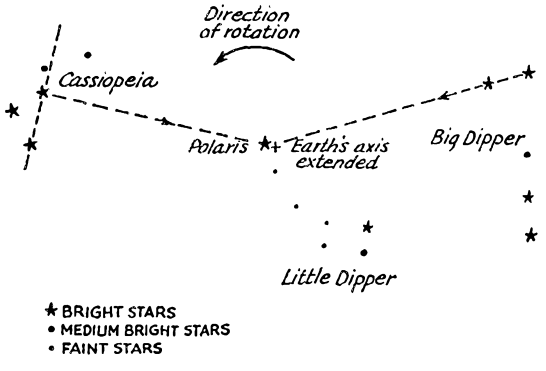


Fig. 2 — A star map for locating the North Star (Polaris). Cassiopeia and the Big Dipper serve as convenient references.

In the United States, the maximum error is ± 1.6 degrees, and the minimum error is of course zero. The maximum error increases as we go north and decreases as we go south. After showing how to pick out *Polaris* from the 2000 stars visible with the naked eye at any one time, we will outline how to take its bearing when the error is zero.

Referring to Fig. 2, if you live in latitudes of the United States, face north, look up about halfway from the horizon to overhead, and the three constellations illustrated should be seen. They will not necessarily appear as they do in the figure. Take the magazine and turn it around, sideways, upside down, etc., keeping the eyes on the figure. The actual constellations maintain their relative positions but seem to revolve around *Polaris* just as they did when turned around in this *QST*, and when one goes outside to look at them, they may be at any stage in their apparent revolution. If one lives far enough south, either the Big Dipper or *Cassiopeia* may, at times, be partially or completely obscured below the horizon. Don't let this upset you — both never disappear at the same time.

Still referring to the diagram, the easiest thing to find is the Big Dipper. The two bright stars forming the outboard side of the pan point to *Polaris*, the bright star at the end of the handle of the Little Dipper. If the Big Dipper is below

the horizon, *Cassiopeia* (more easily remembered as a "*W*" *upside down* because it *is* upside down when the Big Dipper is below the horizon) may be used to find *Polaris*. A perpendicular to a line through the center and outer bright stars of the "W," erected at the center star, points to the North Star. Once *Polaris* is located, if a small error is unimportant, a bearing can be taken immediately by lining up two objects with it. This will give a north-south line with an undetermined error from zero to ± 1.6 degrees for locations in the United States. However, if true north is wanted, proceed as follows:

Hang up a string as a plumb-bob where you can look past it and see *Polaris* and either *Cassiopeia* or the Big Dipper. Wait, while the constellations revolve, until the string can be lined up with *Polaris* and a point halfway between the two medium bright stars of *Cassiopeia*, or halfway between the last two bright stars in the handle of the Big Dipper. See Fig. 3, right side up or upside down. At these times *Polaris* is true north from the observer and a bearing taken then will have zero error.

For those who desire an explanation, this is merely a visual means of determining the time of local meridian upper or lower transit of *Polaris*.

Hudson Division Convention

Schenectady, N. Y., October 6th, 7th, 8th

Two hundred local amateurs throughout the capitol district received a few days ago their first inkling as to what the coming 14th Annual Hudson Division Convention this fall holds in store for them in the way of surprises and prizes. The major convention sponsored by the Schenectady Amateur Radio Association and approved by the A.R.R.L. will be held in Schenectady, N. Y., on October 6th, 7th, 8th with the Hotel Van Curler as convention headquarters.

The convention will officially open on Friday noon, October 6th, with advance registration throughout the afternoon at the Hotel Van Curler. Activities officially get under way Friday evening at the Schenectady Y.M.C.A., where a big evening of fun is being planned for those attending. This will be followed by visits to local stations and informal rag-chewing.

Saturday morning registration will continue until 1:00 P.M. when the convention will be officially opened by a short address of welcome from Dr. Albert F. Korn, President of the Association.

A fine technical program arranged by W. R. Williams, W2CSN, of the General Electric Radio Engineering Department will take place Saturday afternoon; also L. H. B. Peer, W2ACB, local Emergency Coördinator will conduct a meeting of the Amateur Emergency Corps. Naval Communication Reserve will be taken in hand by R. E. Haight, N2LU. In addition the enthusiastic delegates will have an opportunity to inspect the manufacturer displays, attend a special "House of Magic" Show, visit the world-famous South Schenectady location of WGY, W2XAF and W2XAD, and witness a television broadcast. Sometime during the afternoon, K. B. Warner, W1EH, Secretary of the A.R.R.L. will broadcast to the amateurs of the world over W2XAF and W2XAD, and a recording of his address will be "played back" later in the evening so that no one will miss hearing it. This broadcast is being arranged by Eugene S. Darlington, W2ALP, and John Sheehan of the General Electric short-wave stations and is planned in the form of an interview between Mr. Warner and Roy Jordan, W2KUD, General Chairman of the Convention.

Plenty of entertainment for everybody and especially for the visiting ladies under the chairmanship of Dorothea Jordan. Registration fee has been set at $3.50 for men, or ladies drawing for men's prizes, before October 1st, and $4.00 thereafter; and $2.00 for ladies — eligible for ladies prizes only at this price — before October 1st, and $2.00 thereafter.

Tickets should be purchased from G. M. Brown, W2CVV.

Strays

It is now possible to obtain a gadgety connecting terminal for wire-terminal transmitting tubes. This new terminal is one-half inch in diameter and three-quarters inch long. It is made of turned aluminum and has four heat-radiating fins. A set-screw is provided for fastening to the tube wire terminal and a 6-32 screw terminal at the other end for the plate lead. These terminals (Type R-62) are obtainable from Wunderlich Radio Inc., South San Francisco, Calif.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

Philip J. Crane, W8LHP, Booneville, N. Y.

Leon H. Halpern, W6MXA, San Francisco, Calif.

Morris L. Hoag, W6KMA, Ogden, Utah.

Horace Paul Houf, W6RFZ, Coronado, Calif.

W. A. Mackay, ex-W2AQB, New York.

Harry L. Sadenwater, W9GGZ, Michigan City, Ind.

Results, 1939 DX Competition

BY E. L. BATTEY,* WIUE

DX AT its peak! That quite adequately describes A.R.R.L.'s Eleventh International DX Competition, March, 1939. Not that conditions were all that could have been desired at all times during the contest, but there was DX in abundance, as the record-breaking results show. W/VE scores topped all previous performance, in spite of the fact that the elimination of 1.75 and 3.5 Mcs. from the battle should have made for lower "band multipliers." New highs in number of countries worked were established by W9TJ, who worked *85* different countries, W6GRL with 84, and W2UK, W3CHE and W3EMM each with 80, all on c.w. In the 'phone group W3EMM worked *66* different countries, W6GRL 64, W8KML and W8NJP 62, W2UK and W4BMR 59, and W6OCH 58. The availability of so many countries made the affair of great interest to all DXers, resulting in the greatest concentration of DX contacts of all time!

C.w. participation, as measured by the number of logs received, was somewhat less than in recent years, while 'phone interest rose to new heights. The results of 1298 code operators (949 W/VE, 349 foreign) and 803 voice operators (568 W/VE, 235 foreign) are recorded in the score list. These figures include some duplications as many operators participated in both the c.w. and 'phone periods.

263 Winners

Certificate awards go to the leading code operator and the leading voice operator in each A.R.R.L. mainland section and in each outside country where qualifying entries were received; 133 section awards (67 c.w., 66 'phone) and 130 country awards (71 c.w., 59 'phone) are being made. A special tabulation of winners lists their scores, transmitter final stage, receiver and antennas used. As you look over what the victors used you will begin to realize how some of them accomplished what they did. Those antennas! Wow!! Hearty congratulations to all winners from everyone who listened on the DX bands those hectic days in March!

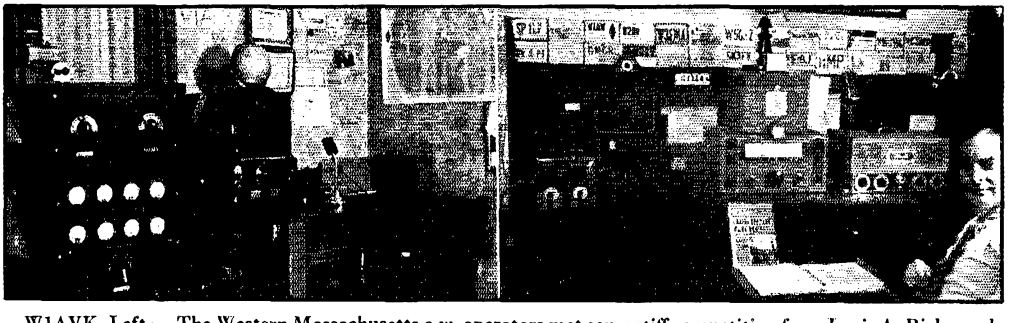
Club Scores

Winner of the gavel offered to the amateur radio club whose members, operating individual stations, submitted the highest collective score in the contest, is once again the South Bay Amateurs Association of Los Angeles. Considerably bettering its winning 1938 total, the S.B.A.A. this year aggregated 533,463 points. The operators amassing this figure were W6GRL, W4DHZ operating W6GRL, W6CUH, W6QD, W6VB, W6ACL, W6CXW, W6GRX and W6DIO. Nice work, OM's! Winner of the club certificate for c.w. is W6GRL. 'Phone winner is W4DHZ at the W6GRL mike.

Second high club for the second consecutive year is the Frankford Radio Club of Philadelphia, with 432,237 points, compiled by seventeen operators. Individual winner in the Frankford group is W3BES. The Maui Amateur Radio Club, Hawaii, is in third place with 238,810, led by K6FAZ.

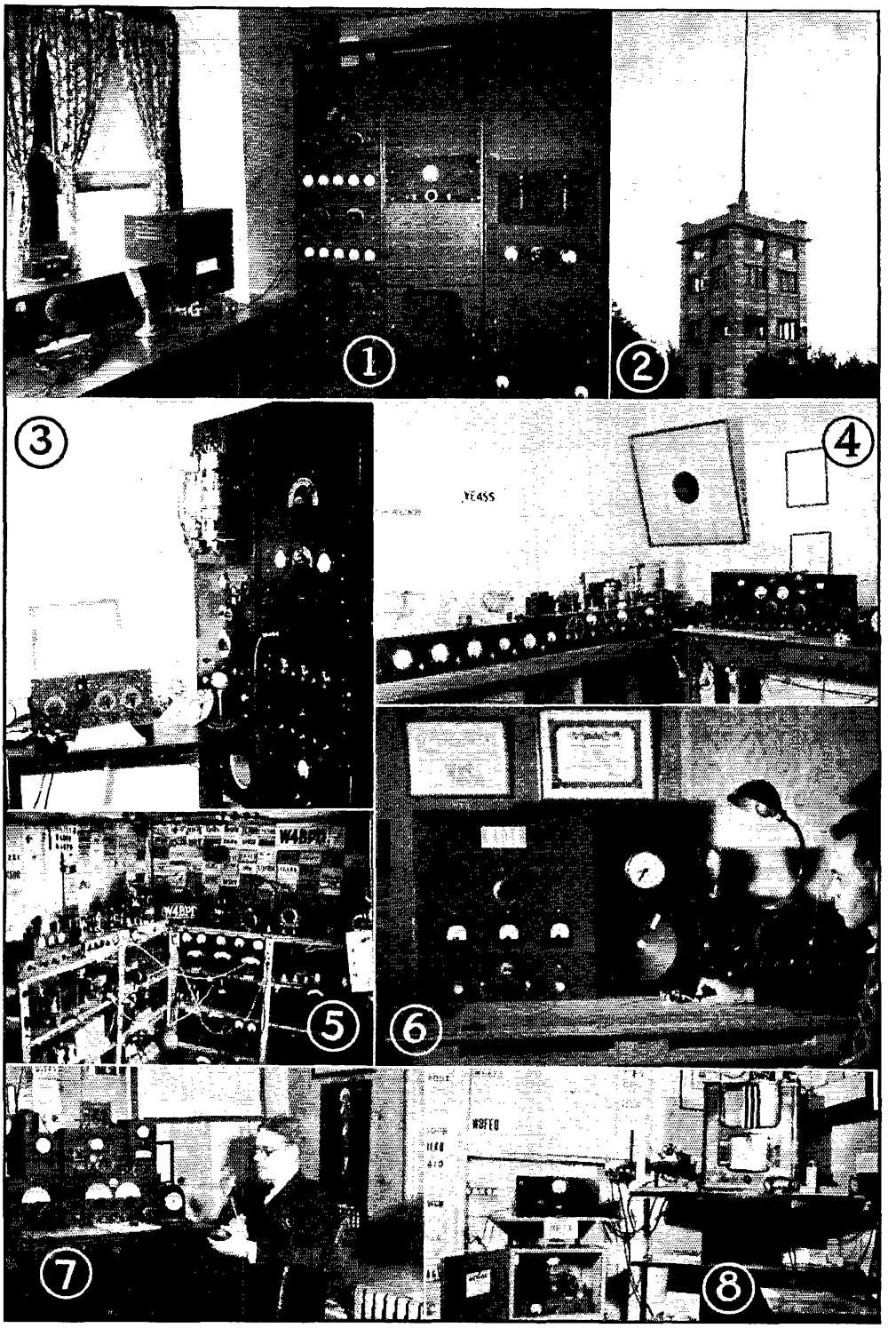
Other competing clubs are listed in order of scores. The calls given in parenthesis are winners of the club certificates; unless otherwise stated, certificate was won in the C.W. Section: Oakland

* Assistant Communications Manager.



W1AVK, Left — The Western Massachusetts c.w. operators met some stiff competition from Louis A. Richmond, W1AVK, who topped that Section with 76,812 points. His transmitter line-up is as follows: Meissner Signal Shifter-807-HF100-P.P. T200's . . . a flexible rig with plenty of punch.

CT1ZA, Right — G. W. B. Pope, CT1ZA, won the vocal bout in Portugal with a score of 12,597 . . . 224 contacts. Left to right on the operating table are 56-Mc. receiver, rotary antenna control, signal shifter (3.5-Mc. variable gap crystal), NC81X receiver, microphone and speech amplifier-modulator. The transmitter, 3.5 to 56 Mc., uses 42-42-6A6-6L6G-6L6G-pair 6L6's, 50 watts input.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W4BPD
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Radio Club, 155,584; York Radio Club (W9GY c.w., W9CIU 'phone) 138,234; Radio Club of Cuba (CO2JJ 'phone) 95,646; South Shore Amateur Radio Club (W1JCX 'phone) 56,684; Washington Radio Club (W3EUJ) 51,512; Milwaukee Radio Amateurs Club (W9GIL) 50,538; Beacon Radio Amateurs (W3ATR) 39,418; Club ON4BC (ON4PW) 27,956; Montreal Amateur Radio Club (VE2EE 'phone) 26,012; Winston-Salem Amateur Radio Club (W4OG) 25,590; Genesee County Radio Club (W8BWC) 22,740; Eastern Massachusetts Amateur Radio Assn. (W1WV) 12,751; Austin Radio Club (W9NRB) 11,010; Southern Montana Amateur Radio Assn. (W7EC) 6088; Trenton Radio Society (W3AWH) 5196; Fort Venango Mike & Key Club (W8JSU) 3450; Raritan Valley Radio Club (W2LJD) 2674; Tu-Boro Radio Club (W2BYK) 507. Individual club awards are made only in cases where three 'phone entries or three c.w. entries were received from club members or local hams invited by the club to participate.

Disqualifications

The following are deemed ineligible for DX-score listings, or awards, in the March 1939 competition. In each case disqualification is for off-frequency operation.

C.w.: W2AIW W5GSK W9ERU W9UAU CM2MR CT1ZZ CX2AJ D4YJI F3AR HI2AC * VP1DM.
'Phone: K6NYD W6EJC W8ROP W9JOL.

In addition to the above-listed, the following stations that did not submit contest entries were logged off frequency by observers during the period of the competition:

C.w.: W1JOX W2BXU W3IR W4AIS W5HUB W6GPU W6HX W6KUR W6MFZ W6NSI W6OAI W6PUZ W7DXZ W7EUY W7FZP W7GWT W8RNQ W9AIW W9MKZ W9REX W9UGV W9UQT W9VES W9WZF W9YFV VE3AEM VE4AAC.
CM2BA CE3AJ CR4HT D4OYT EI9G HP1DM HZ1A VP1BA XE1AT XE2AZ XX5X YV5AE.
'Phone: W2IIL W4DAL W5HUT W6COF W6KRI W8CAV W8EVI W8MNJ W9KIP.

* In addition to off-frequency operation, HI2AC was posing as a Dominican Republic station, while actually being located elswhere. Country credits were deducted from hundreds of scores for this reason.

C.W. High Scores and Records

The highest score among W's and VE's was rolled up by Dan H. Smith, Jr., W3CHE, who tipped the scales at 178,200. This is the highest DX contest score ever achieved in the mainland sections. Dan admits that he doesn't quite know *how* he did it! But he did it, and *how!!* FB, "DX Dan."

Second highest score is that of F. F. Priest, Jr., W3EMM — 172,044, and the leading scorer of the '37 and '38 contests, Ralph Thomas, W2UK, placed third this year with 171,312. Some scores, eh?

Next in line among the do-or-die DXers come W6GRL 159,543, W9TJ 158,440, W3PC 139,500, W1SZ 129,735, W3BES 117,504, W4CEN 111,186, W9TB 109,810, W1TW 107,730, W1KHE 99,448, W2DC 98,670, W8BTI 97,146, W4BPD 92,625, W1TS 91,500, W2BHW 87,075, W8LEC 86,304, W1CBZ 86,037, W4YC (7 ops) 82,943, W6CXW 79,544, W8QDU 79,492, W1AVK 76,812, W3FQP 75,240, W1ME 72,927, W3FRY 72,261.

Those leading in number of contacts: W3CHE 360, W3EMM 354, W2UK 344, W9TJ 318, W6GRL 311, W3PC 300, W3BES 289, W1SZ 279, W1TW 272, W1KHE 268, W9TB 267, W4CEN 263, W8BTI 257, W2DC 253.

Those having the highest multipliers (total of countries worked on each band used): W6GRL 171, W9TJ 170, W2UK 166, W3CHE 165, W3EMM 163, W1SZ and W3PC 155, W4CEN 142, W9TB 140, W3BES 136, W2BHW 135, W1TW 133, W2DC 130.

Among the c.w. participants outside the W/VE mainland sections, the highest score was made for the second consecutive year by Juan Lobo y Lobo, XE2N, with 230,584 points. Due to a smaller multiplier (because of fewer bands available for the contest) he did not reach his '38 score, but his contacts numbered 1910, about 500 more than the last year! This is an average of 22.4 QSO's per hour *for 85 hours!!* Some traveling!!

K4DTH — 176,778 — is second highest c.w. scorer outside W/VE, followed by ZSAL 147,414,

A Few of the Winners

(1) (Opposite page) Earle F. Lucas, W2JT, brought to his shack the honors for leading the 'phones in Northern New Jersey. Push-pull 354's in the final, eased around by e.c.o. control, did the trick. W2JT scored 82,698. (2) Oliver Bingen, LA1F, is the 'phone winner for Norway. This is his "Ham Tower," which houses the complete station. The tower itself is 40 feet high, the pole extending skyward another 60 feet! LA1F claims the distinction of being Norway's first licensed ham (1926). (3) W4CEN, station of Tom Brandon, North Carolina c.w. winner. The receiver is a homemade super. Push-pull 250TH's were used in the final. An A-1 station with an A-1 score — 111,186! (4) Alf. G. Sheffield, VE4SS, did the best talking in Manitoba, leading the 'phones with a total of 24,453. The 28-Mc. rig used a pair of 852's for final stage, while 150T's did the business on 14-Mc. A 10-tube home constructed super dragged 'em in. (5) W4BPD, well known South Carolina Official Phone Station, led that Section in both the c.w. and 'phone battles. There's plenty of equipment there and "Gus" put it to good use. The final stage used during the contest, for both code and voice operation, employed four 852's. Reception is via a home built s.s. super. (6) Second highest c.w. scorer outside W/VE, and winner of the award for Puerto Rico, is Jose F. Flores, K4DTH, whose 1406 QSO's resulted in a score of 176,778. A makeshift breadboard rig did service during the competition. Line-up was 6L6-807-HK254, 400 watts input. The unit in the photo is a new band-switching exciter which uses 6L6-6L6-814; this will drive a pair of 810's. (7) Harold C. Bowen, W1DQ, Rhode Island 'phone winner, in action. With the tidy score of 54,339, he had 165 QSO's in the British Isles alone, 307 contacts in all. The transmitter final uses push-pull RK38's. (8) Panama was a rare one in the contest and a number of the gang are indebted to HP1X, c.w. winner, for providing contact. The contest receiver was a rebuilt RCA-Victor 10-tube super. Outgoing signals came from 6L6's.

ZL1MR 120,042, K4FCV 114,228, XE1CM 111,000, LU5AN 110,592, VK2ADE 107,040, ZS6DW 103,311, K6FAZ 103,284, YS2LR 97,992, K6LKN 93,366, K5AF 91,020, ZL4DQ 84,591, and LU1EP 80,771.

High in number of contacts: XE2N 1910, K4DTH 1406, ZS2AL 1338, ZL1MR 1032, K4FCV 1020, LU5AN 1017, XE1CM 1000, K6FAZ 960, YS2LR 914, ZS6DW 907, VK2ADE 892, K5AF 841, K6LKN 808, LU1EP 743, FM8AD 729, K6CGK 726, ZL4DQ 723.

Leaders in multipliers: K4DTH 42, XE2N 41, ZS2AL 41, VK2ADE 40, K6LKN LU9BV ZL1MR ZL4DQ ZS6DW 39, K4FCV 38, G6NF K6CGK LU1EP LU9AX 37.

'Phone High Scores and Records

With a score that would have made the c.w. gang hold their seats a couple of years ago, OM Priest, W3EMM, led the vocal contingent. The score: 142,002!! This represents 483 contacts in 66 countries. The number of contacts made by leading W/VE voice operators ran higher than code participants due to the fact that 'phone stations were not operating under a "quota system." W3EMM made 123 more contacts than the leading c.w. scorer. There's some fast talking for you! Swell work, EMM!

Dave Evans, W4DHZ, operating W6GRL, hit 110,763, and W2UK also went over 100,000 with 106,533. 'Phone certainly has made a place for itself in this DX game!

Other outstandingly high W/VE 'phone scorers: W6ITH 99,296, W6OCH 98,175, W8NJP 93,104, W4BMR 92,461, W3EOZ 87,282, W8KML 86,856, W8DST 85,455, W4BPD 85,050, W2JT 82,698, W4AGB 78,570, W9ARA 78,075.

Leaders in number of 'phone contacts: W3EMM 483, W2UK 399, W6ITH 398, W6GRL (W4DHZ op) 397, W6OCH 386, W3EOZ 373, W2JT 358, W8NJP 354, W8DST 353, W4BPD 350, W4BMR and W9ARA 347, W8KML 333, W4AGB 324, W1DQ 307.

'Phone participants having the highest multipliers: W3EMM 98, W6GRL 93, W2UK and W4BMR 89, W8KML and W8NJP 88, W6OCH 85, W6ITH 84, W4AGB and W8DST 81, W1HKK and W4BPD 80.

The leading voice operator outside W/VE is G. Madrid, CO2WM, who made 1312 contacts for a score of 109,536. And so another new record was established. Well done, OM!

Second highest 'phone scorer outside W/VE is XE1A, 96,000 points, 1305 contacts. Other highs: VP6YB 81,027, CO2JJ 65,043, ZS6DW 61,452, HC1PZ 59,556, PY2AC 50,568, CE2BX 49,968, LU5AN 47,068, VP9L 45,520, LU7BK 45,240, VK4JP 45,072, LU9BV 43,794, GM6RG 41,075, HK3CG 39,447, VK2UC 38,400, ZS4H 36,840, G6LK 35,880, XE2HD 35,628.

Leaders in number of W/VE contacts: CO2WM 1312, XE1A 1305, VP6YB 1015, CO2JJ 810, ZS6DW 765, VP9L 764, HC1PC 710, CE2BX 694, VK4JP 626, PY2AC 602, LU7BK 584, LU5AN 569, LU9BV 548, GM6RG 531, ZS4H 520, VK2UC 512.

Leaders in multipliers: CO2WM, HC1PZ, LU5AN, LU9BV and PY2AC 28, CO2JJ, HK3CG, HK3CO, TI2FG, VP6YB, ZS5AW and ZS6DW 27, G6LK, LU7BK and XE2HD 26.

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It was a grand contest all around, and we hope there will be many more like it — in spite of the sorry outlook in the world at the present time. Best of luck to all until the logs start rolling in again.

WINNERS, ELEVENTH INTERNATIONAL DX COMPETITION RADIOTELEGRAPH

Section	*Winner*	*Call*	*Score*	*Transmitter Final Stage*	*Receiver*	*Antenna*
E. Penna.	Jerry Mathis	W3BES	117,504	P.P. 809's	NC101X	Center-fed Herts
Md.-Del.-D. C.	R. B. Green	W3BEN	62,055	P.P. 100TH's	NC101X	99-ft. center-fed; tuned feeders
So. New Jersey	G. C. Giberson	W3PC*	139,500	100TH's	———	Rhombic; Lazy H; Rotatable
W. New York	L. E. De La Fleur	W8AU	64,512	810	NC101X	Three W8JK 2-section Beams
W. Penna.	Francis Walczak	W8DWV	41,818	P.P. 50T's	HRO + DB20	28-Mc. vert. Q; 14-Mc. horiz. Q; 7/14-Mc. vert.
Illinois	E. E. Schroeder	W9TB	109,810	860's	———	7-Mc. vertical; 14/28-Mc. rotatable
Indiana	Leslie Gregg	W9IU	67,648	35T's	Homemade super	V beam; 14-Mc. vertical; 7-Mc. Herts
Kentucky	Bert Brown	W9FS	65,670	Par. 25TH's	RME69 + DB20	67-ft. single-wire, voltage-fed Herts
Michigan	Richard J. Cotton	W8LEC	86,304	T200	Homemade super	7-Mc. horiz. doublet: 14-Mc. rotary beam; 28-Mc. co-axial vertical
Ohio	Carl W. Luhn	W8BTI	97,146	250TLs/204As	RME69 + DB20	14-Mc. rotary; 14/28-Mc. Q's; 7-Mc. doublet
Wisconsin	R. C. Schmidt	W9VDY	49,098	100TH	Homemade super	2-section W8JK; 3/2-wavecenter-fed
No. Dakota	H. E. Holmberg	W9UBB	1,326	100TH	NC101X	14-Mc. Q; 28-Mc. vertical
So. Dakota	Bill Mattison	W9USI	10,965	T55's	RME69	28-Mc. Sterba curtain; 28-Mc. Lazy H; 28/14/7-Mc. V beam
No. Minn.	Julian H. Craig	W9NIM	5,883	35T	Homemade super	70-ft. single wire, Collins-coupled
So. Minn.	Kenneth A. Olson	W9YXO	9,504	Par. 35T's	Homemade t.r.f.	67 ft., single wire-fed
Arkansas	William Hall	W5ASG*	34,650	T125	RME69	28/14-Mc. rotary; 7-Mc. ½-wave sing. wire-fed
Louisiana	V. L. Rosso	W5KC	66,272	P.P. 100TH's	———	———

* Also Radiotelephone winner; not again listed in 'phone section.

W9BBS, Left — C. D. Larimore, W9BBS, won the c.w. fight in Nebraska, as well as placing second among the 'phones in that Section. His rig runs 600 watts on voice, 800 watts on telegraph, and operates on the 28, 14, 7, 3.5 and 1.75-Mc. bands. The line-up is 53 crystal-'45-841-800-P.P. 809's-P.P. 852's. The 809's are used only on 28-Mc. The receiver is a PR-16C.

LY1KK, Right — The Lithuanian winner in the c.w. section is K. Karkauskas, LY1KK, who is shown seated at his operating position. The 814 final stage is pushed by a 59 crystal oscillator and parallel 6L6's. There is no lost space in LY1KK's neat station arrangement.

Section	*Winner*	*Call*	*Score*	*Transmitter Final Stage*	*Receiver*	*Antenna*
Mississippi	Fred L. Ford	W5AVF.	4,445	Par. 6L6G's	NC81X	Vertical ½-wave Q
Tennessee	Claude Bass	W4DQH	3,276	P.P. 808's	NC81X	7-Mc. doublet; 14/28-Mc. rotary
E. New York	E. H. Fritschel	W2DC	98,670	FP198A's	NC101X	14-Mc. ½ wave; 14-Mc. extended doublet
N. Y. C. & L. I.	Ralph E. Thomas	W2UK*	171,312	P.P. 250TH's	HRO	28/14-Mc. rotaries; 7-Mc. extended doublets
No. New Jersey	Rolf Lindenhayn, Jr.	W2BHW	87,075	T200	HRO	6-element phased array; 3/2-wave V; Lazy H; 28-Mc. ½-w. vert.; 14-Mc. full-wave Zepp
Iowa	Charles E. Gross	W9GKS	7,956	852	HRO	2-element rotary
Kansas	Charles A. Pine	W9CWW	39,672	P.P T125's	NC101X	67-ft. Hertz, single wire-fed
Missouri	Wm. M. Atkins	W9TJ	158,440	P.P. T125's	HRO + DB20	Five V beams, each 2 waves on a leg
Nebraska	C. D. Larimore	W9BBS	13,570	P.P. 852's	PR-16C	132-ft. end-fed Hertz, 7 Mc.; rotatable beams, 14 and 28 Mc.
Connecticut	A. H. Jackson	W1NI	53,770	P.P. 805's	NC101X	130-ft. Zepp, 60-ft. feeders
Maine	Thomas A. Leavitt	W1IK	22,320	RK28/807	Sky Challenger	Single wire-fed Hertz, 134 ft., 14/7 Mc.; vertical doublet, 28 Mc.
E. Mass.	Jefferson Borden, 1V	W1TW	107,730	RK63	HRO	Terminated Rhombic; 4½-wave V; 4-sect. W8JK
W. Mass.	Louis A. Richmond	W1AVK	76,812	P.P. T200's	HRO	7-Mc. ½-wave doublet; 14-Mc. Q; 28-Mc. Q
New Hampshire	Carl B. Evans	W1BFT	31,590	860	RME69	Three long untuned wires
Rhode Island	W. E. Burgess	W1BDS	6,880	P.P. T55's	SX16	W8JK; 2½-wave V
Vermont	Hal Pratt	W1EZ	40,120	203D e.c.o.	Det-audio, O1As	½-wave Zepps, 3.5-, 7- & 14-Mc. vert.; W8JK vert.
Idaho	Louie B. Cox	W7ACD*	18,000	250TH	RME69	V beam, 202 ft. per leg; doublet; vertical ½ w.
Montana	Lyle W. Coleman	W7EOI*	16,740	250TH's	———	———
Oregon	Arthur H. Bean	W7AMX	24,090	HK354	Homemade super	530-ft. inverted L end-fed Hertz
Washington	Harold Ingledue	W7CMB	29,230	P.P. 808's	Homemade super	7-Mc. ½-wave vert.; 14-Mc. V; Lazy H
Nevada	Geo. H. Osborn	W6QQL	1,008	P.P. TZ40's	S-18	14-Mc. 3-element rotary beam
Santa Clara V.	John Kelliher	W6AHZ*	20,988	P.P. HF300's	HRO + DB20	Single wire-fed, 7 Mc.; 3-element rotary, 14 Mc.; 28-Mc. Q
East Bay	John Woerner	W6ONQ	26,625	P.P. 450T's	HRO	7 Mc.: ½-wave delta match; 14 Mc.: W8JK's; 28 Mc.: vert. W8JK, ½-w. Q, 8-elem. Sterba
San Francisco	W. E. Bachman	W6BIP*	32,148	P.P. 250TH's	———	———
Sacramento V.	A. T. Sepponen	W6AJD	25,938	300TH	RME69	7-Mc. off-center Hertz
San Joaquin V.	Thomas Sue Chow	W6MVK	51,084	P.P. 100TH's	HRO Jr.	Term. Rhombic; V; Q's; stacked dipoles
North Carolina	Tom Brandon	W4CEN	111,186	P.P. 250TH's	Homemade super	14-Mc. vertical Q; 14-Mc. ½-wave Zepp
South Carolina	Gus Browning	W4BPD*	92,625	4-852's	Homemade super	Three 3-w. V's; 8-w. V; two ½-w doublets
Virginia	Dan H. Smith, Jr.	W3CHE	178,200	HK354's	———	½-w. vert., 28 Mc.; 2 beams, 14 Mc.; cent.-fed, 7 Mc.
W. Virginia	Kenneth Leiner	W8LCN	16,874	150T	NC101X	28-Mc. vert. Q; 2 14-Mc. Q's; 7-Mc cent.-fed

Section	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Colorado	Warren Mallory	W9PGS	48,450	TZ40	RME70	14-Mc. ½-w. Q; 14-Mc. 3/2-w. Q
Utah-Wyoming	Chester R. Ashby	W6DTB*	12,690	P.P. 800's	SX16	3-elem., close-spac. rotary, 28 Mc.; 4 V beams, 275 ft. on all legs
Alabama	E. C. Atkerson	W4ECI	60,102	P.P. 100TH's	Hammarlund Super Pro	Half-wave doublets, 28, 14, 7 Mcs.
E. Florida	Harold J. Klaiss	W4QN	22,032	100TH	Homemade super	2-element, close-spaced unidirectional rotary
W. Florida	J. N. McCaskill	W4CDE	12,815	T55	Homemade super	½-w. doublets, 7, 14, 28 Mcs.
Georgia	N. W. Fincher	W4FIJ*	33,360	Pr. 35T's	Homemade super	134-ft. Herts, 7, 14 Mc.; 4 half-waves in phase, 14 Mc.; 3-element rotary, 28 Mc.
Los Angeles	C. E. Stuart	W6GRL*	159,543	P.P. 250TH's	HRO	5 V beams spaced radially from a central support; for others see June '39 *QST*
Arizona	Bud Keller	W6QAP	40,317	P.P. 100TH's	HRO	Q's, 28 and 14 Mc.; 7-Mc. doublet
San Diego	Norol O. Evans	W6LYM	45,630	P.P. 250TH's	HRO	2 Rhombics; 1 V beam
No. Texas	C. H. Vannoy	W5DM	35,952	805	NC81X	Two 279-ft. Zepps
Oklahoma	Harold Frank, W5EGA, operating	W5YJ	28,689	P.P. T55's	RME69	3.5-Mc. ½-wave Zepp
So. Texas	Wilmer Allison	W5VV	55,848	P.P. 100TH's	HRO	Signal Squirters, 28, 14 Mc.; full-w. Zepp
New Mexico	Charles Cerba	W5CJP	1,066	T55	T.R.F.	7-Mc. Hertz, single wire feed, Collins coupler
Maritime	C. E. Roach	VE1EA	37,433	P.P. HF100's	RME69	3.5-Mc. Zepp for 28, 14, 7 Mcs.; Q's, 28/14 Mc.
Ontario	R. D. Carter	VE3QD	38,590	P.P. 35T's	Homemade super	Rotary W8JK, 14/28 Mc.; ½-wave doublet, 7 Mc.
Quebec	W. G. Southam	VE2AX	26,572	T200	HRO	Dipoles, 28, 14, 7 Mcs.
Alberta	Jim Smalley	VE4GD	3,888	P.P. T20's	SX17	28 Mc.: 2-element beam; 14 Mc.: Vert. Q; 7 Mc.: Horiz. doublet
Brit. Columbia	Wm. D. Wadsworth	VE5ZM	13,524	P.P. T20's	RME69 + DB20	2-element rotary, 125 ft. high
Manitoba	Geo. Behrends	VE4RO	52,272	852s/270As HK354Ds	FB7	33-ft. vert., 28 Mc.; center-fed Zepp, 14 Mc.; vert. Zepp, 7 Mc.
Saskatchewan	Allan Chesworth	VE4JV	1,404	P.P. HF100's	PR16	7-Mc. Zepp

Country	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Algeria	Edouard Brocard	FA3RY	4,620	6L6	———	———
Egypt	Frank H. Pettitt	SU1SG	20,675	805	Crystal Pro + pre.	———
Madeira	J. A. Ferraz	CT3AB	46,575	P.P. 809's	RME69	———
Mauritius	L. R. Raoul Thomas	VQ8AI	2,220	6L6	———	———
Morocco	Georges Duranceau	CN8MQ	4,194	6J7	———	———
Mozambique	L. Feuilherade	CR7AK	4,455	6L6	———	———
So. Rhodesia	D. C. H. Human	ZE2JC	115	TZ20	———	131-ft. Zepp
Tanganyika	T. W. M. Millar	VQ3TOM	6,666	———	3-tube t.r.f.	67-ft. vertical
U. of S. Africa	R. G. Henwick	ZS2AL	147,414	T40	———	Close-spaced 2-element beam, 14/28 Mc.; 66-ft. end-fed, 7 Mc.
Burma	D. K. Clamp	XZ2DX*	9	———	———	———
China	A. E. Lower	XU4XA	3,368	803	RME69	———
Chosen	S. Matsunaga	J8CA	4,180	210	———	———
Hong Kong	John J. Alvares	VS6AG	7,020	801	Comet Pro + pre.	2-sect. W8JK flat top beam
India	L. Thomes	VU2FX	1,413	RK20	———	———
Japan	M.Okochi	J2JJ	22,609	35T	———	———
Azores	H. Raposo de Costa	CT2BJ	3,530	210's	Homemade, 3-tube	Zepp
Belgium	Guy de Burlet	ON4NO	59,080	809's	———	———
Danzig	H. Schmidt	YM4AS	1,287	L495D/RS281	O-V-2 battery	7-Mc. Zepp
Denmark	E. V. B. Krogsoe	OZ9Q	61,914	P.P. HK54's	FBXA	Terminated rhombic, 225 ft. on a leg
Eire	F. Halpin	EI4J	70,770	100TH	Howard 450	136-ft. end-fed Zepp
Estonia	Karl Kallemaa	ES5D*	5,066	P.P. 6L6G's	3-tube battery	7-Mc. Zepp
Finland	A. W. Tornblom	OH2PS	63	RV258	3-tube battery	7-Mc. L
France	Edmond Bonamy	F8RR	38,460	RK20	Homemade, 3-tube	14-Mc. Hertz
Germany	Erich Oppermann	D4GAD	54,510	RK20	3-tube	7-Mc. Zepp
Great Britain	A. D. Gay	G6NF	70,041	P.P. RK20's; 203A/211E	———	———
Hungary	Imre Antalffy	HA4H	35,310	———	2-tube	Zepp
Italy	———	I1TKM*	31,800	100TH	———	———
Latvia	Vilis Zirnis	YL2BZ	320	T780	3-tube	3/2-wave 14-Mc. current-fed
Lithuania	K. Karkauskas	LY1KK	14,490	814	SX16	7-Mc. L; 14-Mc. L; 28-Mc. doublet
Netherlands	P. Neve	PAØPN	44,800	T40'	3-tube	28-Mc. vert. Zepp; 14-Mc. horiz. Zepp; 7-Mc. horiz. Zepp; all ½ wave
No. Ireland	J. N. Smith	GI5QX	21,576	35T	SX18	99-ft. single wire, end-fed; ½-wave vertical, 14 Mc.
Norway	Birger Larsen	LA2B	1,265	HF100	3-tube	14-Mc. Zepp

Country	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Poland	G. Kruglowski	SP1MX	12,038	P.P. RK20's	Super Pro	———
Portugal	A. V. d'Oliveira David	CT1JU	18,725	4-6L6G's	SW3	Zepp, all bands; 14-Mc. ½-wave Hertz, single wire-fed
Roumania	C. Florian	YR5CF	39,184	———	HRO	———
Scotland	Doug Harrower	GM6NX	23,100	P.P. T21's	NC81X	7 Mc.: Full-wave center-fed Zepp; 28 and 14 Mc.: Full-wave end-fed 14-Mc. Zepp
Sweden	T. E. Ullman	SM7MU	27,020	P.P. TZ40's	Super Pro	Close-spaced rotary beam
Switzerland	G. de Buren	HB9AW	18,450	RK20's	HRO	7-Mc. Zepp
Wales	J. Stewart Owen	GW3QN	3,060	'46	———	———
Yugoslavia	Otto Hudecek	YU7LX	124	P.P. '45's	2-tube	Zepp
Alaska	Jerry W. McKinley	K7GSC	22,350	P.P. 35T's	Homemade super	28 Mc.: 3-element rotary; 14 Mc.: ½-w. vertical; 7 Mc.: ½-w. doublet
Barbados	Thos. A. Archer	VP6YB*	588	35T's	10-tube super	14 Mc.: 2-section W8JK, Zepp tuned feed; 28 Mc.: 3-element close-spaced rotary
Bermuda	Horace A. Frith	VP9X	17,880	T20	FB7	Full-wave doublet, center-fed
Brit. Honduras	E. W. Barber	VP1WB*	3	———	———	———
Canal Zone	C. E. Crabtree	K5AF	91,020	P.P. 860's	NC100	67-ft. Hertz, fed 11 ft. from center
Costa Rica	Federico Gonzalez	TI2FG*	35,910	C201	RME + DB20	Multiband, Collins
Cuba	Mario de la Torre	CM2OP	31,062	'03A	SX16	33-ft. vertical
Haiti	Emile Cadet	HH2MC	19,006	203A	Sky Champion	Matched impedance
Honduras	———	HR4AF	67,986	T20's	———	———
Martinique	E. Midas	FM8AD	67,394	P.P. '10's	———	———
Mexico	Juan Lobo y Lobo*	XE2N	230,584	HF100	———	———
Newfoundland	R. W. Munro	VO1D	8,551	RK20	SX11	66-ft. single wire, fed off-center
Panama	———	HP1X	1,110	6L6's	10-tube super	66-ft. doublet
Puerto Rico	Jose F. Flores	K4DTH	176,778	HK254	NC101X + DB20	66-ft. Zepp
Salvador	———	YS2LR*	97,992	6L6's	Breting 14AX	137-ft. single wire-fed Hertz
Windward Is.	Louis Devaux	VP2LB	26,730	P.P. 6L6G's	———	———
Australia	C. A. Miller	VK2ADE	107,040	809	11-tube ss super	7-Mc. V beam; 14-Mc. rotary
Hawaii	Sadami Katahara	K6FAZ	103,284	P.P. T40's	HRO	———
New Zealand	R. E. M. Barnes	ZL1MR	120,042	HK154	7-tube super	———
Philippine Is.	Simeon B. Palino	KA1SP	196	———	———	———
Phoenix Is.	Chas. D. Calley	KF6DHW*	7,344	———	———	———
Sumatra	Tan Koon San	PK4KS*	10,890	T55	———	———
Tasmania	C. H. Miller	VK7CM*	17,688	6L6G	———	69-ft. Zepp
Argentina	Martin L. Hidalgo	LU5AN*	110,592	35T	———	———
Brazil	J. C. de Almeida	PY2AC*	41,076	838	———	———
Chile	L. A. Brito R.	CE4AD	31,920	T20's	FB7A	Zepp
Curacao	———	PJ5EE	105	———	———	———
Ecuador	V. Salvador	HC1PZ*	3,300	807	———	———
Trinidad	D. Gordon Bagg	VP4TO	20,042	6L6's	———	———
Uruguay	Carlos E. Juele	CX1FB	19,278	809's	3-tube	14-Mc. single wire, fed off-center
Venezuela	Rev. J. Ignacio Rincon	YV4AE*	15,764	800's	HRO	3-element rotary beam

RADIOTELEPHONE

Section	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
E. Penna.	Thos. A. Consalvi	W3EOZ	87,282	RK63s/T200s	HRO + DB20	W8JK's; Q; doublets
Md.-Del.-D. C.	John D. Rowe	W3BNC	31,472	250TL's	NC81X + pre.	2-element rotary, 14 Mc.; 2½ w. in phase, 28 Mc.
W. New York	A. C Haussmann	W8DST	85,455	250THs/T125s	RME69 + DB20	28 Mc.: 3-elem. rotary; 14 Mc.: 3-elem. rotary
W. Penna.	Bill Martin	W8QXT	25,080	P.P. 250TL's	NC101	3-element rotary, 14 Mc.; vertical
Illinois	James C. Lewis	W9DKU	58,275	250TH's	———	———
Indiana	Fowler E. Macy	W9MM	20,592	250TH's	SX16/HQ120	3-element rotary, 14 Mc.; doublet, 28 Mc.
Kentucky	W. R. LaVielle, Jr.	W9ELL	58,167	100TH's	HRO/Super Pro	3-element beam, 14 Mc.; Q's, 28, 14 Mc.
Michigan	R. Z. Majeske	W8NJP	93,104	HK354's	———	———
Ohio	Robert C. Higgy	W8LFE	21,390	P.P. WE 276A's	HRO	3-element rotary beam
Wisconsin	D. B. Haas	W9BCV	39,123	100TH's	———	———
No. Dakota	Roy S. Lund	W9VSK	1,488	P.P. HK54's	SX17	Single wire
So. Dakota	A. W. Lundeen	W9PZI	4,623	P.P. 100TH's	NC101X	Two 4-sect. W8JK flat top beams
No. Minn.	C. H. Wesman	W9PFR	2,875	T55	———	———
So. Minn.	F. A. Nelson	W9NNO	20,130	P.P. 261A's	———	———
Louisiana	Samuel G. Daigre	W5ACY	7,755	T200	NC101X	2 full-waves, single wire-fed, off center
Mississippi	Jimmie King	W5DNV	27,144	HK354C	RME69 + pre.	102-ft. flat top, center-fed

Section	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Tennessee	Wilson Raney	W4SW	29,928	250THs/849s	RME69 + DB20	V beam, 350 ft. per leg; V beam, 207 ft. per leg; matched impedance doublet
E. New York	Llewellyn B. Keim	W2IKV	49,968	150Ts/T40s	HRO	Three-phased arrays; 2 on 14, 1 on 28 Mc.
No. New Jersey	Earle F. Lucas	W2JT	82,698	P.P. 354's	HRO + DB20	14 Mc.: close-spaced, 3-element rotary; vert. ½-w. Q. 28 Mc.: Lazy H; ½-w. horiz. Q
Iowa	Wesley J. Novotny	W9MCD	30,561	C300	HRO	2-elem. rotary, 14 Mc.; 3-elem. rotary, 28 Mc.
Kansas	Paul W. Mark	W9CVN	30,855	P.P. 100TH's	HRO	2-element close-spaced beam, 14/28 Mcs.
Missouri	Bob Henry	W9ARA	78,075	P.P. 250TH's	HRO	3-element rotary beam, 28/14 Mcs.
Nebraska	John E. Hachten, Jr.	W9ZNA	9,090	———	———	———
Connecticut	Owen J. McCabe	W1COJ	10,956	P.P. 150T's	Rebuilt FB7	2-element beam, unidirectional, rotatable
Maine	F. Norman Davis	W1GKJ	5,508	TZ40	NC81X	End-fed 3.5-Mc. Zepp
E. Mass.	Dana W. Atchley, Jr.	W1HKK	60,000	P.P. HK54's	SX17 + Browning preselector	10-element Sterba; 5/2-w. Colinear; V beam
W. Mass.	H. J. Nuttall	W1COI	22,313	852s/HK24s	RME69	3-wave Rhombic; 3½-w. V beam; 4-sect. flat top beam
New Hampshire	George D. Perkins	W1IVU	408	T200	Homemade super; Sky Challenger	14 Mc.: ½-w. doublet; 28 Mc.: ½-w. Q
Rhode Island	Harold C. Bowen	W1DQ	54,339	P.P. RK38's	HRO/RME69	Rhombic, unterminated; 144 ft. each leg
Oregon	C. M. Weagant	W7GAE	10,416	100TH's	Homemade super	3-element beam
Washington	Rush S. Drake, Jr.	W7ESK	37,620	35T's	PR10 + pre.	6 antennas: 3- 14-Mc. Barrage; 1-14-Mc. V beam; 2- 28-Mc. Barrage
Navada	A. L. Bernes	W6HCE	2,226	P.P. HY25's	PR10	V beam, 5 waves on 14 Mc., 10 w. on 28 Mc.
Santa Clara V.	Elmer Armond	W6LXA	5,865	279A	HRO	14-Mc. ½-wave doublet
East Bay	D. Reginald Tibbetts	W6ITH	99,296	P.P. 806's	———	———
Sacramento V.	Emil Malek	W6GVM	15,885	P.P. 100TH's	RME69 + DB20's	W8JK beams
San Joaquin V.	Frank Valentich	W6MEK	24,647	P.P. 150T's	Homemade super	14 Mc.: 2-section W8JK; half-wave delta match.; 28 Mc.: Semi-vertical Herts
No. Carolina	Dave M. Heath	W4BMR	92,461	250T's	RME69 + DB20	Three ½-waves out of phase; two stationary 2-element beams
Virginia	F. F. Priest, Jr.	W3EMM	142,002	250TH's	HRO	7-Mc. V; three 6-element Sterba curtains, 14 Mc.; 2-element rotatable, 28 Mc.
W. Virginia	Wm. A. Hallam	W8JKN	650	808	FBXA + pre.	W8JK 28-Mc. rotary
Colorado	A. L. Wolfe	W9WJJ	8,154	35T's	RME69	3-element rotary beam
Alabama	Bill Britton	W4ECF	34,020	100TH	RME69	2-element rotary
E. Florida	Eleree Atkinson	W4AGB	78,570	P.P. 203A's	RME69	V beam, 14 Mc., 3 wavelengths to leg
W. Florida	W. R. Staggs	W4FWY	7,998	T55's	RME69 + DB20	3-element close-spaced rotary
Arizona	Geo. H. Floyd, Jr.	W6OJK	8,910	250TH's	RME69 + DB20	3-element close-spaced rotary, motor-driven
San Diego	Henry Jones	W6GCT	10,836	P.P. 354's	HRO	8/2 NNE Zepp-fed; vertical ½-wave Q, 14 Mc.; Bi-square, 28 Mc.
No. Texas	D. J. Tucker	W5VU	16,942	250TH's	HQ120X	2 vert. 33-ft. ½-waves stacked in phase, 14 Mc.; 33-ft. vert. full wave, 28 Mc.
Oklahoma	George H. Chapman	W5BEE	15,502	P.P. 250TH's	———	———
So. Texas	H. Frank Jordan	W5EDX	10,560	P.P. T55's	RME69	Two 2-section W8JK beams
New Mexico	Frank Warehime	W5DWP	5,668	P.P. T40's	HRO	W8JK rotary
Maritime	M. H. F. Young	VE1GH	12,543	809's	SX16	Wave and half V beam
Ontario	May Senior, op'g	VE3QL	22,464	100TH's	RME69 + DB20	2-element rotary beam using reflector
Quebec	Stan Comach	VE2EE	11,080	242A	SX16	End-fed Zepp, 66 ft., 7 in.
Alberta	Ernest McNair	VE4WJ	3,168	T40's	SX15	14-Mc. Q; 2-elem., 28-Mc., close-spac. rotary
Brit. Columbia	E. J. Fowler	VE5VO	16,842	P.P. 810's	SX17	Q's
Manitoba	Al. G. Sheffield	VE4SS	24,453	150T's/852's	———	———
Saskatchewan	A. C. Cox	VE4BF	2,340	T55	Homemade super	W8JK rotary-fed with Zepp feeders

Country	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Algeria	Rene Roujas	FA3JY	650	———	———	———
Egypt	F. J. Wilhelm, op'g	SU1CR	3,300	P.P. 6L6's	———	———
Morocco	Pierre Ramond	CN8BA	6,012	211	NC101X	Herts. single wire feed
U. of S. Africa	Bill Meyer	ZS6DW	61,452	100TH/35T	HRO + DB20	Signal Squirter, 14 Mc.; 8 half-waves in phase, 28 Mc.
China	W. H. Wood	XU8AM	2,475	P.P. 154's	———	———

Country	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Chosen	Katsumi Ninomiya	J8CI	705	———	———	———
Japan	Ichiro Sakurai	J3FZ	3,640	P.P. 35T's	———	———
Belgium	Albert Deschodt	ON4AK	12,210	P.P. 100TH's	Homemade super	½-wave vertical Zepp, 14/28 Mc.
Eire	T. F. Murphy	EI2L	31,211	RK36	———	———
France	Henri Ciavatti	F8QD	25,001	HF100	Homemade super	28-Mc. Herts; 14-Mc. Herts
Great Britain	E. J. Laker	G6LK	35,880	50Ts/HF100s	HRO + DB20	14-Mc. Q; 28-Mc. doublet
Hungary	Louis Kiss	HA8C	54	211	Homemade super	Full-wave Zepp
Lithuania	P. Vanagaitis	LY1J	4,560	T125	7-tube super	W8JK beam
Netherlands	D. Zaayer	PAØUN	25,344	P.P. '10's	———	½-wave doublet & reflector, 14 Mc.; 2½ waves in phase, 2 reflectors, 28 Mc.
No. Ireland	J. St. C. T. Ruddock	GI8TS	1,248	T20	3-tube	½-wave dipole & director, 14 Mc.; ½-wave dipole, 28 Mc.
Norway	Oliver Bingen	LA1F	2,607	T40's	SX17/5-10	28-Mc. vertical
Poland	E. Kawczynski	SP1DC	1,820	T55	9-tube super, hm	7-Mc. L
Portugal	G. W. B. Pope	CT1ZA	12,597	6L6's	NC81X	W8JK rotary; 346 ft. long wire
Roumania	P. Becherescu	YR5PB	315		P.P. 210T's	———
Scotland	Bryan Groom	GM6RG	41,075	100TH's	HRO	9-element rotary, 28 Mc.; Lazy H, 14 Mc.
Sweden	A. Nordgren	SM7UC	8,280	'10's	———	———
Wales	J. V. E. Webley	GW6JW	5,104	T40	NC101X	W8JK single section 14-Mc. beam
Alaska	R. W. McCrary	K7AOC	1,239	35T's	RME70/SW3	Rotary beam; 134 ft., single wire feed
Bahamas	M. D. Russell	VP7NS	10,542	809's	HQ120X	3-element rotary beam

Scores

Eleventh International DX Competition

(Operator of the station first-listed in each Section and Country is winner for that territory, unless otherwise indicated. . . . Asterisks denote stations not entered in contest, reporting to assure credit for stations worked. . . . The multiplier used by each station in determining score is given with the score — in the case of W/VE entrants this is the total of the countries worked on each frequency band used; in the case of non-W/VE participants it is the total of the W/VE Districts worked on each frequency band. . . . The number of contacts established is next listed. . . . The letters A, B and C approximate the power input to the final stage at each station: A indicates power up to and including 100 watts; B indicates over 100 watts, up to and including 500 watts; C indicates over 500 watts. . . . In cases where power is varied, this is shown by the use of more than one letter. . . . The total operating time to the nearest hour is given for each station and is the last figure following the score. . . . Example of listings: W3BES 117504–136–289–B–90, or, Final Score, 117504; multiplier 136; 289 contacts; power over 100 watts; total operating time 90 hours. . . .)

ATLANTIC DIVISION

E. Pennsylvania

W3BES 117504–136–289– B–90
W3FRY 72261–111–217–BC–73
W8OKC 51930– 90–194– B–68
W3CWU 46060– 93–178– B–58
W3HTS 36936– 81–152– B–72
W3ATR 30552– 76–134– B–68
W3KT 33060– 76–145– B–69
W3FZH 23217– 71–109– C–42
W3CHH 21204– 62–114–BC–40
W3GYV 20580– 60–115– B–60
W3AAL 18234– 59–106– B–75
W3CBK 16936– 58– 98– B–68[1]
W3GHD 14952– 56– 89– B–45
W8FCB 13776– 56– 82– B–50
W3FJU 12528– 48– 90– C–40
W3FUF 7258– 38– 65– B–32
W3AGV 7242– 34– 71– B–29
W3DVE 7128– 36– 66– C–31
W3HER 6903– 39– 59– A– –
W3GRF 6270– 38– 55– B–35
W3FQG 6125– 35– 59– B–39
W3EML 5775– 35– 58– B–30
W3BQP 4719– 33– 51– – –45
W3GKO 4284– 34– 42– B–16
W3EHO* 3267– 27– 41– – – –
W3GFG 3000– 25– 40– B–20
W3EUC 2990– 26– 42– B–76
W3BGD 2596– 26– 32– A–16
W3FXZ 2520– 20– 42– B–41
W3GMS 2304– 24– 32– B–21
W8FDA 2205– 21– 35– A–55
W8LYF 1740– 20– 29– B–68
W3CPV 1562– 22– 25– A–23
W3GTL 1173– 17– 23– – – –
W8MEH 1050– 15– 24– B–17
W3HSX 810– 15– 18– B–21
W3GHM 780– 13– 20– B– 8
W3HDH 585– 13– 15– C– 9
W8RFR* 416– 8– 18– B– –
W8RZK 400– 10– 14– A–15
W3HRS 390– 10– 15– B–24
W3JN 324– 9– 12– B– 8
W3BNM 279– 9– 11– A– 9
W3CBY 144– 6– 8– B–27
W3DHO 48– 4– 4– B– 5
W3OP 36– 3– 4– B– 3
W3GOM* 27– 3– 3– B– –
W3CLI 20– 2– 4– B– 7
W3GYL 12– 2– 2– A– 6

Md.-Del.-D.C.

W3BEN 62055–105–197–BC–58
W3EPV 52704– 96–183– B–66
W3HXP 47940– 94–170– C–66
W3EUJ 44616– 88–175– B–72
W3DUK 41499– 87–159– B–46
W3HWZ 21238– 74– 97– C–53
W3GXX 19520– 61–108– C–57
W1HJ/3 19468– 62–106–AB–50
W3GEH 15900– 53–100– C–69
W3CIQ 15561– 57– 91– A–77
W3GKN 13923– 51–104– B–45
W3DRD 8118– 41– 66– B–56
W3HZH* 8109– 51– 53–BC–40
W3DQU 6696– 36– 61– A–65
W3CCU 6510– 35– 63– B–34
W3CXL 6270– 38– 55– C–24[2]
W3CDG 4650– 31– 50–AC–23
W3EKZ 3584– 27– 44–AB–35
W3GXU 3198– 26– 42– A–23
W3CBV 2760– 23– 40– B–22
W3GBC 1863– 23– 27– B–13
W3EPR 1826– 22– 27– B–33
W3FSP 1071– 17– 21– A–30
W3CVA 882– 14– 21– B–29
W3DPA* 300– 10– 10– – – –
W3APJ 240– 8– 10– B– 9
W3AYS* 210– 8– 10– – – –
W3CDQ 200– 8– 9– B– 7
W3HPU 3– 1– 1– – – –
W3HJP* 3– 1– 1– A– 1

So. New Jersey

W3PC 139500–155–300– C–84
W3FAX 38528– 86–151– B–85[3]
W3FKK 37931– 83–153– C–59
W3DOK 19488– 56–116–BC–63
W3GGL 16008– 58– 92– B–59
W3BVE 12152– 49– 83– B–69
W3CKT 8446– 46– 63– C–20
W3AIU 7714– 38– 64– B–31
W3CBR 7296– 38– 65– B–58
W3AWH 3321– 27– 42– A–10
W3HHG 3248– 29– 38– A–25
W3FHY* 2832– 24– 40– C– –
W3BEI 1638– 18– 33– – –19
W3HTG 1071– 17– 22– A–81
W3GHF 1008– 16– 21– A– 8
W3ELG 944– 16– 20– A–23
W3AXU 864– 16– 18– – –15
W3CKA* 462– 10– 14– – – –
W3ZX 280– 10– 10– C–10
W3HAZ* 208– 8– 9– B– 8
W3ECG 189– 7– 9– A–13
W3HGS 108– 6– 6– – – –
W3FBT 3– 1– 1– – – 1

W. New York

W8AU 64512–112–192– B–81
W8DSU 38183– 79–161– B–77

[1] Station score: opr W2GED 3009, W1CHP 4543, W3CBK 9676. [2] W3HNF opr. [3] Station score: opr W3FAX 11394, W3DBD 12349. [4] Three oprs, W9YES, W9GIG, W9UHQ. [5] Purdue Univ. Radio Club: eight oprs, W8ALG, W8QBY, W9SDC, W9VFA, W9VCF, W7BME, W7BRU, W9BJL. [6] Two oprs, Bernard and Theodore Szafranski. [7] Bristol Radio Club, oprs W1VK, W1JWG, W1COJ, W1AYR, W1JLU. [8] Trinity College Radio Club; oprs W1ILA, W1GKM, W1ILI. [9] Member A.R.R.L. HQ's staff; ineligible for contest awards. [10] North Shore Amateur Radio Assn., W1JPW opr. [11] Dartmouth Radio Assn., W9KHD opr. [12] Two oprs, W6LPC, W6KRM. [13] Two oprs, W6PEV, W6MHB. [14] Winston-Salem Amateur Radio Club, four oprs. [15] N. C. State College Radio Club, oprs W4CWD, W4CYA, Chas. D. Harris. [16] Charles S. Newman, opr. [17] Station score, opr W5GQM 3240, W. C. Murray 429. [18] Clearwater Radio Club, Inc., W4AKA opr. [19] Tech High School, Atlanta, Ga., seven oprs, W4YC, W4ELR, W4FJI, W4FUZ, W4FJP, W4FOB, W4FXK. [20] Ga. Tech Radio Club, opr W4DXI 2398, W4FPT 702, W2KVY 36. [21] W6BBR opr. [22] Two oprs, W5GJG, W9EHA. [23] W5EGA opr. [24] Halifax Amateur Radio Club, VE1KG opr. [25] Two oprs, Henri and Lucien Gilbert. [26] Score of opr C. E. Crabtree; opr N. F. Miller 603. [27] Edward J. Esbrook opr. [28] Two oprs, W3FKO, W3CXU. [29] Kay I. Kibling, W2HXQ, opr. [30] Four oprs, W7AOF, W2LSB, W6FZR, W3CIE. [31] W7CRD opr. [32] Clearwater Radio Club, Inc., two oprs; W4AKA's score listed; W4EHX 1530. [33] G. G. Fletcher asst. opr. [34] Tech High School, eight oprs, W4YC, W4ELR, W4FJI, W4FUZ, W4FJP, W4FOB, W4FXK, W4EF8. [35] W4DXI opr. [36] Dave Evans, W4DHZ, opr. [37] W6LXK opr. [38] Score of opr W6PNX; station score 12204, oprs W6PNX, W6NGG, W6OMH, W6LKE, W6NKG. [39] Two oprs, J. Y. Bowman, J. S. Stover. [40] Three oprs, W5CCU, W5HAQ, W5GWL. [41] Score of opr May Senior; E. E. C. England 2nd opr; station score 25144. [42] No award in the Azores; three stations tied; collaboration evident in working same stations and duplicating scores. [43] K. B. Archer opr. [44] Two oprs, Gertrude and Eric Bleo; no award in Haiti pending information on individual opr scores. [45] Earl Hornbostle opr.

Country	Winner	Call	Score	Transmitter Final Stage	Receiver	Antenna
Bermuda	Cyril Lindley	VP9L	45,520	———	———	———
Canal Zone	Earl W. Lockwood	NY1AA	27,672	TZ20	HRO	Single wire voltage-fed, off center, 3.5 Mc.
Cuba	G. Madrid	CO2WM	109,536	———	———	———
Guatemala	James B. McElroy	TG9AA	13,915	RK37	———	———
Leeward Is.	Arthur Tibbits	VP2AT	252	P.P. 6L6G's	ACR136/3-tube	66-ft. Zepp
Newfoundland	Harold Wells	VO1Y	5,980	'46's	S15	Two ½-waves center-fed
Nicaragua	———	YN1IP	12,138	203A	8-tube G.E.	Single wire
Panama	———	HP1A	3,840	———	———	———
Puerto Rico	R. Bartholomew	K4SA	24,552	RK20's	RME69 + DB20	198-ft. Hertz center-fed, semi-vertical
Windward Is.	Marie L. Devaux	VP2LC	2,343	P.P. 6L6G's	8-tube s.s.s.	66-ft. Zepp
Australia	G. H. B. Gray	VK4JP	45,072	———	———	———
Hawaii	D. C. K. Enomoto	K6LKN	23,064	P.P. HK254's	HRO	———
Java	A. te Riet	PK1RI	4,836	P.P. 35T's	———	———
New Guinea	Charles E. Davis	VK9DK	2,002	807	SW3	———
New Zealand	G. H. Diedrich	ZL1LC	18,774	HK54	———	———
Philippine Is.	Earl Hornbostle, opr.	KA1LB	22,488	———	———	———
Chile	Ernst Seemann	CE2BX	49,968	814's	Comet Pro	———
Colombia	A. Gomez Cruz	HK3CG	39,447	HK354	———	"Y" matched impedance
Peru	Alberto Torre	OA4AI	3,003	———	———	———
Uruguay	Ricardo Sierra	CX2CO	19,470	100TH	S17	Single wire, 5/4 wave long

W8CZB 21922– 69–106– C–76
W8IOT 19392– 61–106– B–77
W8ACY* 14040– 52– 90–BC–36
W8CKY 11760– 49– 80– B–59
W8DOD 10916– 52– 70– B–30
W8DZC 10434– 47– 74– C–38
W8NQC 9522– 46– 69– A–31
W8PLR 8880– 40– 77–AB–39
W8FYF 4608– 32– 49– A–29
W8APD 3404– 23– 50– B–27
W8ADG* 2700– 25– 36– B– –
W8QKM 2650– 25– 36– B–67
W8NCH 1836– 17– 36– B– –
W8FYH 1224– 17– 24–AB– –
W8RKM 816– 16– 17– A–25
W8DHU 576– 12– 16– A–10
W8OWP 243– 9– 9– B– 7
W8NEY 126– 6– 7– A–14
W8OMA* 48– 4– 4– – – –
W8BHK* 18– 2– 3– – – –
W8RWN* 12– 2– 2– – – –
W8AVF* 3– 1– 1– – – –

W. Pennsylvania

W8DWV 41818– 95–152– B–73
W8JMP 32469– 79–137–BC–72
W8CMK 27936– 72–130–BC–65
W8KTW 15312– 59– 88– B–32
W8HGG 11169– 51– 73–AB–31
W8BSF 9240– 44– 70– B–45
W8MJF 8569– 41– 71– B–57
W8ODH 8307– 39– 71– B–67
W8JSU 3444– 28– 34–AB–15
W8AAT 2829– 23– 41– – – –
W8SFV 2565– 19– 45– A–62
W8CXX 2267– 23– 33– B–35
W8KXP 1980– 22– 30– B–25
W8GMH 1542– 20– 29– B–27
W8MTY* 1152– 16– 24– – – –
W8AJN 1095– 15– 25– B–59
W8RQA 969– 17– 19– A–19
W8IOH 588– 14– 14– A– –
W8HET 315– 9– 15– B–26
W8CJF 312– 8– 13– B– 8
W8OEM 296– 8– 13– B– 7
W8OMF* 216– 8– 9– A– 9
W8NRE 144– 6– 8– A–12
W8IYI 120– 5– 8– B– 6
W8CZF 120– 4– 10– A– 6
W8OMR 75– 5– 5– A–11
W8RFE 75– 5– 5– A–34
W8LOL 55– 5– 5– B–39
W8NCJ* 12– 2– 2– – – –
W8HUL 3– 1– 1– B– 2
W8ITF 3– 1– 1– B– 3
W8NDE 3– 1– 1– B– 1

CENTRAL DIVISION

Illinois

W9TB 109810–140–267– C–89
W9GRV 69480–120–193– B–81
W9GY 49698– 99–167– C–81
W9TH 48960– 96–170– C–73
W9NST 25200– 24– 47– B–56
W9HLF 17864– 56–107– C–55
W9WLB 15776– 58– 91– B–54
W9FJB 12879– 53– 81– B–37
W9VFZ 12691– 49– 87– B–47
W9AGM 11730– 46– 85–BC–44
W9UTB 10332– 42– 82– B–50
W9NRB 9757– 49– 80–AC–71
W9VIN 8981– 43– 69– B–42
W9ETP 7371– 39– 63– B–16
W9WC 6195– 35– 59– B–31
W9VDX 5883– 27– 53– B–38
W9AIO 5184– 36– 48– C–46
W9MDK 4464– 31– 51– B–56
W9YZN 3050– 25– 42– C–45
W9VOQ 2925– 26– 39–AB–19
W9CUX 2550– 25– 34– B–25
W9MUX 2520– 20– 45– B– –
W9EKC 2178– 22– 34– B–21
W9SGL 1940– 20– 33– B–46
W9VWL 1827– 21– 29– B–35
W9EUL 1482– 19– 26– B–33
W9TKN 1224– 17– 24– B–29
W9PNE 1104– 16– 23– A–41
W9UAZ 945– 15– 21–AB–20
W9ZFP 848– 16– 19– B–14
W9IWX 663– 13– 17– C– 9
W9FXZ 576– 12– 17– B–46
W9ATS 468– 9– 18– B–10
W9ISM 420– 10– 14– B– –
W9DGK 396– 11– 12– A–54
W9YES 360– 10– 12– B–284
W9QIY 350– 10– 12– A–47
W9HQH 297– 9– 11– – – –
W9ZSS 297– 9– 11– A–10
W9NQI 240– 8– 10– A– 9
W9SG* 210– 7– 10– B– –
W9ICP* 168– 7– 8– – – –
W9AMP 90– 5– 6– C– 3
W9AGV 72– 4– 6– A–57
W9GSB 72– 4– 6–AB–12
W9ZMG 60– 4– 5– A– 4
W9OTS 48– 4– 4– A– 4
W9KXU 45– 3– 5– A–12
W9BWN* 39– 3– 5– A–13
W9INY 36– 3– 4– A–14
W9TMS 36– 3– 4– – – –
W9UWE 36– 3– 4– – – 4
W9MZP 27– 3– 3– B– 2
W9ZAM 12– 2– 2– A– –
W9DVY 3– 1– 1– – – 1
W9ZEM* 3– 1– 1– – – –

Indiana

W9IU 6 648–112–202– – –75
W9AMM 10374– 42– 83– B–68
W9SPB 8910– 45– 66– A–37
W9AKJ 5673– 31– 62– B–44
W9EES 5332– 31– 58– B–33
W9EOC 4050– 30– 45– B–54
W9YB 1930– 23– 28– – – –
W9EBQ 1710– 19– 30– B–22
W9IWS 1404– 18– 26– B–18
W9RZM 1292– 17– 26– B–23
W9HUV 1173– 17– 23–AB– –
W9JKK 806– 13– 24– B–44
W9YCZ 780– 13– 21– B–15
W9OKB 363– 11– 12– B–16
W9WCE 168– 7– 8– B–13
W9EGQ 144– 5– 8– A– –
W9CTT* 120– 5– 8– – – –
W9ZYK* 90– 5– 6– B–15
W9KBL* 24– 2– 4– A–11
W9LCL* 12– 2– 2– – – –
W9MDJ* 12– 2– 2– – – –
W9CP 3– 1– 1– – – –
W9ERP* 3– 1– 1– – – –

Kentucky

W9FS 65670–110–199–BC–72
W9ELL 20494– 57–114– B–41

Michigan

W8LEC 86304–124–232– C–88
W8QDU 79492–119–224– C–79
W8OQW 25704– 72–119– C–54
W8KO 15624– 56– 93– C–63
W8JAH 12000– 50– 80– B–66
W8BWC 9729– 47– 69– C–50
W8IQS 7380– 41– 61– B–56
W8OXP 7068– 38– 62– – –29
W8BWB 5642– 31– 61– B–38
W8JDG 4698– 29– 54– C–68
W8MCC 4371– 31– 47– A–52
W8ITK 1620– 20– 27– B–29
W8EWS 1620– 18– 30– B–17
W8AF 1404– 18– 27– B–34
W8MKZ 1152– 16– 24–AB–47
W8CVU 1050– 15– 24– – –12
W8ND 1035– 15– 24– B–27
W8LJP 912– 16– 19– B–52
W8FAF 720– 15– 16– B–17
W8RVE 684– 12– 19– C–22
W8QIZ 660– 11– 20– C–10
W8ENL 450– 10– 15– – – –
W8SDR* 224– 10– 8– – – –
W8FOV 36– 3– 4– B–13
W8BTP 27– 3– 3– – – –
W3HFP/8 27– 3– 3– A– –
W8LPQ 27– 3– 3– B–18
W8LYT 3– 1– 1– A– 1

Ohio

W8BTI 97146–127–257– – –72
W8LYQ 51000–100–170– C–69
W8ERA 50601–101–167– C–70
W8HGW 38868– 82–158– A–55
W8NV 33040– 80–139– C–50
W8BKP 26724– 50–131–AB– –
W8OXG 15045– 59– 85– B–67
W8LFE 13294– 46– 97– B–59
W8PEN 9196– 44– 73– B–71
W8GKG 8159– 41– 67– B–51
W8PUD 7605– 39– 65– C–60
W8ENA 7009– 43– 55–AB–42
W8JTW* 6708– 43– 54– – – –
W8CED 6156– 36– 57– B–44
W8ENH 6090– 35– 58– B–48
W8LCO 5643– 33– 57– B–44
W8SDD* 3564– 29– 44– – – –
W8JLQ 3312– 23– 48– A–32
W8IWI 3306– 29– 38– B–32
W8BRQ 3125– 25– 43– C–25
W8RAF 2625– 25– 35– C–21
W8DAE 2552– 22– 39– B–28
W8QXM 2442– 22– 37– B–24
W8IWS 2430– 20– 27–AC–21
W8ISK 2376– 22– 36– A–61
W8FGV 2231– 21– 37– B–21
W8BZB 2079– 21– 33– B–40
W8NKU 1880– 20– 32– A–31
W8BOS 1653– 19– 29– – – –
W8JXY 1242– 18– 23– B–24
W8OGK* 686– 14– 17– – – –
W8IPF 624– 14– 16– B– 8
W8SPM 576– 12– 16– – –12
W8DGP 572– 13– 15– C–16
W8NZI 560– 14– 15– C–19
W8BMX 540– 12– 15– B–11
W8DGX 432– 9– 16– B–25
W8EHZ 360– 8– 15– B–17
W8QMN* 192– 8– 8– – – –
W8CBI 189– 7– 9– B–16
W8PCS 144– 6– 8– B– 6
W8GER 60– 4– 5– – – –
W8DCC 48– 4– 4– A– 8
W8OTT* 12– 2– 2– – – –
W8JDW 3– 1– 1– B– 1

Wisconsin

W9VDY 49098– 98–168– B–61
W9HFJ 39150– 87–150– C–58
W9GIL 37800– 84–150–BC–75
W9RBI 19305– 65– 99– B–74
W9RRT 14148– 54– 88–BC–63
W9RH 10878– 49– 74– C–41
W9TJI 7872– 41– 64– B–64
W9FJQ 5508– 36– 51– B–45
W9RPW 4515– 35– 43– – – –
W9RQM 4089– 29– 47– B–23
W9YQM 2756– 26– 36– B–50
W9POS 2706– 22– 41– B–40
W9QIH 1860– 20– 31– A– –
W9IZQ 1428– 17– 28– A–38
W9MBX 1350– 18– 25– B–25
W9DRN 1275– 17– 25– B–12
W9QOJ 1035– 15– 23– A–45
W9YMG 975– 13– 25– B–21

W9YCV	576-	12-	17-	B-25
W9LUC	126-	6-	7-	B- -
W9TXF	96-	6-	6-	B- 7
W9KXK*	90-	5-	6-	B- 6
W9MRW	45-	3-	5-	B- 9
W9HRM*	27-	3-	3-	B- -
W9ZCU*	3-	1-	1-	- - -

DAKOTA DIVISION

North Dakota

W9UBB	1326-	17-	26-	B-13
W9YJL	144-	6-	8-	A-22

South Dakota

W9USI	10965-	43-	85-	B-57
W9PZI	6464-	32-	68-	C-51
W9FOQ	144-	6-	8-	A- 4

Northern Minnesota

W9NIM	5883-	37-	53-	B-50
W9PFR	3483-	27-	44-	B-67
W9DNY	660-	10-	22-	A-49
W9GKM*	60-	4-	5-	- - -
W9CDV*	48-	4-	4-	- - -

Southern Minnesota

W9YXO	9504-	44-	88-	B-65
W9DGH	6732-	31-	66-	- -29
W9TQW	5088-	32-	53-	AB-42
W9VKF*	4704-	32-	54-	A- -
W9TYE	72-	4-	6-	B- 6
W9VIP*	12-	2-	2-	A- -

DELTA DIVISION

Arkansas

W5ASG	34650-	75-	154-	B-81
W5EIJ	76-	4-	7-	A-25

Louisiana

W5KC	66272-	109-	210-	B-82
W5BRR	15912-	52-	102-	BC-51
W4BGO/5	6475-	37-	58-	B-32
W5AFW	5024-	32-	55-	C-35
W5CEW	780-	13-	21-	A-28
W5FTA	561-	11-	17-	A- 8
W5DAQ	138-	6-	8-	B- 4
W5BFX	24-	2-	4-	B- 5

Mississippi

W5AVF	4445-	33-	45-	A-30
W5FIT	189-	7-	9-	A-33

Tennessee

W4DQH	3276-	26-	42-	B-30
W4ZZ	468-	12-	13-	B-23
W4DFB	120-	5-	8-	B- 3
W4FDT	54-	3-	3-	A- -

HUDSON DIVISION

E. New York

W2DC	98670-	130-	253-	B-87
W2CBO	57474-	103-	186-	B-63
W2CJM	52722-	101-	174-	C-68
W2AWF	32706-	79-	138-	BC-58
W2DSB	17784-	76-	78-	B-44
W2OA	12285-	45-	91-	C-28
W2HCV	6020-	35-	58-	B-55
W2AIH	5014-	27-	64-	B-24
W2DQT	702-	13-	18-	- - 7
W2GTW	429-	11-	13-	A- 8
W2ISJ	390-	10-	13-	A- -
W2LRV	180-	6-	10-	A-13
W2HCM	12-	2-	2-	- - -

N.Y.C. & Long Island

W2UK	171312-	166-	344-	C-85
W2BJ	68634-	123-	186-	A-66
W2BEF	59280-	104-	190-	C-84
W2AHC	34656-	76-	152-	B-71
W2IRV	29054-	73-	135-	A-81
W2KZN	25058-	67-	125-	B-68
W2HYA	21978-	66-	111-	B-70
W2UOP	21696-	64-	113-	B-20
W2CUQ	16524-	54-	102-	B-57
W2ALB	13530-	55-	82-	B-47
W2AV	13095-	45-	97-	C-77
W2CTO	12150-	45-	90-	B- -
W2GTZ	11715-	55-	71-	C-47
W2FSK	11375-	35-	111-	- -38
W2DKF	9632-	43-	75-	C-35
W2EGG	8880-	40-	74-	B-58
W2AXZ	8541-	39-	73-	B-41
W2HXT	4896-	32-	51-	B-20
W2DZR	3948-	28-	47-	B-30
W2KIR	3301-	28-	47-	B-18
W2HAY	3075-	25-	41-	A-23
W2JXH	3000-	24-	56-	B-26
W2KMZ	2952-	24-	41-	A-27
W2FU	2697-	29-	31-	B-44
W2BO	2484-	23-	36-	B-22
W2EYD	2310-	21-	37-	- - -
W2BWC	2244-	22-	34-	A-22
W2FCQ	2116-	23-	32-	B-25
W2EMJ	1800-	20-	30-	B-29
W2CK	1710-	19-	30-	B-34
W2LKE	1564-	17-	31-	A-23
W2IJN	1520-	16-	33-	B-23
W2ICO	1512-	18-	28-	B-14
W2AOY	1395-	15-	31-	B-27
W2HUG	1173-	17-	24-	A-14
W2JVE	594-	11-	18-	B-13
W2LBC	410-	10-	15-	A- 9
W2BYK	405-	9-	15-	B- 7
W2KZX	360-	9-	16-	B-32
W2HSL	231-	7-	11-	A-11
W2CKO	210-	7-	10-	B- 5
W2KYV*	90-	5-	6-	- - -
W2KAM	48-	4-	4-	- - -
W2HBO	12-	2-	2-	- - -
W2LLE*	12-	2-	2-	A- -
W2KKL*	3-	1-	1-	- - -
W2LAI	3-	1-	1-	- - -

No. New Jersey

W2BHW	87075-	135-	215-	- -71
W2CMY	41820-	85-	143-	C-76
W2WC	35500-	79-	150-	A-58
W2JT	29862-	79-	126-	C-57
W2CYS	20160-	60-	112-	B-43
W2BZB	19980-	60-	111-	B-51
W2BUK	19825-	65-	103-	A-69
W2WZ	16520-	56-	121-	C-65
W2DZA	15892-	58-	92-	B-57
W2GT*	14450-	50-	97-	B-38
W2HZN	8160-	40-	57-	BC-42
W2IFA	7524-	38-	66-	A-39
W2DBY	5008-	32-	52-	- -32
W2GFW	5088-	32-	55-	B-44
W2DBQ	3930-	30-	46-	B-49
W2FBS	3920-	28-	48-	B-22
W2LKF	3744-	26-	43-	B-38
W2GVZ	3690-	30-	47-	C-75
W2DSV	3564-	27-	45-	B-31
W2BQK	3528-	24-	49-	B- 8
W2ALW	2925-	25-	39-	B-80
W2QP	2912-	26-	38-	C-18
W2FPM	2691-	23-	39-	B-23
W2AOG	2592-	18-	72-	B- -
W2JKH	2325-	25-	31-	B- -
W2DEU	2244-	22-	34-	B-16
W2LMN	2142-	21-	54-	A-18
W2DNG	2079-	21-	33-	B-17
W2LCW	1995-	19-	35-	B- -
W2JGP	1980-	22-	41-	B-18
W2DOE*	1729-	19-	31-	- - -
W2FPL	1694-	11-	14-	B-21
W2ALO	1540-	20-	26-	B-62
W2LJD	1408-	16-	30-	B-33
W2CVM	1401-	19-	23-	B-17
W2FLG	1350-	18-	25-	- - -
W2FSN	1248-	16-	26-	A-14
W2CW	1242-	18-	23-	A- -
W2FMP	1083-	19-	19-	C-19
W2EYZ	1056-	16-	22-	B- -
W2EWM	1008-	16-	21-	B-11
W2BUF	756-	14-	18-	B-16
W2LXI	720-	12-	20-	- -16
W2DFV	710-	10-	24-	B-16
W2JPV	675-	15-	15-	B- -
W2KNN	644-	14-	16-	A-35
W2GRG*	468-	13-	14-	C-17
W2IB	450-	10-	15-	B- 9
W2QP	270-	9-	10-	C-10
W2KZJ*	243-	9-	9-	B- -
W2CJX*	234-	6-	13-	- - -
W2LJR	147-	7-	7-	A- -
W2JDC*	133-	7-	7-	A- 3
W2JIY	120-	5-	8-	B- 8
W2GER*	108-	4-	9-	- - -
W2CQW	27-	3-	3-	- - -
W2JSS	18-	2-	3-	A- 3
W2KEG	12-	2-	2-	B- 2

MIDWEST DIVISION

Iowa

W9GKS	7956-	39-	68-	B-54
W9EMS	6303-	33-	64-	B-67
W9QLX	4089-	29-	47-	B-30
W9CDT	2575-	25-	35-	B-24
W9LDH	1764-	21-	28-	B-30
W9DIB	1209-	13-	32-	B-46
W9NTA	1080-	18-	20-	B-42
W9QVZ	360-	8-	15-	B-12
W9HLZ	288-	8-	12-	- - -
W9ARE	240-	15-	16-	B- 6
W9QVA	90-	5-	6-	A- 7

Kansas

W9CWW	39672-	88-	152-	C-78
W9UQV	9198-	42-	73-	A-26
W9VBQ	4725-	35-	45-	B-33
W9AWP	3782-	31-	41-	B-20
W9WCB	1953-	21-	31-	- -39
W9YAH	72-	4-	6-	A- -
W9MKU	18-	2-	3-	B- 8
W9CVL*	3-	1-	1-	- - -

Missouri

W9TJ	158440-	170-	318-	C-82
W9NNZ	26772-	69-	130-	C-78
W9DAE	11907-	49-	81-	C-31
W9BMM	11178-	46-	81-	- - -
W9LBB	4464-	31-	48-	B-45
W9WCM	4176-	29-	48-	B-41
W9TPH	1200-	16-	25-	B-23
W9DHN	810-	15-	18-	A-32
W9CTR*	231-	7-	11-	- - -
W9HIC	210-	7-	10-	B- 9
W9FFR	125-	5-	9-	B- 9
W9EYM	105-	5-	7-	- - -
W9QMD	75-	5-	5-	A-16

Nebraska

W9BBS	13570-	50-	91-	C-64
W9QUJ	4890-	30-	55-	B-66
W9AZT	1998-	18-	37-	B-33
W9ASO	1632-	17-	32-	A-21
W9ZNA*	1280-	16-	28-	- - -
W9WGL	1260-	15-	28-	C-23
W9MGV	1173-	17-	24-	B-18
W9ZRP	1040-	16-	22-	A-14
W9RQS	528-	11-	16-	B-18
W9UBN*	56-	4-	5-	B-13
W9GDB	12-	2-	2-	A- 2

NEW ENGLAND DIVISION

Connecticut

W1NI	53770-	95-	189-	C-89
W1FTR	48944-	92-	178-	B-75
W1APA	29452-	74-	135-	AC-54
W1AB	19320-	70-	92-	C-61
W1AFG	14994-	51-	98-	A-81[8]
W1FVF	13104-	52-	84-	B-49
W1CSC	7215-	37-	65-	B-34
W1BIH	7068-	38-	63-	B-50
W1DHT	3861-	27-	48-	C-31[7]
W1CUH	3350-	25-	46-	B-51
W1ZL	3276-	28-	39-	A-26
W1BYW	2028-	26-	27-	B-31
W1BQL*	1766-	22-	29-	- -21
W1JUD	1760-	20-	30-	A- -[8]
W1JHV	1720-	20-	29-	B-20
W1GVK	1560-	20-	26-	- - -
W1FUY*	1216-	16-	26-	B- -
W1AVB	1170-	18-	22-	- -24
W1CEJ	1104-	16-	24-	B-26
W1DOV	945-	15-	21-	B-25
W1BTU	*900-*	*15-*	*20-*	*B-16*
W1GVV	702-	13-	18-	C-15
W1BHM	200-	10-	10-	B- 5
W1ACV	189-	7-	9-	B- -
W1KGX	72-	4-	6-	A-12
W1JJR	48-	4-	4-	B- 5
W1KDQ*	1-	1-	1-	- - -
W1SZ	129735-	155-	279-	C-89[9]
W1TS	91500-	125-	244-	B-87[9]
W1JPE	51975-	105-	165-	C-50[9]
W1JTD	10125-	45-	75-	B-45[9]
W1EH	645-	15-	16-	- - -[9]

Maine

W1IK	22320-	62-	120-	AB-85
W1BFA	18582-	57-	113-	B-52
W1GKJ	5088-	32-	53-	A-72
W1ACW	2952-	24-	42-	B-49
W1BPY	1125-	15-	25-	B-10
W1DHH	301-	7-	16-	B- -

E. Massachusetts

W1TW	107730-	133-	272-	B-79
W1KHE	99148-	124-	268-	C-90
W1CBZ	86037-	119-	241-	B-83
W1ME	72927-	111-	219-	B-67
W1ICA	45030-	95-	158-	A-78
W1RY	39249-	89-	150-	B-54
W1GLF	34730-	80-	145-	B-82
W1DMA	32631-	73-	149-	B-84
W1JEA	11745-	45-	88-	B-45
W1HX	9372-	73-	44-	B-50
W1WV	7913-	41-	66-	B-59
W1CAA	7425-	33-	78-	- - -
W1AQT	6480-	36-	60-	B-42
W1BFR	6120-	36-	57-	B-52
W1EHT	2783-	23-	41-	B-41
W1BEV	2610-	22-	40-	C-22[10]
W1LOK	2576-	23-	38-	B-47
W1KCQ	1800-	20-	32-	B-22
W1JNV	1470-	14-	35-	C-25
W1KGH	1140-	15-	26-	B-23
W1IQ	829-	13-	21-	- - -
W1DGA	624-	13-	16-	A-26
W1AJL*	576-	12-	16-	- - -
W1ICI*	576-	12-	16-	- - -
W1IVX	184-	8-	9-	- - 8
W1IBF	126-	6-	7-	B- 4
W1HVR	90-	5-	6-	A- 6
W1BB	60-	4-	5-	- - 3
W1ZI*	60-	4-	5-	- - -
W1DTP*	12-	2-	2-	- - -
W1HLX*	12-	2-	2-	A- -
W1LRO	3-	1-	1-	- - 2

W. Massachusetts

W1AVK	76812-	111-	232-	C-90
W1IOZ	57915-	99-	195-	C-85
W1BGY	35313-	79-	149-	B-78
W1JLT	18720-	60-	104-	B-52
W1BPN	15576-	59-	88-	B-68
W1COI	11858-	49-	78-	AB-47
W1FFK	6552-	39-	56-	A-56
W1IKT	3146-	28-	41-	A-47
W1IEI	1242-	18-	23-	C-25
W1AZW	1120-	16-	24-	A-17
W1RB*	243-	9-	9-	B- -
W1HRV	27-	3-	3-	- - -

New Hampshire

W1BFT	31590-	81-	130-	B-64
W1AQX	7455-	35-	71-	B-53
W1IVU	5814-	34-	57-	C-45
W1FTJ	2346-	23-	34-	B-18
W1ET	1407-	21-	23-	B- -[11]
W1DUK*	396-	11-	12-	AB- -

Rhode Island

W1BDS	6880-	40-	58-	B-27
W1GBO	3645-	27-	45-	B-25
W1KIV	420-	10-	14-	B- 4
W1HRC*	72-	4-	6-	B- -
W1LFB*	3-	1-	1-	- - -

Vermont

W1EZ	40120-	85-	158-	B-73
W1JVS	21886-	62-	119-	B-79
W1JXS	350-	10-	12-	A- 8

NORTHWESTERN DIVISION

Idaho

W7ACD	18000-	45-	133-	B-51
W7GDU/7	5280-	32-	56-	B-59

Montana

W7EOI	16740-	54-	104-	BC-57
W7EC	5797-	31-	63-	B-74
W7GBI	4588-	41-	49-	B-57
W7HFZ	3276-	26-	42-	B-26
W7EWR	405-	9-	15-	B-11
W7JC	105-	5-	7-	B- 6
W7GLM	81-	3-	9-	A- 7
W7HCV	69-	3-	8-	A-32
W7FMV	36-	3-	4-	A-10

(Continued on page 82)

HOW WOULD YOU DO IT?

HOMEMADE QSL'S BY PHOTOGRAPHIC PROCESS

A GOOD many solutions to problem No. 29 were received. Unfortunately, available space permits publishing only a small portion of the many ideas presented. Those which follow are representative, however.

—•••—

I think one of the easiest and most economical ways to make QSL cards by the photographic method is by the use of a paper negative which does not require the use of a camera.

We shall take it for granted that at one time or another Our Hero has had some QSL cards printed and is satisfied with the design. If he has not, he can make a pattern of the desired layout

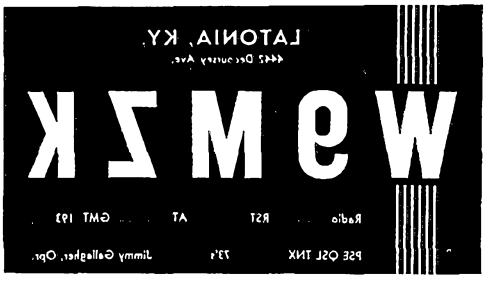


Fig. 1 — W9MZK's paper negative made from printed original.

on a post-card size piece of draftsman's tracing cloth or paper.

In processing, place the sensitized paper on a table with the emulsion side up and place the printed QSL card or tracing, face down, directly on top of the sensitized paper. Next, place a sheet of glass on top of both cards and weigh down at the edges to insure good contact between the card and the paper. The time of exposure depends on the size of the printing light, the distance of light from sensitized paper and thickness of stock from which the original printed card was made and can be determined only by experiment.

After developing, we now have a paper negative. (See Fig. 1.) To make a positive or finished QSL card, we follow the same procedure as in making the negative except that the negative is used in the position previously occupied by the printed card. After the proper exposure time has been found, we can eliminate all guess work and make a perfect card every time. If we do not have the printed card to start with, or if we want a variation in design, we can piece sections of QSL-card samples and hold the sections together with "scotch" tape. The samples must have printing on one side only.

—*James A. Gallagher, W9MZK*

—•••—

Since the problem states that the cards must be made by the single-exposure contact-print method, we must work on the hypothesis that Our Hero understands enough elementary dark-room photography to make contact prints from a negative without further instruction. We shall, therefore, endeavor to provide him with a negative.

With the aid of the inexpensive camera, Our Hero takes such pictures of his equipment, shack, operator, YL, etc., as he may wish to incorporate in his finished card. The resulting prints are then cropped with a razor blade or other sharp tool so that the pictures or sections of same may be arranged to form a standard-size QSL card. The arrangement, of course, is subject to the desires of Our Hero. The components are then cemented to a QSL card or similar backing with rubber cement, or similar good adhesive, to form a flat, smooth, neat "master card." Data spaces may be hand lettered or typed. The entire card should be in black and white rather than in colors for best results.

Our Hero then retires to his dark room. A sheet of single-weight photo printing paper of high contrast is placed emulsion-side down over the master card. The two are held tightly together by means of a heavy sheet of clear glass or in a printing frame if available. He then exposes *through* the back of the contact paper. The light source should be kept in motion at a uniform distance from the paper to assure even exposure of the entire sheet. (If a diffusing-type glass is used, this is unnecessary.) The paper is then developed and fixed in the usual manner. A dark print of high contrast is desirable.

The "print" obtained is the master negative from which any number of contacts may be made. Printing should always be done with the emulsion sides of negative and paper tightly in contact. Exposure should be through the paper negative in the usual manner. A standard post-card paper with semi-matte surface should be suitable for prints since this can be written upon.

The negative should be made on Eastman No. 961 negative paper, while Azo No. 4 is recommended for the prints. It will be noted that colored backgrounds are not so satisfactory, since the negative is made with reflected light. Due to the variation in the coefficients of reflection of

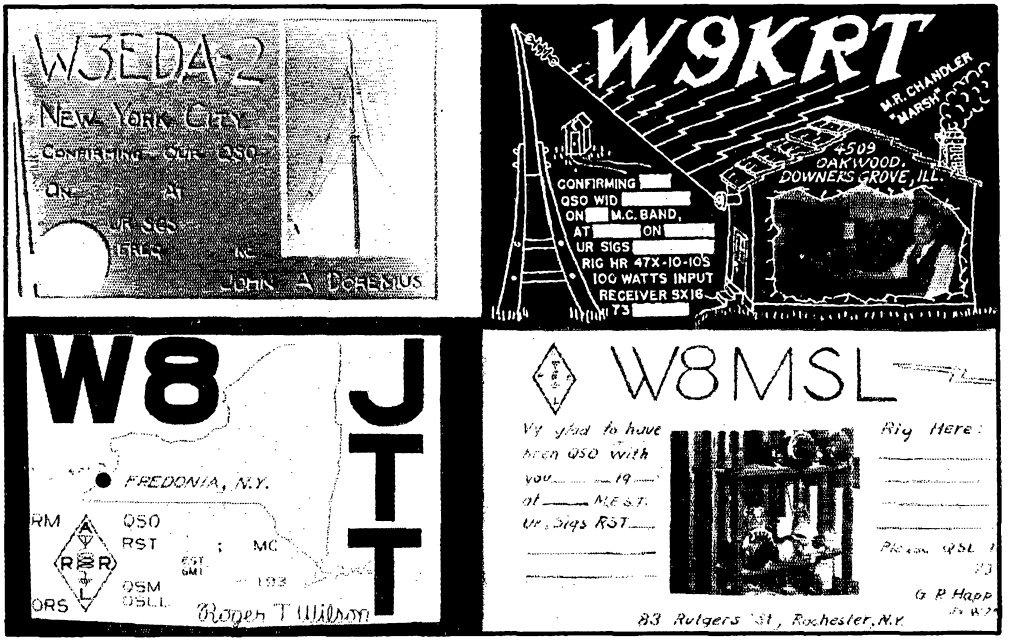


Fig. 2 — Upper left — W3EDA's finished card which is the result of printing through off-set positive and negative films. Upper right — Finished card made by W9ASF from tracing-paper negative with photo-negative insert. Lower left — W8JTT's card made by process similar to that described by W4CNY. Lower right — W8MSL's card made by same process with photo insert.

various colors, sufficient contrast is not always possible.

For prints of greater gradation than possible with the above method, we suggest that Our Hero use an inexpensive portrait lens on his camera and photograph his master card. The resultant negative can be enlarged by most photographic finishing establishments, for a nominal sum, to a negative of desired size. Or, he may take his master card to the same place and have a "copy negative" of the desired size made for a reasonable sum. In either case, the final prints are made in the usual manner.

— *F. Eugene Young, W2EBK*

This describes a system of making photographic QSL cards which might find fancy among the more-advanced ham photographers. Our Hero first draws his design in pencil rather roughly on a piece of white paper, leaving space for a photograph if he desires. Then he lays a piece of draftsman's tracing paper on top and traces the design using black India ink. He must remember to make his original design just the size of the finished card. The photo negative, if used, may be fastened to the paper negative with "scotch" tape in small, thin strips or by slotting the paper as was done in our case.

(Continued on page 118)

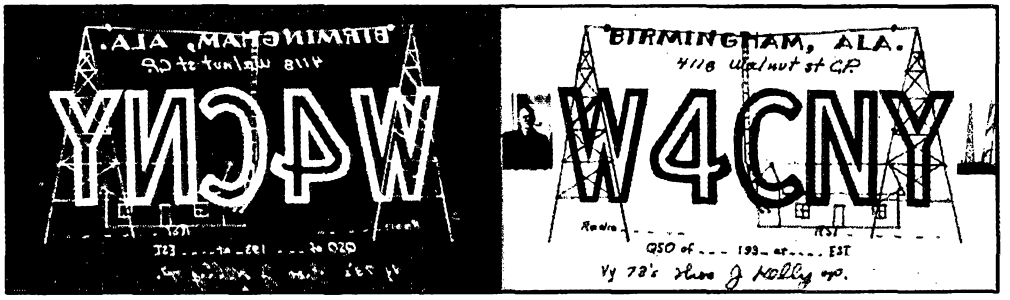


Fig. 3 — W4CNY's negative to left prepared by printing tracing on film and finished card printed from negative after inserting photo negatives.

★ I. A. R. U. NEWS ★

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

Headquarters Society: THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

MEMBER SOCIETIES

American Radio Relay League
Asociatia Amatorilor Romani de Unde Scurte
Associazione Radiotecnica Italiana
Canadian Section A.R.R.L.
Ceskoslovenstí Amatéri Vysilaci
Deutscher Amateur Sende-und-Empfangs Dienst
Eesti Raadio Amatooride Uhing
Experimental Radio Society of Egypt
Experimenterende Danske Radioamatorer
Federation des Emetteurs Belges
Irish Radio Transmitters Society
日本アマチュア無線聯盟 Japan
Liga Colombiana de Radio Aficionados
Liga Mexicana de Radio Experimentadores
Magyar Rövidhullámu Amatőrök Országos Egyesülete
Nederlandsche Vereeniging voor Internationaal Radioamateurisme
Nederlandsch-Indische Vereeniging Voor Internationaal Radioamateurisme
Newfoundland Amateur Radio Association
New Zealand Association of Radio Transmitters
Norsk Radio Relæ Liga
Polski Zwiasek Krotkofalowcow
Radio Club de Cuba
Radio Club Venezolano
Radio Society of Great Britain
Rede dos Emissores Portugueses
Reseau des Emetteurs Français
Reseau Luxembourgeois des Amateurs d'Ondes Courtes
South African Radio Relay League
Suomen Radioamatööriliitto r.y.
Sveriges Sandareamatorer
Unión de Radioemisores Españoles
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia

7-MC. BROADCASTING

IN various countries, revised amateur frequency assignments are being announced, most of them effective September 1st when the Cairo treaty takes effect. In France and Switzerland, the amateur assignment in the 40-meter band is being reduced to 7000-7200 kc. Thus in those countries amateurs will lose the use of the portion of the band to be internationally shared with broadcasting. Curtailment of amateur operation on 7 Mc. is also expected in Australia. From Estonia, on the other hand, comes the welcome assurance that "our administration does not intend to put stations in this region . . . nor does our administration intend to discontinue amateur assignments in this region". In Egypt, so far as SU amateurs know, the authorities have not indicated their intention of using these frequencies, although it is understood that the government intends to put up a short-wave station for broadcasting to Arabian countries. However, Egyptian amateurs are allowed only the use of 7100-7200 kc., the first 100 kc. at each end being a buffer band restriction imposed by the government and in effect some time.

NEW ZEALAND CALLS

THE time has now come when the two-letter calls being allotted in the second district of New Zealand have been exhausted. A conference between the Post and Telegraph Department and the N.Z.A.R.T. resulted in a decision to assign the prefix "ZL7" to any new licensees in the present second district, rather than use a three-letter call system. It should be noted, particularly with respect to contests and awards, that "ZL7" will not constitute a new district in New Zealand, but will be exactly the same as "ZL2."

AUSTRIA

THROUGH U.S. Department of Commerce channels, we have the following report from the German Ministry of Propaganda:

"Most of the former Austrian amateur radio operators have again received their broadcasting licenses. The Austrian amateur union was consolidated with the German national union, the D.A.S.D. Operating licenses for amateurs in the Sudentengau will be issued in the near future. Amateur broadcast within the Reich Protectorate Bohemia-Moravia falls under the competency of the Reich Protector, respectively of the Czech postal administration. To our knowledge all Czech amateurs have received back their short-wave broadcasting sets."

VK-ZL DX CONTEST

THE rules for the 1939 VK-ZL Contest, this year under the supervision of the N.Z.A.R.T., are essentially the same as those appearing in the September, 1938 issue of *QST*, so we will not repeat them in their entirety but merely point out the major changes and additions. The dates for the senior contest are September 30th–October 1st, and October 7th–8th. The junior contest will be held October 21st–22nd, and 28th–29th. Rule No. 10 has been greatly changed, and we quote it below:

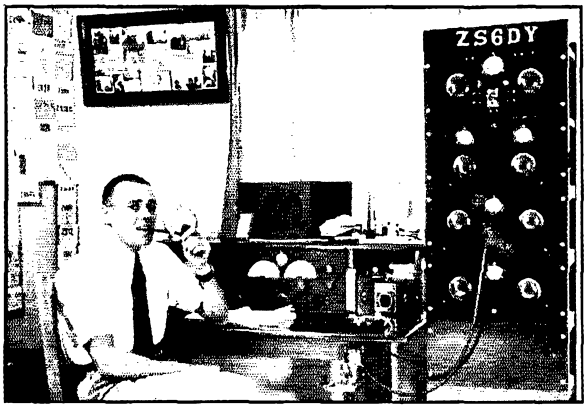
"Scoring by competitors beyond VK-ZL. 50 points will be scored for the first contact with a VK-ZL zone, 45 for the second, 40 for the third and so on in steps of five points until the tenth station worked in that zone will count five points. Thus the first ten stations worked in any particular zone will score 275 points. Thereafter, each additional station worked in that zone will count five points. The points scored in the above manner will be added and the total multiplied by the total number of prefix zones worked on all bands. Prefix zones are VK2, 3, 4, 5, 6, 7, 8, 9, and ZL1, 2, 3, 4."

Two new cups, in honor of the New Zealand Centennial, are to be awarded this year. Rule 15, governing the awarding of these cups, follows:

"Scoring for these cups will be by means of one point for every complete 1000 miles great circle distance separating the stations in contact. Thus: for a contact with a station 7300 miles distant, great circle distance, from Wellington, N.Z., the ZL2 station would be awarded 7 points while the other station would be awarded a similar score. The total score gained by this method is to be multiplied by the number of countries worked as set out in Rule 10 for competitors outside VK-ZL.

"In view of the difficulty certain competitors may experience in calculating great circle distances, it is suggested that the points column for this section of the contest be left blank, and it will then be filled in by the Contest Committee."

All overseas logs must reach the Contest Committee, N.Z.A.R.T., P. O. Box 691, Christchurch, N. Z., not later than December 31st, 1939.



ZS6DY, C. E. Lowe, Johannesburg, who helped the *Pang Jin* (see page 13) out of one jam, is second South African WAS. The transmitter line-up is 6L6–807–p.p.20s, with 6L6 modulators.

JAMAICA RESCUE

THE newly-organized Jamaica Amateur Radio Club distinguished itself by its participation in a widespread search for five young school boys lost in the Blue Mountains. The club, using portable VP5BM by special permission of the government, and with volunteered emergency equipment, set up several communication circuits to keep the various searching parties in touch with each other and the home base. After two days of diligent work, the boys were found alive although greatly weakened, reached first by the radio scouting party under the direction of club president E. Metcalfe. Another feather in amateur radio's cap!

GLEANINGS

Netherlands: PA0KT, using a 30-line (Baird System) television transmitter on 76 meters, is making television broadcasts regularly from 6:40–8:10 a.m. GT each Sunday morning. . . . An N.V.I.R. goodwill test, to make as many QSOs as possible with other Dutch stations, will be held on the 80 meter band during one weekend in October. . . . Dutch amateurs staged a 5 meter relay test on August 26th and 27th. ***South Africa:*** S.A.R.R.L. members, again showing their public service consciousness, recently cooperated with the Johannesburg police in relaying important traffic concerning a murder. The police were unable to get through by commercial wire circuits, but amateurs did the job. . . . The League has persuaded their P.M.G. office to discontinue the requirement that a licensed amateur pay a fee for a B.C. receiver in his car in addition to his amateur license fee. ***Norway:*** The N.R.R.L. has completed its central transmitter, LA1C, at Notodden. This station, which comprises two complete transmitters and standby equipment, sends regular broadcasts to amateurs. ***Palestine:*** For purely private reasons, ZC6RL is discontinuing his amateur activity. He says that, to the best of his knowledge, he has QSL'ed all contacts, so if you worked him and did not receive a card, drop him a note.

QSL BUREAUS

FOLLOWING is the latest revised list of foreign QSL Bureaus to which QSL cards may be sent for distribution. Most of these bureaus refuse to handle SWL cards and reports, and therefore listener reports should be sent directly to the station.

Alaska: Jerry McKinley, Box 1533, Juneau
Antigua: A. Tibbits, Box 43, St. John's
Argentine: Radio Club del Argentina, Rividavia 2170, Buenos Aires
Australia: Ray Jones, 23 Landale Street, Boxhill, Victoria
Bahamas: M. D. Russell, P. O. Box 374, Nassau
Barbados: *see* Antigua
Belgium: Baronne Bonaert de la Roche, ON4HM, Chateau de Marchiennes, Harvengt nr. Mons
Bermuda: Alfred E. Redman, Coney Island, St. George's
Bolivia: Henry E. J. Smith, c/o Standard Oil Co. of Bolivia, La Paz
Borneo: *see* Malaya
Brazil: L.A.B.R.E., Caixa Postal 2353, Rio de Janeiro
British Guiana: *see* Antigua
British Honduras: D. Hunter, Box 178, Belize
Canal Zone: *Norman Miller, 15th Air Base Squadron,* Albrook Field
Ceylon: Radio Club of Ceylon and South India, P. O. Box 282, Colombo
Chile: *Luis M. Desmaris, Casilla 761, Santiago*
China: I.A.R.A.C., Box 685, Shanghai
Colombia: L.C.R.A., Apartado 330, Bogota
Costa Rica: Federico Gonzalez, Box 384, San Jose
Cuba: Adolfo Dominguez, Milagros 66A, Vibora, Habana
Curacao: care A.R.R.L.
Czechoslovakia: C.A.V., Post Box 69, Praha I
Denmark: E.D.R. Postbox 79, Copenhagen
Dominican Republic: H. H. Gosling, Calle Cesar Nicolas Penson, Ciudad Trujillo
Ecuador: Carlos Cordovez, Box 30, Rio Bamba
Egypt: F. H. Pettitt, Catholic Club, Mustapha Barracks, Alexandria
England: R.S.G.B., 53 Victoria St., London, S.W.1

(Continued on page 98)

KEYING E.C. OSCILLATORS

HAVING built the e.c.o. described by Browning and Tilton in *QST* for July 1938, I encountered trouble in keying the oscillator for break-in work. Since many others have undoubtedly built the same unit, the simple change I made should be of interest. The original circuit is shown in Fig. 1 A, while the revised circuit is shown at B. With the original circuit, the short-circuiting of the blocking condenser apparently changed the tuning sufficiently to cause a very

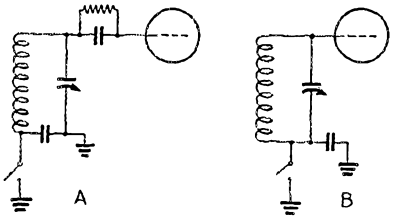


Fig. 1 — Removing the blocking condenser from the tuned circuit eliminated keying chirps for W9UUH in using the Browning e.c.o. B shows the revised circuit.

decided chirp. Even the difference in lengths of the paths between the base and the dot and dash contacts of my bug was sufficient to cause a noticeable difference in frequency. With the revised circuit, all of these difficulties were eliminated and the unit keys very well. The change requires insulating the tuning condenser from ground.

— *Lafe H. Rees, W9UUH*

In the circuit shown in Fig. 2, an old anti-blinking scheme is used by W. Wallace, W9EYH, to keep the plate voltage constant while keying his e.c.o. A variable cathode resistor in the 6L6 buffer stage is adjusted so that the total current read by the meter is the same with key open or closed. The load remaining constant, the voltage also remains constant under both conditions. Since the total current is between 45 and 50 ma., the 6L6 buffer need dissipate only about 12 watts which is well within rating.

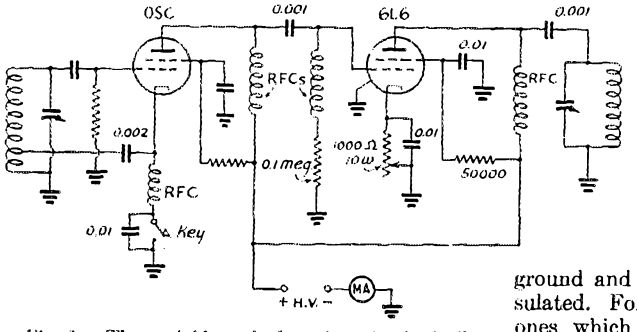


Fig. 2 — The variable cathode resistor in the buffer stage may be adjusted to keep the plate voltage constant while keying in W9EYH's e.c.o.

GROUNDING POSITIVE HIGH VOLTAGE FOR SAFETY

THE desire to "switch to safety" and to build a cheap r.f. amplifier led me to adopt the circuit shown in Fig. 3 A. Although the idea is not new, I think it deserves much more consideration than has been given. Comparison with the orthodox circuit of B will show that the *positive* terminal of the high-voltage plate supply is grounded instead of the negative terminal. While this involves certain problems, they are not insurmountable and are brought about chiefly because the design of commercially produced components have been based upon the grounded-negative circuit. When the two circuits are compared, the advantages of the grounded-positive version are quite apparent. Almost without exception, those parts of the circuit which are normally exposed and sources of danger in the grounded-negative circuit are grounded and, therefore, harmless in the grounded-positive circuit. The tank coils, tank condensers, plate-circuit milliammeter, tube plate terminal and filter chokes are at ground potential and the adjusting shaft of the neutralizing condenser is also grounded. Another advantage is that no difference of d.c. potential exists between the rotors and stators of the split-stator condenser and, therefore, a tank condenser with sufficient spacing to withstand the peak r.f. voltage only is required.

On the other hand, the filament and d.c. grid circuits are at high d.c. potential in respect to the chassis or ground and these circuits must be suitably insulated. Fortunately, these portions are the ones which are usually hardly accessible to accidental contact. The filament by-pass condensers must have a voltage rating somewhat

greater than the plate voltage used. The same sort of insulation is required between the primary and secondary windings of the filament transformer. All components of the bias supply must also be well-insulated from ground including the

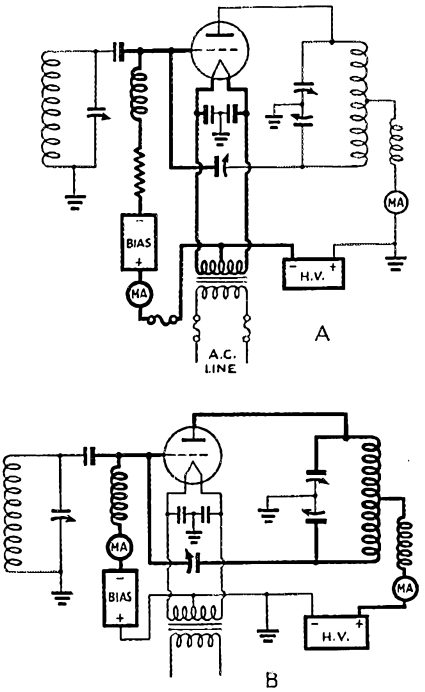


Fig. 3 — Grounding the positive high-voltage terminal instead of the negative terminal places most of the exposed portions of the circuit at ground potential, while less exposed portions are at high d.c. potential above ground. Heavy lines indicate high potential points of the usual arrangement at B and the grounded-positive arrangement at A. See text for precautions in using.

rectifier filament and plate-transformer secondaries. Batteries might be used for low-voltage, high-mu tubes but they must be placed at an inaccessible point and have well-insulated mountings. The grid coupling condenser must withstand the sum of grid and plate voltages. Some of these difficulties may be avoided by obtaining the biasing voltage from a voltage divider across the plate-voltage supply, connecting the grid return to the negative high-voltage terminal and filament center tap at an appropriate point on the divider. With high-mu tubes, the sacrifice in plate voltage will usually not be appreciable.

— *Arpard A. Fazakas, W2FLT*

CRYSTAL FILTER FOR 'PHONE WORK

I RECENTLY built a receiver here using a regenerative preselector, regenerative first detector and one stage of 456-kc. i.f. The receiver had very good sensitivity and output but lacked

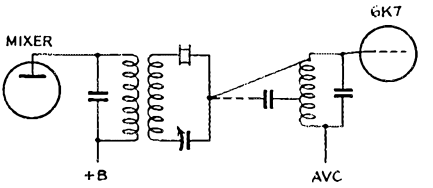


Fig. 4 — Broadening crystal filter for 'phone work. The coupling connection is shifted from the center tap to the grid.

selectivity on the crowded 20-meter 'phone band. So, I purchased a Meissner crystal-filter unit and installed a second i.f. tube, a 6K7. It was found that the selectivity for c.w. was perfect but very much too sharp for understandable 'phone work. A variable condenser across the input coil of the crystal bridge helped only very little. I checked December 1938 *QST* article by D. K. Oram and decided that I would try that circuit. I removed the tap from the crystal to center of the i.f. grid input coil and connected a wire directly to grid of the i.f. stage. I found that this connection gives just about the right amount of selectivity for 'phone use with good discrimination and understandable quality. Circuit change is shown in Fig. 4.

— *W. S. Davis, W6VS*

POWER-SUPPLY KINKS

I AM building a new transmitter and have included a few kinks I have not seen published so far, which I would like to pass along to the gang.

First, I had installed filament transformer with a winding for 5v. 3a. I decided to use 866 Jr's, so used the circuit shown in Fig. 5 A.

Next, my bias-supply transformer put out 220 and 110 volts each side of center tap. I used two sockets for the rectifier tube, one connected to each voltage so bias voltage could be changed by placing the rectifier tube in either socket. The circuit is shown at B.

The circuit shown at C was used for the 110-v. a.c. line to the low-voltage and high-voltage plate-transformer primaries. S_1 is the main control switch. With S_2 open and S_3 closed, both high and low voltages are reduced while the exciter is being tuned up. With S_2 closed and S_3 open, the low-voltage supply operates normally, while the high voltage remains reduced for tuning. With both switches closed, both high- and low-voltage supplies operate normally. With S_2 and S_3 both open, the low-voltage supply is turned off while the high voltage is reduced. This position has no particular use except possibly to test the final amplifier in case of trouble. The amount of voltage reduction may be controlled by the size of series lamp used. A 150-watt lamp will usually be about right for most installations and will prevent damage to tubes in the final amplifier even

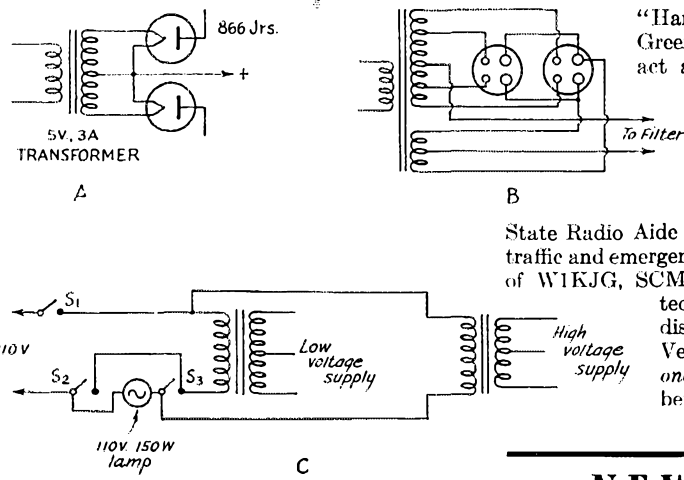


Fig. 5 — Power-supply kinks. A — Operating 866 Jr's from 5v., 3a. transformer. B — Changing voltage by changing rectifier-tube sockets with dual-voltage secondary transformer. C — Plate-voltage control system.

though the stage is operated off tune for considerable lengths of time.

— *Myron Lawson, W9BQZ*

Midwest Division Convention

Des Moines, Iowa, October 20th–21st

THE 1939 Midwest Division A.R.R.L. Convention will be held in Des Moines, Iowa, Friday and Saturday, October 20th and 21st, at the Hotel Fort Des Moines. As in the past, the Des Moines Radio Amateur's Association will be host to amateurs of the Midwest Division. The convention committee has made every effort to make this affair an outstanding success, and one to be long remembered by those attending. A program consisting of talks and demonstrations by well known speakers; A.R.R.L. forum, A.A.R.S. and N.C.R. meetings, Wouff Hong initiation, equipment displays, special events for the ladies, prizes and a banquet have been prepared. Registration begins at 10:00 A.M. Friday morning at Hotel Fort Des Moines. Those registering before October 18th will be eligible to draw for a special pre-registration prize. Tickets are $3.00 for OMs and $2.00 for ladies, and include the entire convention activities. Send registration to L. H. Larson, W9URK, 3510 Wright Street, Des Moines, Iowa.

Vermont State Convention

(New England Division)

Rutland, Vermont, October 14th

THE Bardwell Hotel at Rutland, Vermont, Saturday, October 14th, will be the Mecca for all "Hams" and their YL's, where the Green Mountain Radio Club will act as host. The program begins with registration at 12:00 o'clock noon followed with varied entertainment for the ladies; A.A.R.S. meeting to be conducted by R. C. Teachout, WLGU-W1FSV, State Radio Aide for Vermont; 'phone meeting; traffic and emergency meeting under the guidance of W1KJG, SCM for Vermont; code contests; technical talks and manufacturers' display. The banquet will be a Vermont turkey dinner *with seconds!* A floor show will be put on between courses and there will be

(*Continued on page 102*)

★ NEW TUBES ★

TAYLOR TW-150

THE Taylor TW-150 is the first transmitting tube to use the new thin-wall carbon plate. This plate is cup-like in shape and is turned out from a solid block of carbon to a thickness of 0.015 inches. The light weight of the plate makes a relatively high-capacity supporting structure unnecessary and, volume being reduced, there is less danger of occluded gas. The tube is a high-power triode.

The tentative ratings of the TW-150 follow:

Maximum plate voltage	3000
Maximum plate current	200 ma.
Maximum rectified grid current	60 ma.
Plate dissipation	150 w.
Amplification factor	35

Typical Operation — Class C Telegraphy

Plate volts (d.c.)	2000	2500	3000
Plate current (d.c.)	200 ma.	200 ma.	200 ma.
Grid current (d.c.)	46 ma.	45 ma.	45 ma.
Grid bias volts (d.c.) *	— 92	— 120	— 173
Grid volts (peak a.c.)	322	350	411
Plate dissipation (watts)	112	127	135
Power output (watts)	288	373	465
Plate efficiency (%)	72	74.5	77.5
Plate angle (degrees)	165	160	150
Driving power (watts)	13.35	14.25	16.75

Class C Telephony

Plate volts (d.c.)	2000	2500	3000
Plate current (ma. d.c.)	200	185	165
Grid current (ma. d.c.)	46	43	40
Grid bias (volts d.c.) *	— 142	— 195	— 257
Grid volts (a.c. peak)	379	430	487
Plate dissipation (watts)	103	101	95
Power output	297	361	400
Plate efficiency (%)	74.25	78	80.75
Plate angle (degrees)	150	140	130
Grid driving power (watts)	15.7	16.9	17.3
Plate volts	2000	2500	3000
Battery bias (volts)	60	75	90
Grid leak (ohms)	1775	2740	4225

— *D. H. M.*

* Bias should be secured from combination of battery, or power pack, and grid leak.

CORRESPONDENCE FROM MEMBERS

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

SOS HOAXER DENOUNCED

1290 20th Ave., San Francisco, Calif.

Editor, *QST:*

The enclosed newspaper item [concerning the hoax SOS call off the Florida coast August 2nd] is self-explanatory and it certainly caused my old thermometer to explode with super violence. I sincerely feel that this item and comment should be published in *QST* for the object lesson and perhaps an angle on the public relations situation.

It is alleged to be the prank of some amateur. But it hurts all of us interested in our grand old hobby. While every fraternity has among its membership some rather neurotic individuals, nothing but a person devoid of all intellect could be guilty of such an alleged prank.

If any amateur has any knowledge of this affair, and was a party to it, I feel that the League should assist in the prosecution, if the violator is apprehended. Those of us interested, know that amateur radio suffers from enough adverse criticisms without becoming involved in the violation of international laws and treaties.

It is to be hoped that when and if the person or persons are found that it clears the amateur fraternity.

— *J. R. Wells, W6QL ex-KA1QL*

EDITOR'S NOTE: Any thinking amateur would most emphatically aid in the apprehension and prosecution of such a hoaxer if opportunity offered. Concerning the public relations angle, it is gratifying to note that, outside of the initial dispatch, which originated in Florida and apparently was not edited by the New York AP office, all newspaper and radio services coöperated in avoiding references to an "amateur" in connection with the hoax. This indicates that A.R.R.L.'s long campaign with the press services to preserve the distinction between radio's licensed amateurs and the customary broad application of the term is succeeding. Much can be done to aid this campaign by local amateurs and clubs by informing local news agencies in detail concerning amateur radio.

CQ DX—BUT WHAT DX??

Blue Bell, Pa.

Editor, *QST:*

This means one thing to you and quite another to me, and location seems to be the factor, aside from momentary interest.

Often operators are heard crabbing that others will not answer them, undoubtedly for reasons of their own, but which they did not indicate when calling CQ DX.

If directional calls are useful, as all will agree, how about a set of signals by which the DX hunter can indicate the inner limits of his quest?

The shorter such a call, theoretically, the greater the possible number of contacts in a given time, such as as a contest.

CQ DX is cumbersome to one who is trying to "pack them in." How about dropping the "DX" part of the call and add one digit to the "CQ" to indicate in thousands of miles the radius within which don't bother to reply?

CQ W5 would be, of course, a directional call, while CQ5 would mean, "Don't answer closer than 5000 miles."

The scale would then be:

CQ — no limitations
CQ1 — beyond 1000 miles
CQ2 — beyond 2000 miles
etc.

There would be little reason to go beyond CQ9 from the average ham's point of view!

— *John B. Morgan, W3QP*

MOVIES

142 Cortland St., Groton, N. Y

Editor, *QST:*

I recently saw a movie short entitled "Radio Hams." Many people in this town saw that picture and I think there is a much better understanding of amateur radio in this community.

This picture shows the help that amateur radio has given during emergencies. I certainly hope that more of these short subjects concerning amateur radio will be produced.

I wish to urge every amateur to see his local theater manager and find when this picture will be shown and not only see it yourself but tell all your friends so that the general public will get a better understanding of amateur radio.

— *Stanley H. Kenyon, W8SVC*

Harlingen, Texas

Editor, *QST:*

I have recently written Columbia Picture Studios on their excellent presentation of ham radio as evidenced in their late motion picture entitled "Grand Jury Secrets."

I advise every ham that has the opportunity to see this picture if possible, because it is refreshing to see at last an accurate picture concerning amateur radio. All that I have viewed before have been detrimental rather than educational, as they should be in order to improve our public relations.

I believe it would be a good idea, after seeing this picture, to write Columbia Picture Studios and thank them as such encouragement might result in similar efforts in the future.

— *H. H. Bowers, Jr., W5EWZ*

HIGH POWER—WHY NOT?

58 W. Cambridge, Phoenix, Ariz.

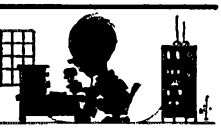
Editor, *QST:*

My pet peeves are the boys who say, "There should be a law against high power and the swishing e.c.o."

In the first place, the reason the boys don't like high power is because they can't have high power for themselves or, at least, they think they can't. It takes no more money to build a simple kw. than an elaborate 100- to 200-watt low-power rig. I know quite a few men who make a so-called living wage and have nearly always had a kw. or high-power rig on the air. Next, the boys will say it isn't sporting to have a high power station when hams all around have low power. Well, amateur radio is a competitive sport, which is plainly evident by the various contests offered by the A.R.R.L. The meaning of competitive sport is, "Try to go your competitor one better in speed, class, style, and anything else you can do." And if it isn't sporting to have a kw. on the air then W1AW should be torn up as a monument to low power because the A.R.R.L. is the essence of the amateur spirit. You will have more confidence if you have high power, for as in business you feel better if you have a bigger show room or truck than your competitor. So in parting I'll say, if you want high power, go ahead. You can afford it, and you won't be a traitor to the amateur spirit. . . .

— *Warner Thomson, W6PUM*

OPERATING NEWS



F. E. HANDY, W1BDI, Communications Mgr. **E. L. BATTEY,** W1UE, Asst. Communications Mgr.

War. The world appears to be filling with war madness, as we write these lines. Every inhabitant of the globe is directly or indirectly affected. Some of the effects are profound, indeed. The shadow of war falls quickly across our pursuit of our chosen hobby, amateur radio operating, as well as everything else. Already we are obliged to bid regretful farewell to our VE cousins as well as our distant neighbors in many parts of the world who are promptly off the air by government edict. May we hope for the return of our friends to the air!

Be neutral. The President of the United States has just proclaimed the U.S.A. neutral and issued detailed rules for neutrality. It is not at this writing expected that any special restrictions will be issued for radio amateurs. In fact, we are assured to the contrary. We know our individual responsibility. *We must guard our conversations to make sure they can aid no belligerent.* Unless conditions force such governmental steps, we need face no special loss of privileges. We are put on our honor to *be neutral,* and in radio operating it is an important responsibility that deserves thoughtful consideration.

Usual A.R.R.L. Activities Scheduled. The operating news of the day is the silence of so many brother amateurs — and the need for every U.S. ham to continue usual observance of *international* regs that prohibit handling third party information, while leaving us traffic freedom, domestically, as usual. On the domestic horizon it looks like a big year for traffic and all amateur radio activity — all in spite of the international shadows. The usual A.R.R.L. program is contemplated, subject only to some new unexpected development. In October we remind you of Navy Day, and the coming highlight in operating, our A.R.R.L. Sweepstakes (10th annual) which is scheduled for Nov. 11th–12th, 18th–19th.

For us it is time to give thought to reopening of Trunk Lines, for appointments as ORS, OPS for registration in the A.E.C. (if not previously lined up, of course) and for alignment with the N.C.R. and A.A.R.S. within which organizations we may learn much, may prepare ourselves for skilled communication branches in event of necessity, and which builds the respect of our government's departments for the radio amateur to the advantage of us all. Our local emergency organization for flood or hurricane must be developed and advanced this season. Amateur plans will progress domestically in all these lines. We proceed then to discuss some disaster operating policies.

Amateur Service Emergency Policy. During the past year a number of agencies as well as amateurs, have asked in what fashion we serve, as a result of which previously understood but unstated policies have been defined. These principles are now stated to save further questions and so all amateurs may benefit by having them for reference.

Our function *as radio amateurs* is to provide emergency *communication.* We are not responsible for predicting when dams will fail, estimating lives lost or property damage, making technical reports on flood stages or the extent of cities' food or medical supplies. These things go beyond our limited personal observations. We do not wish to be taken to task for giving pronouncements in such matters. It is, therefore, our policy to handle only information from official sources, or if not, then by all means to be sure that information handled is definitely signed or labeled as to its source, with rumors marked plainly as such. Information on roads should come from state police or the highway department, information on weather and flood conditions from the U. S. weather forecaster, data on relief needs and property damage from the Red Cross or mayor's office, etc. Information is *not* to be given out to reporters or individuals *by amateurs.* A message addressed to a person is *not* to be broadcast, but sent and receipted for by each station handling, in turn. It may be delivered *only* to the addressee or his authorized agent. Only with express authority from a person addressed may information be released. Observe the Radio Act, which imposes heavy penalties for violating the provisions on secrecy of correspondence. Keep inquisitive persons (however friendly their intent) from your message files. Refer them to the agencies or persons to whom your messages have been delivered, if occasion arises.

The Emergency Coördinator represents the amateur service and contacts all agencies direct, except where he assigns stations for particular agency jobs requiring direct contact between station and agency. Even then he has the nice problem of keeping an up-to-date chart of the changing schedules of all the local stations to facilitate giving advice on best routings. Should a message center be established by the communications committee of the Red Cross or by civic or military authority, the Coördinator will report complete information on amateur facilities at intervals to this center, but otherwise than to extend general coöperation to all other communication agencies

to aid in reëstablishment of facilities and protection of the public, traffic will not in general come from or through any one source or agency. Priority will be determined for each dispatch filed by any or all agencies on the principle of the greatest good of the greatest number, and in view of the public interest involved.

— *F. E. H.*

PRIZES FOR BEST ARTICLE

Each month we print the most interesting and valuable article received marked "for the C.D. contest." Contributions may be on any phase of amateur operating or communication activity (DX, 'phone, traffic, rag-chewing, clubs, fraternalism, etc.) which adds constructively to amateur organization work. Prize winners may select a 1939 bound *Handbook*, *QST*, Binder and League Emblem, six logs, eight pads radiogram blanks, DX Map and three pads or any other combination of A.R.R.L. supplies of equivalent value. Try your luck. Send your contribution to-day!

DX Bookkeeping

BY KENNETH B. WARNER, WIEH

We've heard of a couple of fellows who seem to keep a 5 x 7 card record on every station they work, with details of everything. Not only the usual dope on dates and bands and "handle" is put down; occupation, wife's name, children, other hobbies and so on are detailed. One can imagine space for a passport photo, a blueprint of the other fellow's house and a copy of his last income-tax return. Where the keeping of neat records is itself the hobby, this stuff is just dandy; but for most of us it is too much like work. Now at the other extreme is the fellow whose sole reliance for figures and data is his very bad memory. Sure, he's worked Siam, but they didn't send him a card and he can't recollect station, band or date except by hunting through old logs. He doesn't know where the logs are and he couldn't read them if he found them. He doesn't know whether he's worked Bulgaria or not, but he guesses that if everybody he worked had only QSL'd him he'd be on top of the Century Club.

Somewhere between these extremes of excess industry and ignorance is a sensible useful system for the average amateur. As concerns my own needs, I've found the answer, and I'm passing it along for possible ideas to others. It won't do for W1WV with away over a thousand different G's worked; he'll still need a card system (but let's hope that 3 x 5 cards will do!). But for the average aspirant to the DX Century Club who is just trying to get along and add a new number now and then, like myself, I think my scheme will be found very useful.

I have a bound record book of a couple of hundred pages, about 7 x 8", about 25 lines to the page. I letter the name of a country at the head of a page and then list the stations worked, chronologically, one to a line. For each I show the call, the city, the band, whether c.w. or 'phone, and the month and year. Where I know the "handle" (detestable word!) I write it in parentheses following the city. The city is important; calls change, for one thing. Our record shows we worked oa7DX in Tasmania in early 1927 on 7 Mc., but we neglected to note the city and he never QSL'd and we threw away our 1927 callbook. Probably the same as VK7DX to-day, you say? OK, only there isn't any such call. See? Well, returning to our story: the remaining data we log in a cryptic but simple manner of our own to show band, c.w. or 'phone, and date. We make use of the F.C.C. nomenclature for types of emission, wherein A-1 is c.w., A-2 is i.c.w., A-3 'phone, etc. Suppose we worked somebody on 10-meter 'phone last July. We'd log it, in small writing, "28-3-July '39." Small, so as to leave room for future entries when that same station is worked again, perhaps next time as "14-1-Aug. '39," meaning of course 20-meter c.w. Thus a typical entry, on the page for Eire, might read: "EI2L Dublin (Tim) 14-3-June '37. 28-3-Feb. '39." And all the other Eire entries on the same page, in uniform style.

If further particulars become necessary they can be had by consulting the log for the stated month. They are not needed with sufficient frequency to justify posting any more than this essential information in the record book. Note that I do not show the date of the month. You may want to but then you're stuck with listing every day and sometimes you have QSO's by schedule or chance many times in a month with the same station, then never to hear him again. I find just the month-reference ample.

For an "average" country, where only half a dozen stations or so have been worked, one page in the record will be ample — for the next ten years, in all probability. Paper is cheap enough, however, to warrant leaving yourself plenty of room to grow. For instance, under England I have assigned several pages each to G2, G3, G5, G6 and G8, with room for 4 and 7 and 9 if they ever get started. (Hmm . . . Guess I'd better add 4 now.) Notice, also, that I said England not Great Britain. This is because any such record as this should be laid out in terms of the I.A.R.U. country list, whereunder England, Scotland, North Ireland and Wales count separately and should be listed separately.

So your book will probably start out with two pages for Argentina, a page or so for each numbered district in Australia, one page for Austria (sure, list those worked, even though there'll be no more; they still count in the Century Club), a couple of blank pages for possible future developments under "A," then moving to Belgium, and so on. It is desirable to give a full page to each country in which you have worked even a single station, provided it is actually an independent country. The real difficulty in "country-counting" and in record keeping is with the colonies and protectorates that count separately with us. They are so sparsely settled with amateurs that it is rare to work more than a couple of stations in any one of them, and yet there are so many of them that they'd eat up a book on a simple page-per-I.A.R.U.-country basis. I solve that by having one page marked Portuguese Colonies, one for Netherlands Indies, a couple for French Colonies, several for British Colonies & Protectorates, and grouping these entries by such heads. When I count up my countries I have to remember that such a page will list more than one country, but that's easily done. If my correspondence with the colonies of any one nation ever becomes too heavy to keep count on in this way, I'll break it down and set up new and separate pages for the Madeiras, the Azores, etc. Meanwhile I like the grouped headings. There's one for "Australian Dependencies," by the way, to take care of Papua, Tasmania (the idea of calling VK7 a separate country!) and VK9. We probably put a strain on political nomenclature but our book serenely announces that the Isle of Man and the Channel Ids. are "English Dependencies." U.S.S.R. we of course set up on the basis of seven countries, per the I.A.R.U. list. The fact is, we confess, that if we didn't mind wrestling a big enough book, we'd set up the whole I.A.R.U. list right from scratch but (tcht, tcht!) an awful lot of the pages would long remain perfectly blank and we've tried to dope out a sensible system that can be expanded easily if we suddenly become enormously successful in snaring the little DXes in their lairs.

I post this record book when I'm in a pen-and-ink mood from writing QSL cards. I do my outgoing cards every few days. From the QSL cards, last thing before I take them down to mail, I post the record book. In somewhat similar style I deposit received QSL cards in a pigeonhole until I find time to check them against the record book. A little check mark after the call indicates that the QSL was received. Then the cards are filed.

Now to some of the uses of the book. You hear a station CQing. Have you ever worked him? A flip of the page tells you. Or you are called and you start answering, meanwhile running your finger down the column and seeing the last

time worked, what band, the chap's name and location, and something to start the conversation. Or you hear a weak Algerian. He might be worked but you've already got Algeria so why bother . . . hold on, you haven't got Algeria? That was Morocco you have? Well, it's worth trying, then. Or maybe, as has happened too frequently for peace of mind in my case, it is a country where you worked several stations a few years back but not one ever QSL'd, so you still have no way of proving it to hard-boiled Mr. Century Club. So the country's still worth working again on the chance that your luck will now change. And then there are statistics to get. Turn the pages of this book, counting as you go the countries where there is an entry, and remembering to count extras on the pages where colonies are grouped, and you have your total worked. You can even tell how many of 'em haven't yet QSL'd. When did you work that J?; hasn't he had time to QSL? Who have you worked in Norway recently? What band was most useful to VK last December? What was the date of your very first contact with England? All such questions the book answers with neatness and despatch, summarized in carry-aroundable form. I also find it convenient to keep in the book a summary sheet showing total of countries worked to date, number of Canadian and of other stations, countries from which no QSL has yet been received, and my total on hand towards the C.C.

One aspect of DX Bookkeeping is the care of QSL cards. While "duplicate" cards can be used for wallpaper, I've always felt that the precious No. 1 card from a difficult country deserved better care. Do you know that you can still buy postcard albums at a good stationer's? If he hasn't them he can get them. I suggest a 150- or 200-card album entitled "Exhibit for the DX Century Club." Then put your cards in, alphabetically by prefix or country, as you prefer, with only one from each, leaving space between letters for those you hope for in future. If you're going strong on both 'phone and c.w., you may want to keep a book for each.—Ambitious You. "Exhibit for Worked-All-States" requires only a 100-card album to show the story twice, once for c.w. and once for voice. This keeps the essential cards safe, clean and handy for showing. The rest can be wallpaper.

(Add Fates-worse-than-death: To have *your* card miss getting tapped for Album, relegated to the classification of mere wallpaper.)

—•••—

The Jackson County Radio Amateur Club recently held its annual picnic and field day near Jackson, Minn. W9UYZ, W9JSS, W9FAJ, W9GBZ, W9IYJ, W9OMC, ex-W9FAD and many others were on hand to participate in a host of enjoyable activities arranged for that occasion.

—•••—

Flash—All Districts Worked on 56 Mc.

To W9JZB, "Vince" Dawson, Kansas City, Mo., goes the honor of working all nine licensing areas in "these here" United States. This in fact is the *outstanding* news of the month. While hundreds of successful 56-Mc. and 112-Mc. contacts have been completed over thousands of miles in August–September, W9JZB's accomplishment is the outstanding fact among the reports received.

On August 18th at 12.27 A.M. W9JZB's contact with W7GBI, Great Falls, Mont., completed the list of licensing areas. W1LLL, W2LUR, W3EIS, W4AUU, W5AJG, W6QLZ, W7GBI, W8SKR, W9AZE and other QSLs constitute the only card collection of its sort — all confirmations of 56–60 Mc. QSOs — that we have seen. The transmitter at JZB uses a pair of T-20's with 120 watts input in the final. The receiver is a Skyrider 5–10 and the antenna a vertical Lazy-H. JZB says the final QSO gave him a thrill "like the day he received his ticket."

July '39 O.R.S.-O.P.S. Parties

THE summer quarter brought a fifth-time win to W3BES. Rumor has it that he's moved to a locality full of electrical noise though, so we'll take heart and see how many millions (if any) that knocks off the October result! W1TS (again 2nd high) will be watching as well as brass pounding to win in the next. Congratulations to THE HIGH TEN and other outstanding participants whose O.R.S. results are indicated below!

Official 'Phone Stations likewise enjoyed a fine workout of stations in the July test. W8OZH, working 47 stations in 22 Sections for 5390 points tops the lists, with W8PFM, W8MOL and W4DCQ right behind him for honors. Congrats to all the high pointers we are listing!

With keen fall conditions, and a new All-Season Contest in view with Trophies to the leaders contemplated such as won by W2JZX-W6IWU-W8BTP O.P.S. activity will go to even higher levels of success. Yes, in the O.R.S. group, too, will be an All-Season Contest. W4PL and W1KIN can tell you how to win them. The first step to get in on both opportunities for awards is to get lined up and reporting regular activity via your S.C.M. as either O.P.S. or O.R.S., depending on your qualifications and 'phone or telegraph-traffic interest.

Official Relay Station Scores (July)

Station	*Score*	*Dif. Stns.*	*Dif. Sects.*	*Heard*	*(Watt) Power Input*	*Operating Time*
W3BES	11,102,629	190	51	9	500	19 hrs., 10 m.
W1TS	9,901,740	174	53	10	350	18 hrs., 25 m.
W2IOP	7,551,771	148	54	6	350	16 hrs.
W8QAN	6,574,428	146	50	8	250	19 hrs., 22 m.
W4DWB	6,449,968	146	50	28	250	18 hrs., 30 m.
W3CHH	5,345,993	129	48	9	40-600	20 hrs.
VE3EF	5,078,160	131	49	12	90	20 hrs.
W3GDI	4,060,903	122	39	9	125	15 hrs., 37 m.
W8LCN	3,709,476	116	46	3	600	13 hrs., 15 m.
W1KQV	3,432,932	114	44	24	——	16 hrs., 42 m.

Station	*Score*	*Stns.*	*Sects.*	*Station*	*Score*	*Stns.*	*Sects.*
W2AXZ	3,849,244	48	116	W9HUV	2,005,375	84	41
W3EML	3,216,996	119	43	W8RHM	1,921,515	96	37
W6PBV	3,022,971	82	41	W2LMN	1,864,440	83	37
W6RBQ	2,975,000	85	40	W5AZB	1,850,332	79	42
W3AMR	2,856,504	107	40	W8SJF	1,821,704	78	44
W6CIS	2,701,809	78	43	W9QMD	1,572,144	74	38
W3ADE	2,631,828	103	39	W2GVZ	1,803,373	102	41
W3BTQ	2,512,062	103	39	W4DW	1,653,828	88	33
W9GBJ	2,354,938	95	44	W8OXO	1,653,223	88	33
W1AW	2,350,092	109	39				
W7JC	2,312,604	73	41				

Official 'Phone Station Scores (July)

Station	*Score*	*QSO's*	*Sections*	*Heard*	*(Watts) Power Input*	*Operating Time*
W8OZH	5390	47	22	8	225	5 hrs., 5 m.
W8PFM	3680	34	20	7	200	5 hrs., 10 m.
W8MOL	3570	42	17	—	500	4 hrs., 49 m.
W4DCQ	3060	36	17	—	1,000	3 hrs., 22 m.
W8KBJ	2940	21	14	—	200	3 hrs., 30 m.
W1EAO	2808	28	18	8	250	4 hrs., 31 m.
W8COR	2366	32	13	5	500	5 hrs., 50 m.
W2JZX	2355	25	15	16	500	3 hrs., 15 m.
W4DGU	2240	140	16	—	220	5 hrs., 46 m.
W8AQ	1884	23	12	21	90	3 hrs., 30 m.

Station	*Score*	*QSO's*	*Sects.*	*Station*	*Score*	*QSO's*	*Sects.*
W8HFR	1560	26	10	W9ATS	1160	18	10
W4AAK	1469	21	13	W3EZL	1050	21	10
W3DRQ	1425	19	15	W8JFC	848	20	8
W5CXH	1278	20	9	W1HIL	756	12	9
W8PUN	1240	22	10	W3BEI	695	15	9
W8JM	1170	20	9	W8QFN	651	13	7
W9VCO	1050	21	10	W1COI	603	11	9

BRIEFS

Atlanta Radio Club Annual Hamfest

October 8th (Sunday) the A.R.C. will hold its annual hamfest. Displays of the latest amateur apparatus, cars with mobile transmitters for ham, broadcast and police work and contests in swimming and archery will have a place on the program. There will be plenty to eat for all. Come early, Oct. 8th, to the estate of Roy Snider, W4FBH, where this hamfest will be held.

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Resentful Hams Silence Bootlegger

Five good amateurs who are members of the O.B.P. in St. Louis engaged in a week's intensive work in direction finding in early August, as a result of which there is one less call-bootlegger cluttering up our amateur bands and defaming the reputation of legitimate amateurs. On Tuesday, August 8th, the information obtained resulted in the apprehension and arrest of Michael Ziegler (31) at his home 2219 Indiana Ave., St. Louis, on a Department of Justice warrant. Ziegler pleaded guilty of unlicensed operation before U. S. Commissioner Burke, and admitted operating at different times during the last several months, and using the calls of legitimate local radio amateurs. Ziegler was apprehended while QSO an East St. Louis amateur.

This illegal operator begged to be allowed to break up his apparatus with a hammer rather than face sentence. Too late, he appeared as a thoroughly contrite individual. He faces sentence, up to full penalties legally possible, but temporarily has been released under $1000 bond. He could not demonstrate sufficient ability to give his call in code but, since he was smart enough to know a call was necessary, it is certain he knew he should have applied for necessary station and operator licenses . . . before any operating was attempted.

A licensed ham who is alleged to have helped adjust the bootleg rig was to be taken in for early questioning in connection with this case, since this individual is believed to have shared in the illegal operations.

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Penalty Invoked

In the case of Louis Raymond Choiniere, W1CON, Holyoke, Mass., the licensee was cited (1) for transmitting profane language in violation of the Communications Act, (2) for transmitting music in violation of the amateur regulations, and (3) for failing to keep a proper amateur log. His operator license privileges have been suspended for a period of three months. There is little excuse for improper operation in any of these respects.

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WLFW on World Cruise

H. T. Mapes of W7DXV writes that he is sailing on the Yacht *California* (63-foot, 3-master) for an eighteen months' cruise around the world. He has permission to work amateurs from WLFW, and will be on the air nightly at midnight (PST) on 6226 kcs.

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A successful week-end hamfest was staged by Ohio and Indiana 160-meter 'phone operators at Russells Point, Indian Lake, Ohio, July 29th–30th. W8TNT, W8TDM, W8RXN, W8MZX, W9VJX, W9VYK, W9ZWN, W8TEF, W8QHV and W8THJ were among those present. TNT's portable rig made the affair complete and all had a swell time.

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W2LPJ, W2CKQ, W2LWP, W2CWE, W2JDC, W2LSD, W2LHP, W2KKW, W2KKR and W2AEU of the F.T.S. (Forty Traffic System) are operating on 7224 kcs with a 75-watt transmitter *nightly at W2USA from* 1800 *to* 2100 *EST*. The several operators take operating schedules for particular days, and are clearing a high percentage of the W2USA originated traffic according to W2LSD, ORS-FTS.

Brass Pounders' League

(July 16th–August 15th)

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
W4PL	8	93	1715	77	1893
W3EML	93	323	1096	305	1817
W7EBQ	0	0	1684	0	1684
W6IOX	29	60	1264	52	1405
W6OBJ	14	600	1	600	1215
W6PCP	154	355	372	300	1181
W9QIL	56	171	696	162	1085
W5FDR	12	119	596	103	830
W2HXQ	10	6	608	5	629
W3CIZ	19	143	319	140	621
W5MN	18	68	466	58	610
W6LLW	18	49	448	14	529

MORE-THAN-ONE OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
KA1HR	725	301	178	0	1204
KA1HQ	216	125	494	84	919
W5OW	118	102	452	50	722
K5AA	384	76	60	70	590

These stations "make" the B.P.L. with *total* of 500 or over. One hundred deliveries + Ex. Del. Credits also rate B.P.L. standing. The following one-operator stations make the B.P.L. on deliveries. Deliveries count.

W8IHR, 273
W7APS, 253
W6LUJ, 211
W5GFT, 205
W6DH, 197
W5DKR, 194
W3QP, 183
W9BAZ, 170
W2CGG, 166
W6GZY, 166
W6MFH, 162
W8ASW, 159
W5BN, 141
***W4AOB*, 140**
W9ZFC, 136
VE3ATR, 107
W6RGQ, 104
K6PUS, 103
W6PGB, 101

A.A.R.S.

WLTK (W9UHQ) made the B.P.L. *on 101 deliveries*.

MORE-THAN-ONE OPERATOR STATIONS

Call	Orig.	Del.	Rel.	Extra Del. Credit	Total
WLM (W3CXL)	84	70	1985	42	2181

A total of 500 or more or 100 *deliveries* Ex. D. Cr. will put *you* in line for a place in the B.P.L.

A "Code Practice Chart," which will be useful in connection with code practice transmissions that W9MWU started on September 18th, will be mailed to any individual interested, on receipt of a stamped, addressed envelope by W9MWU. (Sergt. Geo. H. Freer, Morgan Park Military Academy, 2153 West 11th St., Chicago, Ill.)

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California amateurs are requested to drop a line to W6ZM, Sam Houston, 3164 Bona St., Oakland, Calif., expressing the desire to have the state issue to them motor vehicle license plates with their call signal indicated thereon. Likewise W6CFN (Howard Bogue, Box 436, Tuolumne, Calif.) writes that he has prepared and has on hand blank petitions relative to obtaining amateur call letter license plates, and these will be sent by him to any California radio club on request, or to amateurs who will circulate petitions in communities not covered by a radio club.

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W8ELC, Morris L. Brown, 237 Oxford Ct., Elyria, Ohio, similarly has a petition form available for Ohio amateurs. As many 25-signature sheets will be sent to an individual Ohio amateur as will use them, and return to W8ELC to use in his endeavor to get the 1940 auto tags in Ohio modified (to licensed amateurs) to show their radio calls.

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The following stations operating in the Ohio Section Net (Ohio Regulars) are rapidly giving the control station, W8PIH, the jitters: W8LVH, W8LVU and W8LVV. Hi!

How's DX?

HOW:

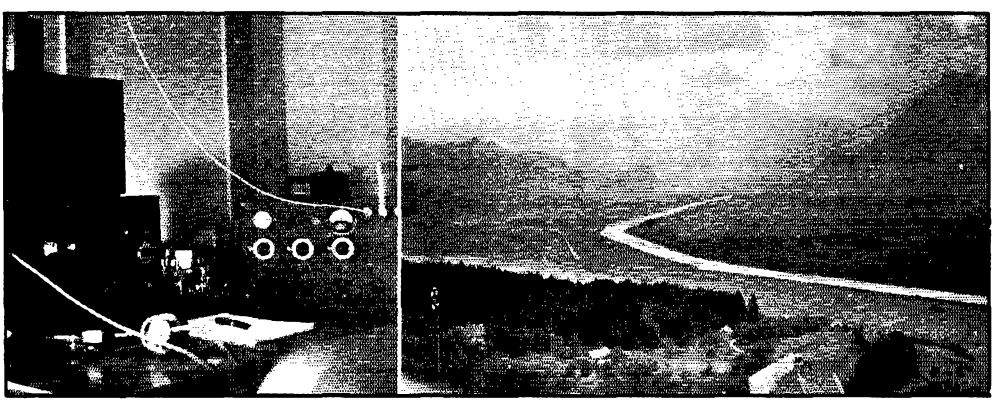
IT WOULD probably be more appropriate to call this pillar "Where's DX?" because, with the turn world events are taking, by the time this column gets around to looking up at you there's no telling what countries will be on the air and what countries will be in the air.

We must confess to a certain lack of enthusiasm this month. Not a lack of enthusiasm for DX — that's something we don't ever expect to suffer — but we do find it a bit difficult to start writing about the gang when we think of what's happening to some of them. That's the big trouble with working DX: the minute a fellow gets interested in it he becomes internationally-minded and acquires a new slant on the whole thing. Heck, we don't think of those fellows in other countries as "foreigners" but as our good friends, particularly when we've had some good rag-chews with them or when we've worked them year after year in the Contest. True, we've been mighty sore at some of them, especially when they don't kick through with that card we need to move us up in the DXCC or something equally as trite, but we've never learned to hate and want to destroy any of them. We might as well face the facts: DX teaches us to be too darned friendly. Because we're content to work at our jobs during the day and return to our spot in the international ether in our spare time, we've lost all sight of the important things in life such as greed and jealousy but, personally, we wouldn't have it any other way.

It's really too bad that a mad dog can't get a ham license — this might be a better world.

WHERE:

WITH England and France in the war, that puts them and their colonies off the air and so we won't mention them. That's going to leave this column kinda blank, because VR1AM, VS1AP, VS7RA, VS7RP, VU2EU, VU7BR, VU2JO, ZC6AA, VS2AL, ZC4AL, VQ3HJP, VQ2GW, FT4AG, FA8DA, FB8AD, ZK1AG, VS6AF, VQ5WES and VQ8AI were all reported active last month. It may be that some will continue active — it's too early for us to have the cold dope. There won't be any VK/ZL Contest, we imagine . . . . . Besides the belligerent nations, ON, PA and CO-CM are the neutrals off the air at the time of writing. A hasty check shows that the war puts off the air 109 out of 204 countries where prefixes are assigned. Outside of W, approximately 70% of the amateurs are silenced . . . . . W9TJ pulled a nice sneak in working J8PG in Kwantung. Kwantung was left off the countries list because it didn't look like there would be any hams there, but Bill scared up this one and made a liar out of us. Kwantung will be included in the list next January but counts from now on . . . . . **P 1AB** (14,395 T8) crossed us up by using that call instead of the others he had planned, but he's been on plenty with that rig the lads got for him. QSL via ARRL or W4CCH only. Like any new country, he complains of the poor manners of the W's that climb all over the stations he's trying to work. Lay off, will you, fellows? (JPE wants a chance — Jeeves) . . . . . W2GT tells us that **17AA** (14,405 T9) is back on again and told Ed that I7AT will be on 'phone soon . . . . . That XI1AA was in Italy, according to W2BHW who knows things like that . . . . . HR4YV was a ship off Venezuela when he used that call, say W8REC and W9CMY . . . . . W3EBC gives us the address of **CR4MM** (14,410 T7): Mario Moutinho, Praia, Cape Verde Islands . . . . . W3FRY forwards a letter from VP8AD who says he hopes to get to South Georgia Island next year, as an operator at ZBH. He's off the air now at Falkland Islands . . . . . VP5AD, who knows about such



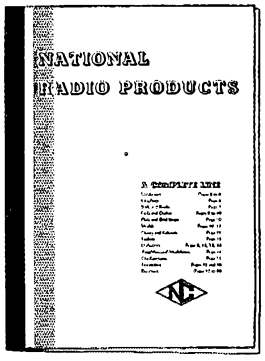
HB1CE was located at Triesenberg, Liechtenstein, a small mountain village located on the side of a mountain at about 3000 feet. The transmitter was an 89-p.p. RK39's combination with 50 watts input, the receiver an HRO and the antenna — a 100-foot b.c.l. antenna that the inn-keeper said wouldn't work. The photograph shows the terrain in the direction of the U.S.A. and the probable reason why the inn-keeper was wrong. That river, snaking its way through the valley, is the Rhine.

Liechtenstein is a beautiful little country of about 10,000 inhabitants located between Switzerland and what used to be Austria. It is governed by a prince and is today the only remaining monarchy using the German language. It is closely allied to Switzerland and, since it is under Swiss radio regulations, Swiss amateurs can operate portable there. HB1 is the Swiss portable prefix.

HB9CE had planned for some time to take a portable to Liechtenstein, to see how many stations he could work and give the gang a new country, and this year he and HB9AT took their vacations there. They started out slowly but within a half hour had to resort to bug keying in order to work as many as possible of the stations calling them. They regret that they didn't have more time for rag-chewing and hope all will understand. That their expedition was a success is demonstrated by their log which shows 580 QSO's during the 9 days, over 500 of them being W's. During that time they ran into the "sort of DX specialists who terminated the QSO by 'Pse look for my friend W. . . . on mi freq', in order to call us, just a little later on, on exactly the same frequency, with exactly the same chirp and exactly the same play of the key, with the call of his friend! A bad ham spirit!" (Who's fooling who?)

The station was in operation almost continuously during the 9 days, during which time HB9AT and HB9CE took turns sleeping and operating. In those 9 days they consumed 21 kilowatt-hours, 2 pencils and 20 packages of cigarettes!

Cards will be sent to all who QSL. A list of QSO's has been forwarded to A.R.R.L. for DXCC credit claims.



IN THIS PAGE a few months ago, you may remember that we asked whether you liked cotter pins for terminals on the R-100U choke. The answer turns out to be "No"! Such being the case, we have decided to go back to the one that Bill Larkin invented in the beginning. It is the one Millen used in his 100-watt amplifier described in *QST* for March 1939. This was no more nor less than an R-100 choke with a threaded extension at one end which could be screwed into a small stand-off insulator of the kind we supply with our sockets. The only reason why we did not make them that way in the first place was because the commercials liked them better the other way, and we preferred to have only one model. However, commercial users like cotter pins and amateurs do not. Such being the case, Larkin's arrangement seems to be the best bet for amateur use, as it is much more versatile.

The new National catalog describes this new model of the R-100U, along with a new NC-600 neutralizing condenser revamped to mount in the same way. You will also find the new R-300 and R-300U chokes, which are like the R-100 models, but are huskier, (300MA).

New models have been added to the line of air-spaced Victron-insulated exciter coils. The amateur bands are now covered down to 5 meters, with a choice of end link-winding or center link-winding. Models with a swinging link-winding for adjustable coupling are also available for the amateur bands from 10 meters to 80 meters, inclusive. All of them fit the same plug-in base, of course.

Another new item is the vibrator power pack for receivers, which makes it possible to operate standard AC model National receivers from a storage battery. These units are not stocked completely assembled, because the design varies with the receiver that is to be powered. In spite of their special nature, units can be assembled promptly. However, if you want an emergency power supply for the next hurricane or flood, do not wait until the water starts coming in over the doorstep, because we cannot put them together *that* fast.

The new 300L Catalogue is now being printed. Dealers will have them by the time you read this page. Better get a copy and read up on what's new in amateur radio.

JAMES FREELEY

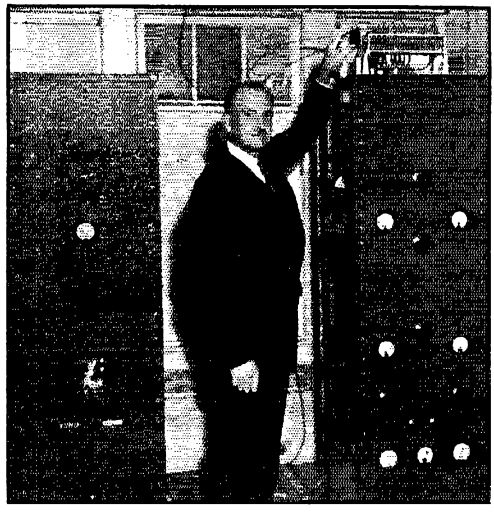
things, says VP5PD, PO, PI, PQ, AM. ENH, DR, SS and PX are all phoney . . . . . I1PK, active on 10 last season, was in Austria, not Italy . . . . . More cards came through from OY4C but he still doesn't say where he was . . . . . VJ2AA (14,400, 14,000 T9) tells the boys he's on San Abrosio Island, off the coast of Chile, but we think that smells a bit.

WHEN:

W2BHW starts the ball rolling with **U8IB** (14,405 T8c) at 10 P.M., **U9BC** (14,420 T9), **XU8WS** (14,350 T9), **KA1LZ** (14,305 T9) at 1 P.M., **KA1SP** (14,400 T8), **KA1WW** (14,330 T9) and **KA7EC** (14,365 T8). Among those heard: **UOAC** (14,450 T7), **PK1YY** (14,290 T9) at 2 P.M., **MX3H** (14,315 T9) at 5 P.M., and **KH6KKR** (14,375 T9). Lindy has a pair of lazy H's that seem to really suck 'em in . . . . . At W9RBI it's **LY1AH** (14,380), **U9ML** (14,420), **SV1RX** (14,425), **YL2CD** (14,360), **KB1FCS** (14,345), **J2KN** (14,405), **J8CA** (14,390) and **XU8MI** (14,350-380) . . . . . W9VES is doing all right, with **CT3AN** (14,290), **CT2BM** (14,420), **UK5KA** (14,420), **U2NE** (14,410), **YL2AA** (14,290), **EA4AP** (14,420) and **KA1HR** (14,280) . . . . . W2GVX/1 has been active again this summer and gives us **CT3AB** (14,350 T9), **ES5D** (14,345 T9), **LY1AP** (14,375 T9) and **TF5M** (14,290 T9) . . . . . W9GKS adds **UK6AA** (14,320 T6) and **W1AB** **J8CB** (14,355 T9) . . . . . W1BHM has **U4AM** (14,350), **U3BM** (14,420), **U9AW** (14,425), **YU7BJ** (14,420) and **YL2BZ** (14,330), while W3HTG reports **UK5HA** (14,410 T8), **U6ST** (14,415 T8), and **J4CT** (14,275 T9) . . . . . W6OLU has a sweetheart of a list which includes such notables as **ON4FE** (14,340), **LY1J** (14,340), **CT1JS** (14,390), **CT1SX** (14,380), **CT3AN** (14,380), **SM6WE** (14,290), **SM6PA** (14,290), **PA0BE** (14,340), **OZ7CC** (14,400), **LA2B** (14,330), **ON4CC** (14,400), **HA4H** (14,290), **PK6OM** (14,300), **PK2RN** (14,350), **PK4KO** (14,365). **J8CD** (14,360), **J8CH** (14,370), **XU6ST** (14,360), **MX1A** (14,410) **J6DU** (14,340), **CR7AF** (14,370) and **CR7BC** (14,350).

WHAT:

W2BMX, who thinks about such things, has a suggestion which shouldn't be passed over lightly. With DX



Frank Carter, W2AZ, of East Rockaway, Long Island, N. Y., is the first to break into the DXCC with all stations worked on 'phone. A vertical collinear two half-waves in phase and two 8-element horizontal stacked arrays are supported from the three 85-foot poles available. The receivers are Super-Pro and HRO with an acorn-tube preselector. The transmitter winds up with a pair of 300T's, modulated by a pair of 250TH's, with 2100 volts on the plates.

The photograph shows the modulation indicator and power supply in the left-hand rack, and the transmitter and modulator are housed in the rack on the right-hand side. Frank is trimming up the antenna tuning unit but it couldn't have been far out of adjustment, since he just knocked off FN1C.

75T TUBE INCREASES CIRCUIT EFFICIENCIES in this transmitter.

One 75T tube with 1250 volts on the plate gives a carrier power of 150 watts. A single 6L6 is the driver. Certainly this kind of performance proves the value of the new Eimac 75T for the amateur.

The outstanding results obtained from this multifrequency transmitter are a tribute to the designer (Wunderlich Radio, Inc.) and to the excellent electrical characteristics of the new Eimac 75T tube. Complicated multifrequency circuits usually cause great loss of efficiency but, here is a three band transmitter with push-button, remote control that sets a new record for efficiency. Think of it! Better than 75% with only 10 watt driving power . . . power gain 15 . . . and much of the credit goes to the Eimac 75T. This new low voltage triode made it possible for an expert designer to produce an outstanding transmitter.

Its efficiency in operation . . . low voltage requirements . . . ease of driving . . . economy of purchase price and ability to provide a high power output even under adverse conditions provides the answer for the amateur with a low power station who wants to step out ahead of the average. If you'll try the New Eimac 75T tube in your "rig" you will quickly see the advantages to be gained. Remember! Eimac tubes are unconditionally guaranteed against tube failures which are caused by gas released internally. See your dealer or write for more complete information.

Eimac TUBES

EITEL-McCULLOUGH, INC.
770 San Mateo Avenue, San Bruno, California

operating such as it is, and fellows listening near their own frequency more often than not, it is sometimes confusing when they send "QMH" or "QML" to guess whether they're tuning from the middle of the band or from around 14,325, if that's where they happen to be. Prose proposes, therefore, some new Q signals: "QOH" would mean "am tuning from my own frequency to the high end" and "QOM" and "QOL" would mean tuning from one's own frequency to the middle and low end respectively. It's the sort of thing the DX stations will want to use after a CQ, particularly in the Contest. W's only need know about it so that they'll understand what the DX station means, because no W ever calls "CQ DX" any more. Or was that a dream we had? ("Lobster and mince pie ain't no dreamless soporific" — *Ling Po*).

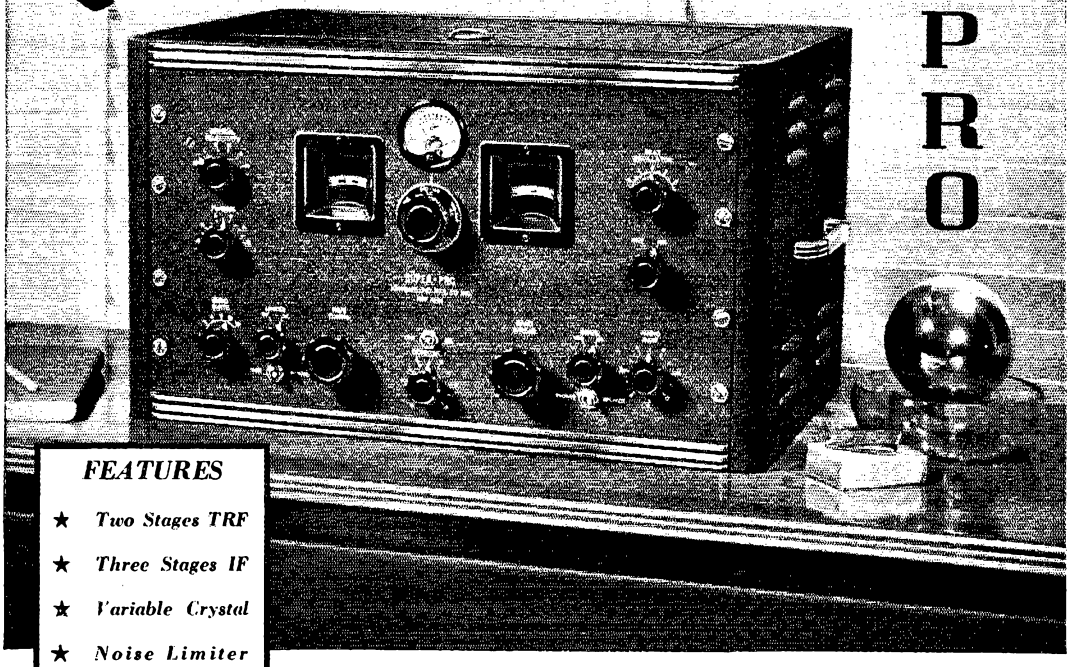
'PHONE:

W6GAL has some new ones: **CT2BP** (14,320), **LA7Y** (14,230) and **TG5JG** (14,050). George says **EK1AF** (14,120) broke through out there a few times .. .. .. A friend up in Massachusetts, who left off his call, reports 28-Mc. DX fair, with **TG9AA** (28,335), **YN3DG** (28,070), **CE3CZ** (28,250), **CE3AG** (28,340), **HR5C** (28,340), **XE2FC** (28,235) and **LU1QA** (28,070) .. .. .. W5GGX in New Mexico had time for a few, including **CT1OR** (14,045), **XU8MC** (14,260), **J2NF** (14,035), **XU8ZA** (14,060), **OQ5AA** (14,080) and other more common stuff like ZS, PK, KA, HK and LU .. .. .. W5VV, who only has a modulator because he heard that Myrna Loy was interested in ham 'phone, dug up **XU8PL** (14,270), **XU7HV** (14,050), **PK6OM** (14,285), **J7CR** (14,280) and **J8CI** (14,100) .. .. .. VR6AY should be back on the air by the middle of September. W2IXY says the transmitter was shipped to NY2AE for repairs — meters and microphones were needed, and they were donated by Triplett and Shure — and will be back at Pitcairn after NY2AE works it over .. .. .. **OQ5AE** (14,400) is back on in the Congo, according to W4QN and W5KC .. .. .. W2AZ tells us that PK6XX is off the air. It seems that VK4HN, who was holding down the mike, "had no knowledge of the Dutch language" and, since they were looking for a reason to close the station, they used that one.

WHO:

DON'T look now (as if you haven't already!) but there's a new top man in the DXCC. A lot of credit is due to W6GRL for the achievement since, as one who has operated on both coasts, we're convinced that it's harder to work a large number of countries from W6 than from the east coast. There will be those that won't agree, particularly now that GRL is top man, but we stick by our guns .. .. .. Our spies report that that dyed-in-the-wool DX-er, W4CBY, is wearing a hole in the 160-meter 'phone band. One never knows, does one? .. .. .. W6MEK, who has joined forces with W6GAL in a DX combine, worked 103 different countries in less than eight months .. .. .. PJ5EE has been giving a number of the lads a thrill by delivering their first PJ card to them in person. Here in the States on vacation, he's been trying to visit all the hams he worked and doing all right at it .. .. .. EI5G sends us a radiogram saying that the relatives of Henry Smith, CP1AA, ex-CT2BK, would appreciate any information on his whereabouts. Send the dope to EI5G or to us .. .. .. W2HTV says ZD4AB has been signing G2TH but expects to be in ZD in late October .. .. .. Someone pirated G4AR's call, so if you didn't get a card you didn't work the real one. The phoney was on 14,350, the real one on 14,375 .. .. .. W8GQB has had to let the 210 DX Club slide a bit on account of a new YL op in the family .. .. .. XU1ZZ is near Tibet and, as soon as he gets going strong, maybe we can talk him into a short expedition. He says conditions are very punko in that part of the world, however, with only an occasional W6 or W7 breaking through from this country .. .. .. W1LZ claims another first, this time the first transatlantic QSL by air mail to the U.S.A. G6CL sent Harry the card on the second Imperial Airways regular flight .. .. .. Looks as though K4 is being depopulated, says W1EH. K4FAY left for a four-year hitch at Newport, R. I., and K4SA bought a citrus grove in Florida and will soon be W4SA .. .. .. We hear tell there's a junior op just arrived at PJ1BV, to carry on the good work in a decade or so .. .. .. W8HGW crashes the 100 mark in the CC with only 85 watts input, which probably makes him the most QRP W in the list .. .. .. Directly following the OBC from W1AW asking W hams to be sure to observe strict

Here it is — The NEW SUPER PRO



FEATURES

- ★ *Two Stages TRF*
- ★ *Three Stages IF*
- ★ *Variable Crystal*
- ★ *Noise Limiter*
- ★ *New "S" Meter*

FOR years the "SUPER-PRO" has been an outstanding receiver in the commercial and amateur fields. This *new* and *improved* "SUPER-PRO" is a de luxe communications receiver. Amateurs who want the best, will find this new "SUPER-PRO" complete in every detail. Selectivity is variable from 16 kc. in the widest position to better than 100 cycles with full crystal selectivity. The crystal filter has five ranges permitting its use for phone reception as well as CW. Continuously variable I.F. band width from 3 to 16 kc. permits high fidelity reception. Exceptionally high sensitivity is obtained with two stages of tuned R.F. and three stages of I.F. The two R.F. stages provide maximum image rejection and a very high signal-to-noise ratio.

Those who are bothered by automobile ignition interference will find the new noise limiter in the "SUPER-PRO" to perform beyond expectations. It will reduce many types of noises to a minimum without distorting the quality of the signal. The "SUPER-PRO" "S" meter is adjustable over wide limits. It is no longer necessary to give inaccurate reports, the "S" meter can be adjusted to provide accurate readings under almost any operating conditions. Besides the many new features, the "SUPER-PRO" has the time-proved tuning unit with multiple section condensers and individual coils for each band. The main dial is accurately calibrated and the band spread dial provides full scale spread on all amateur bands and continuous spread throughout the entire range of the receiver.

Other features include, AVC, beat oscillator, send-receive switch, phone and phono-pickup connections, relay terminals, beautiful metal cabinet, and 16 watts of audio. Available in two standard ranges, 15 to 560 meters and 7½ to 240 meters, this new 18-tube "SUPER-PRO" is the last word in receiver engineering.

WRITE FOR FOLDER

HAMMARLUND MFG. CO., INC. Q-10-39
424-438 W. 33rd St., N. Y. City
Please send New "Super-Pro" Data.

Name.....

Address.....

City.....State.....

Canadian Office: 41 West Ave. No., Hamilton, Ont.

PRECISION PRODUCTS FOR BETTER RADIO

HAMMARLUND

neutrality, W1EH heard someone who really took it to heart. The call, in a fist trembling with emotion, was "CQ DX NO BELLIGERENTS deW 2KEZ"! . . . . . Mama, here's that muse again:

ELEGY

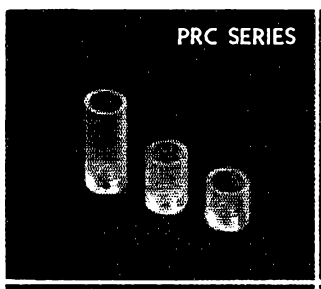
Johnny had a kilowatt,
Or maybe twenty-two
While Jimmy only had a '10
But tried to make it do.
Johnny was an awful dope
And you should hear him wail
'Cuz Jimmy made the Century Club —
While Johnny made the jail! — *W1JPE*

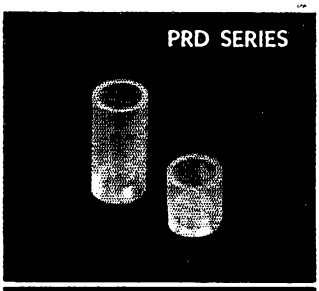
MEMBERS, DX CENTURY CLUB

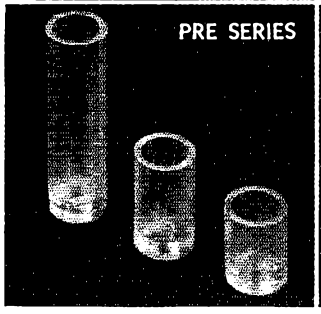
W6GRL	145	VK5WR	115	HB9CE	104
G6WY	144	W2CYS	115	W7DL	104
W8CRA	143	W8NJP	115	W2IOP	104
W2GT	142	G5BD	115	G6KP	103
W2GTZ	140	W9KA	114	W8KKG	103
W8DFH	139	W2DC	114	J2JJ	103
W1TW	138	W9TB	114	W1BGY	103
W6KIP	138	W1HX	114	W5CUJ	103
W1SZ	137	G5RV	114	VE3QD	103
G2ZQ	136	G2DH	113	W9CWW	103
W2GW	135	W8MTY	113	W6MVK	103
W3EMM	135	G6CL	112	W9NNZ	103
W9TJ	135	W6GAL	112	W4CBY	102
W6CXW	134	W3EVT	112	W8AU	102
W1TS	132	W3FRY	112	W9OXO	102
W4BPD	132	W4CYU	111	W1FTR	102
W1LZ	131	W2AAL	111	F8RJ	101
G6RH	131	W5KC	111	VK3KX	101
ON4AU	130	W3GAU	111	W4AJX	101
W8BTI	129	W1ADM	111	W6DOB	101
HB9J	127	G5BY	111	SU1WM	101
W8OSL	127	ON4UU	110	W8EUY	101
W5BB	127	PAØXF	110	W1CC	101
W2BHW	127	W2CJM	110	SU1SG	101
W2CMY	127	W6FZL	110	W8IWL	101
W8DHC	126	W2DSB	110	W6AHZ	101
W5VV	126	W1AXA	110	W1GDY	101
W3CHE	126	W3DDM	109	W4MR	101
W9ARL	125	VE2AX	109	W6GHU	101
W8ADG	125	W2BYP	109	W2GNQ	101
W1FH	125	W9UM	109	G6NF	100
W1DF	124	W6HX	108	W2AER	100
W2UK	124	W8BKP	108	W6KRI	100
W3EPV	124	ZS2X	108	W9UQT	100
W8LEC	123	W1DUK	107	G6MK	100
W2HHF	123	W2CBO	107	VE2EE	100
W4CEN	123	G5BJ	107	W2BXA	100
D4AFF	123	VK2DG	107	W3BEN	100
W8DWV	122	W1WV	106	VK2ADE	100
W8OQF	122	G2TR	106	W8QXT	100
J5CC	120	W1CH	106	ZL1GX	100
W2GVZ	120	HB9BG	106	HB9X	100
W9GDH	119	W2GRG	106	W9RCQ	100
W2JT	119	W2OA	105	W1ICA	100
W1BUX	118	W4DRD	105	W3KT	100
W9KG	118	G5QY	105	W1ZI	100
W3EDP	118	W3BES	105	W8DOD	100
ZL1HY	118	VK3CX	105	W6BAM	100
W9FS	118	VK3QK	105	ZL1MR	100
W2ZA	118	W4TO	105	W1BXC	100
W8JMP	117	EI5F	104	PAØQF	100
W9PST	117	W1ZB	104	W1GNE	100
W9ADN	117	F8RR	104	W4IA	100
W1JPE	117	W3AG	104	W8BSF	100
W7AMX	116	W6TJ	104	D3BMP	100
W3EVW	116	W6FZY	104	W3AGV	100
W6ADP	115	G2MI	104	Radiotelephone	
W9EF	115	W1GCX	104	W2AZ	101

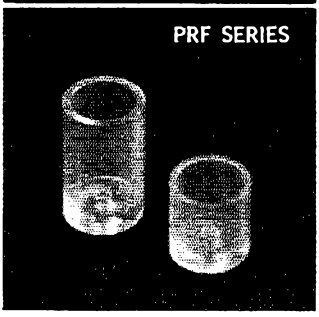
The following have submitted proof of contact with 75-or-more countries: W8HGW 99; W9AJA 99; W4CCH, W8AAJ, W8LYQ 98; G6GH, VE4RO, W1RY, W2JME, W3ZX, W8LZK 97; W3GEH, W4EQK, W5ASG, W8BOX 96; F8LX, FB8AB, G6XL, W2BJ, W2BMX, W3EMA, W8JAH 95; W2CTO, W3AOO, W8CJJ, W8LFE, W8QDU, W9BEZ 94; ON4GK, PAØQZ, VK6SA, W2ALO, W6FKZ, W9RBI 93; W4DMB 92; G6ZO, W3AIU, W3OP, W6TT, 91; D3CSC, G6YR, LU7AZ, ON4FE, SP1AR, SP1LP W8KTW, W8PQQ, W9JDP 90; W8IQB 89; G2DZ, W3JM, W9PGS 88; G8IG, W9AEH 87; EI4J, W1BGC, W3FLH, W9FLH, W9GBJ 86; W1AVK, W3GHD, W4CFD, W6GK, W8LAV 85; SM6WL, W1BFT, W2CUQ, W8BWB, W8DAE, W9OVU 84; OZ7CC, VE2GA, W1IOZ, W2AWF, W2BZB, W6GPB, W8BFQ, W9VKF 83; W1EWD, W3AYS, W6KUT, W8ODK 82; W2WC, VK2TI 80; VK3HG, W1DOV, W2BNX, W3BVN, W3EPR, W6DTB, W6LDJ, W8AAT, W8DGP, W9DIR, W9GMB 80; W4TZ, W8JFC, W9MRW 79; W6AM, W8FJN 78; G3BD, W4EPV, W8BWC 77; LA2X, PAØJMW, W2FLG, W2HTV, W3BSB, W8ITK, W9GKS, ZE1JI 76; W4OG 75.

Radiotelephone: W6OCH 93; G5RV, W2IXY 89; W4CYU 87; W8LFE 77; W2IKV 76; W1ADM, W1AKY 75.









VICTRON COIL FORMS

▶ For ultra high frequency work, where very low losses are essential, these small Victron coil forms will be found extremely useful. Like other Victron parts, they can be readily drilled and grooved with ordinary tools, and can be firmly cemented with National Coil Dope without impairing electrical characteristics. The following sizes are available at the present time.

PRC Series	Diameter 3/8"	Lengths 3/8", 1/2", and 3/4"
PRD Series	Diameter 1/2"	Lengths 1/2" and 1"
PRE Series	Diameter 9/16"	Lengths 3/4", 1" and 2"
PRF Series	Diameter 3/4"	Lengths 3/4" and 1"

NATIONAL COMPANY, INC.
Malden, Massachusetts

A.R.R.L. Official Broadcasting Stations

THE following listed stations address information regularly "to all amateurs" rendering a distinct service to fellow amateurs. First information on changes in F.C.C. regulations, new data on expeditions, special tests and activities, DX conditions and records of prime interest to the amateur world reaches amateurs first through the medium of League weekly broadcasts and the latest-revised list of stations that follows. Stations in all districts assure good coverage on the information which in many cases is so well sent it is used for code practice. Listen for the "QST" from these stations. Report results to the stations you copy too, so the operators will know their signals are successfully received and appreciated.

W1APK, W1AQL, W1ASI, W1AW, W1BKQ, W1BVR, W1BWY, W1DWP, W1FPS, W1GAG, W1GOJ, W1GZL, W1JJY, W1KFN, W1KIN, W1KTB, W1LMO.

W2AZV, W2EOA/W2HXQ, W2FF, W2IXY, W2JGC, W2JHB, W2JKG, W2JZX, W2KHA, W2KIF, W2KUD, W2SN.

W3AEJ, W3AOJ, W3AQN, W3BBV, W3BIG, W3BWT, W3CDQ, W3CFS, W3DNU, W3EUH, W3GCU, W3GRW, W3GSV, W3GWQ, W3HAL, W3UVA.

W4BMM, W4BQE, W4CRG, W4DGS, W4DHG, W4DLK, W4DQW/W4GFT, W4DSY, W4EBZ, W4EEE, W4EPT, W4FJR, W4MS, W4PEI, W4QI, W4TO.

W5CXH, W5DKR, W5ECE, W5ERV, W5FDR, W5FZJ, W5GED, W5GNV, W5HHV, W5KC.

W6CFN, W6FBW, W6IGO, W6MQS, W6NQB, W6OMC, W6PGB, W6PMV, W6ZM.

W7BWH, W7GBF, W7JC.

W8AHV, W8AQ, W8BOK, W8DED, W8DME, W8DXB, W8DZO, W8FGV, W8FTW, W8FZE, W8GHP, W8GJM, W8IAI, W8IOH, W8JQE, W8JTW, W8NDE, W8NEU, W8NQS, W8OQU, W8OUT, W8PAK, W8PJJ, W8RBD, W8RBI, W8SWF.

W9AXH, W9CWW, W9DDF, W9DEI, W9DUD, W9ECY, W9EDW, W9EEZ, W9GBQ, W9GFA, W9GLI, W9GY, W9HPQ, W9HUX, W9IBC, W9KEI, W9KHC, W9MWU, W9OXC, W9PZU, W9RH, W9RPJ, W9UEU, W9UNQ, W9VMI, W9WKP, W9WTD, W9YQH, W9YVF, W9ZGR, W9ZSX.

VE1KS, VE2HL, VE2HV, VE3AMJ, VE3PE, VE4EO, VE4LQ.

BRIEFS

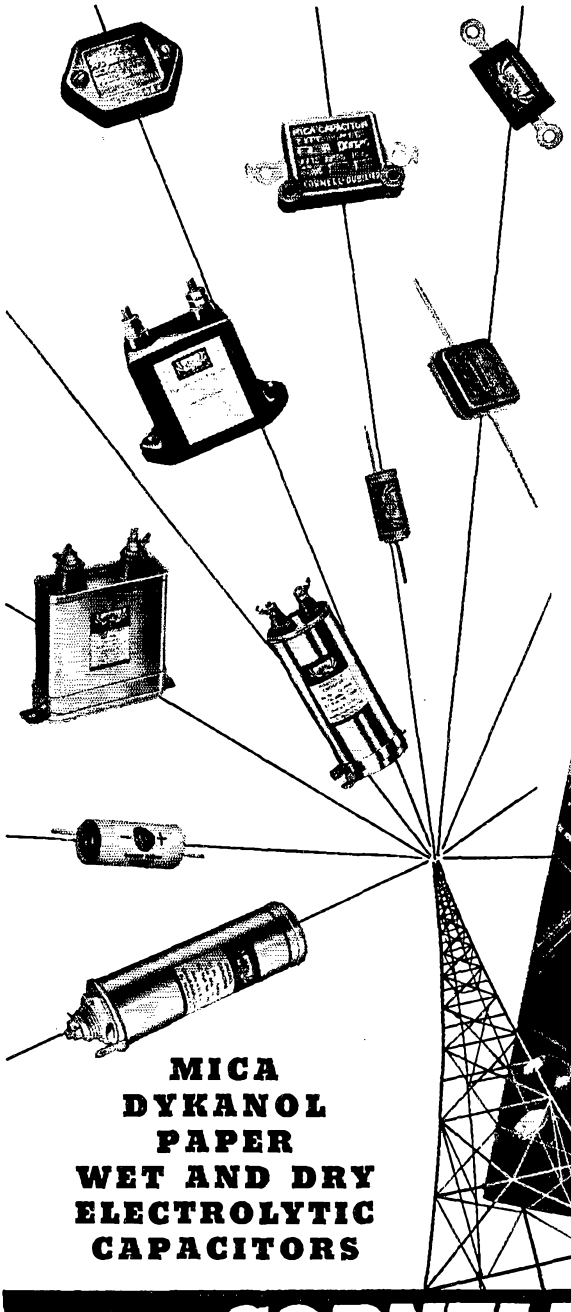
While visiting W2TY, Hollis, L. I., W2KUP asked the operator to demonstrate the rig. Leaving the choice of band to KUP, W2TY made a general call on 3944.5-kc. Back came W4CP, Rocky Mount, N. C. "Rocky Mount" sounded familiar to W2TY, and "Hollis" sounded familiar to W4CP, yet neither could definitely recall a previous QSO. W4CP rummaged through his log and found that the only previous QSO took place with both stations using the same frequency, same power, as the result of a CQ by W2TY at 10:20 P.M., January 19, 1938, exactly one year before to the very minute!

—•••—

W7AF, Decatur Island, Washington, has a notable record of public service! The island has no wire connections to the mainland. and only a small mail boat, which cannot operate in stormy weather. The 30-odd people on the island, or who connect with the island, depend entirely upon W7AF for emergency contact with the mainland. W7AF has maintained a daily schedule with W7AJ, Oak Harbor, Washington, for about seven years. Some of the many services rendered are outlined by W7AF in a recent letter: "About three weeks ago a 140-h.p. diesel tug sat on a broken pile and sank at the dock here. W7AF got aid from Anacortes . . . last fall had a doctor come from Anacortes for a sick girl on the island about 10 P.M. . . . two winters ago our mail boat was wrecked and help from Anacortes was obtained via our network . . . have reported to Lighthouse Dept. in Portland, Lopez Pass Light extinguished . . . obtained Coast Guard help for a disabled boat . . . as no one knows when an emergency message is coming through, I have always assumed each schedule as held for emergency

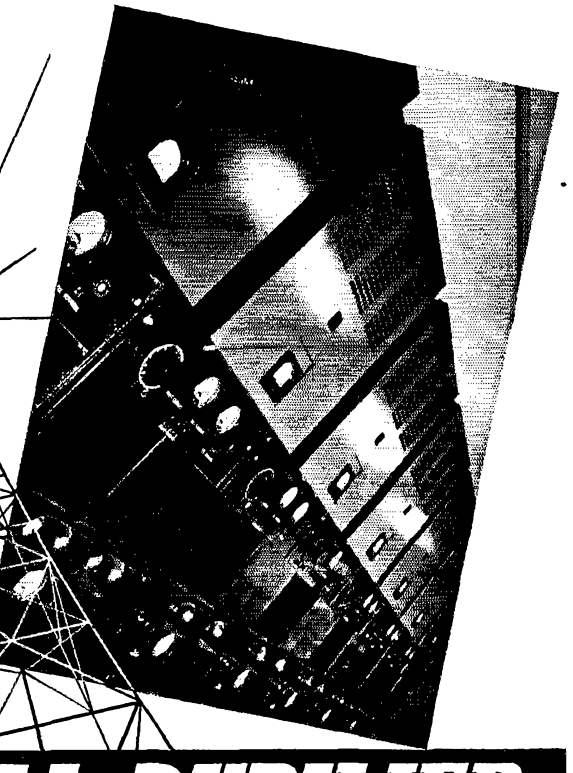
CORNELL-DUBILIER CAPACITORS

backed by 29 years of specialization



For over a quarter of a century the combined engineering and manufacturing resources of Cornell-Dubilier have been focused on the production of capacitors—and capacitors alone. This specialization is directly responsible for the manufacture of dependable capacitors—economically priced. ***That is why there are more C-D's in use today than any other make.***

Send for new free catalog No. 175A today.



MICA
DYKANOL
PAPER
WET AND DRY
ELECTROLYTIC
CAPACITORS

CORNELL-DUBILIER
ELECTRIC CORPORATION
1013 Hamilton Boulevard, South Plainfield, New Jersey
Cable Address: "CORDU"

purposes . . . at some time or other every one on the island has received or sent such a message." W7AHQ provides the connection with Anacortes. W7AF uses only 4 or 5 watts using 3.5 Mc. only.

—•••—

56 Mc. Assists in Air Show

On August 7th the Michigan Chapter of the National Aeronautical Association staged an air show at the Pontiac Municipal Airport. The Five Meter Club of Detroit and members of other Detroit clubs assisted in making this show a success by establishing communication on the field. One station, which we will refer to as station A, was located on the judges' stand. Station B was on top of a hangar known as the control tower. Station C was at the west end of the field, where ships lined up for their take-offs in each event. A fourth station, O, consisting of a pack set, was located in the center of the field. This network functioned as follows: Station A was the control. Station B took orders from station A and passed the information to the man handling the control light. Station C at the starting line received and transmitted orders to both stations A and B. Station O in the center of the field transmitted measurements taken when the ships made spot landings and other information the field judges wanted announced to the public through the P. A. system at the judges' stand. The whole system worked "like a charm." The stations were set up at 9:00 A.M., and the operators were on duty until 6:30 P.M., when the last event was completed. Credit for planning and carrying out this coöperation with the air show is due Fred Moose, W8IFE, secretary of the Five Meter Club of Detroit, Carl Suppanz, W8AKN, Dr. D. F. Grant, W8NXT, Mike Yurkovich, W8PPU, Frank Photiades, W8NOA, Kenneth Stecker, W8SS, Hal Bird, W8DPE, Sam Reid, W8JUQ, Herb Climie, W8RJC, Gerald Pratt, W8IFH, Al Furget, W8NKJ, and G. E. Ryan, W8MCB.

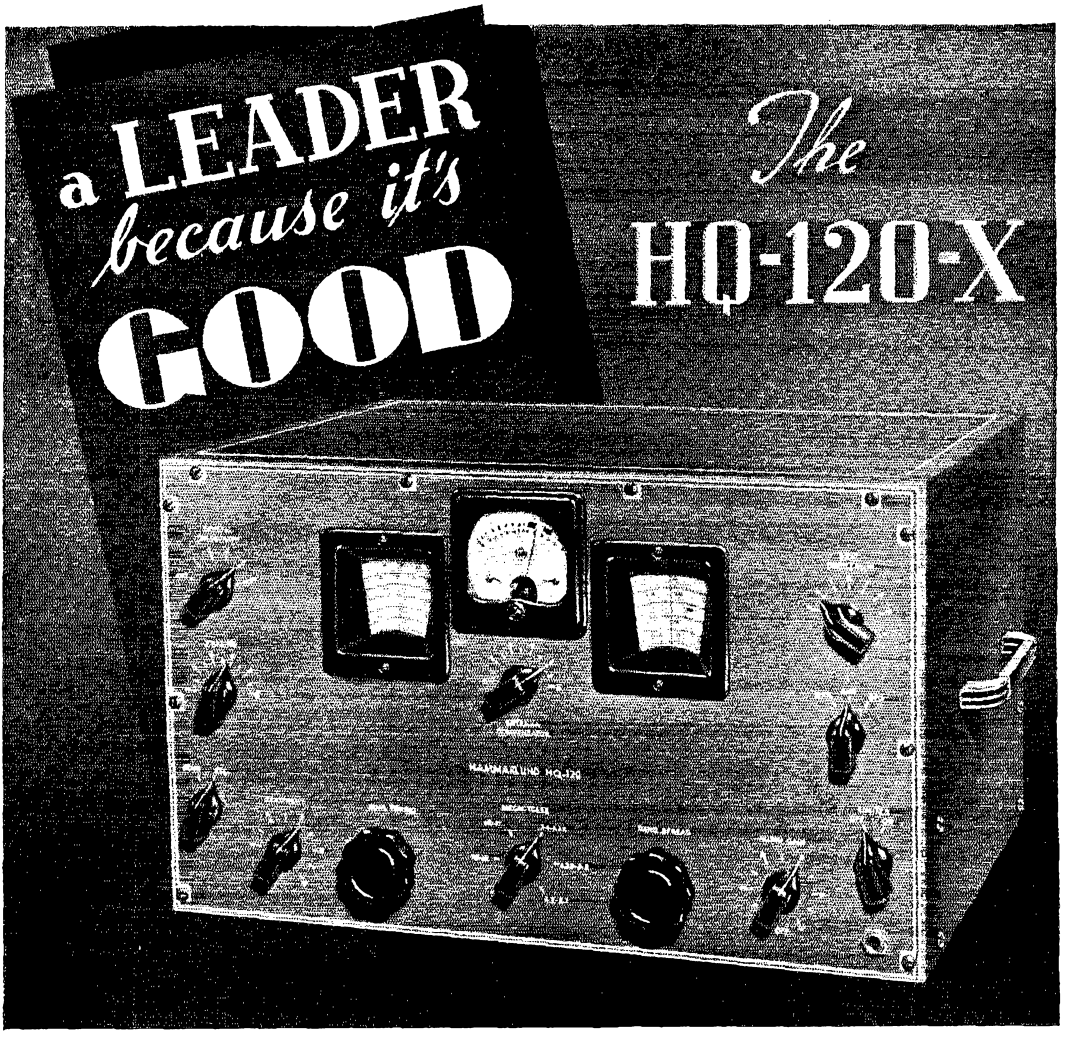
—•••—

W5DAQ, New Orleans, and W4AUP, Montgomery, Ala., have been adding to amateur esteem by keeping a New Orleans resident in touch with his mother, who is ill in a Montgomery hospital.

S.A.R.A. Honors Hams

Robert E. Haight, W2LU, of Schenectady, N. Y., and A.R.R.L. Section Communications Manager, Eastern New York, was awarded on February 6, 1939, the first of a new series of Schenectady Amateur Radio Association awards for meritorious service to amateur radio. The trophy, pictured here, is a handsome silver and black metal shield mounted on mahogany, engraved with the recipient's name, call, and the year in which given.

The idea behind these citations is part of a program proposed by Roy Jordan, W2KUD, to increase greater interest in local ham radio and to engender a greater spirit of enthusiasm and coöperation among S.A.R.A. members. Qualifications include such carefully considered factors as service to the community in time of need — emergency organization and functions; service to the S.A.R.A.; service to ham radio in the community through coöperation with other operators, assistance to younger men just breaking in and enthusiasm and leadership in radio matters. Clubs interested in further details should address inquiries to W2KUD.



THE WIDE ACCEPTANCE of the "HQ-120-X" by amateurs is proof that it is *good*. Hams are shrewd buyers and they have, in the majority of cases, purchased "HQ-120-X" receivers on recommendation of experienced fellow-hams or have made side-by-side comparisons. We welcome this sort of purchasing because we have been modest in our claims for the "HQ-120-X" and know that the prospective owner will find more than would be expected in a moderately-priced receiver. The "HQ-120-X" was an immediate success because it has many features that have long been needed in amateur receivers and these features have put it in a class by itself. Try the "HQ-120-X" . . . put it through every possible test. Note the smooth action of the variable selectivity crystal filter, permitting reception of voice and music as well as code. See how easy it is to check frequencies with the accurately calibrated band spread dial and you'll wonder how you ever got along with a less complete receiver.

WRITE FOR BOOKLET

HAMMARLUND MFG. CO., INC. Q-10-39
424-438 W. 33rd Street, New York City

Please send 16-page booklet

Name.....

Address.....

City.....State.....

PRECISION PRODUCTS FOR BETTER RADIO

Canadian Office: 41 West Ave. N
Hamilton, Ont.

HAMMARLUND

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in West Hartford on or before noon of the dates specified.

Due to a resignation in the Alaska Section, nominating petitions are hereby solicited for the office of Section Communications Manager in this Section, and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, Wednesday, November 1, 1939.

Section	*Closing Date*	*Present SCM*	*Present Term of Office Ends*
Eastern Fla.	Oct. 2, 1939	L. A. Connolly	Oct. 15, 1939
Missouri	Oct. 2, 1939	Letha Allendorf	Oct 19, 1939
Alaska	Nov. 1, 1939	Leo E. Osterman (resigned)	.....
Nevada	Nov. 1, 1939	E. W. Heim	June 14, 1937
Philippines	Nov. 1, 1939	G. L. Rickard	Oct. 15, 193X
Indiana	Nov. 1, 1939	Noble Burkhart	April 15, 1939
Oklahoma	Nov. 1, 1939	C. L. Simpson	Aug. 23, 1939
Idaho	Nov. 1, 1939	C. Eichelberger	June 15, 1939
Eastern N. Y.	Nov. 1, 1939	R. E. Haight	Sept. 16, 1939
Connecticut	Nov. 15, 1939	Fred A. Ells, Jr.	Dec. 4, 1939
Western N. Y.	Nov. 15, 1939	Ed Preston	Dec. 6, 1939
Wisconsin	Nov. 15, 1939	A. C. Krones	Dec. 6, 1939
San Diego	Dec. 1, 1939	H. K. Breedlove	Dec. 16, 1939
Brit. Columbia*	Dec. 1, 1939	J. Hepburn, Jr.	Dec. 20, 1939
So. Texas	Dec. 15, 1939	Dave H. Calk	Dec. 23, 1939

* In Canadian sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of the By-Laws.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list in alphabetical sequence the names of all eligible candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing dates specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the ..... Section of the ..... Division hereby nominate ..... as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.)

The candidates and five or more signers *must* be League members in good standing or the petition will be thrown out as invalid. *Each candidate must have been a licensed amateur operator for at least two years and similarly, a member of the League for at least one continuous year, immediately prior to his nomination or the petition will likewise be invalidated.* The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit to the number of petitions that may be filed, but no members shall sign more than one.

4. Members are urged to take initiative immediately, filing petitions for the officials for each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— *F. E. Handy, Communications Manager*

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given.

No. New Jersey	Joseph P. Jessup, W2GVZ	July 3, 1939
South Carolina	Ted Ferguson, W4BQE	Aug. 25, 1939

In the Manitoba Section of the Prairie Division Mr. A. W. Morley, VE4AAW, and Mr. J. W. Hartley, VE4SR, were nominated. Mr. Morley received 22 votes and Mr. Hartley received 18 votes. Mr. Morley's term of office began August 11, 1939.

In the Eastern Pennsylvania Section of the Atlantic Division Mr. Jerry Mathis, W3BES, and Mr. John B. Morgan, W3QP, were nominated. Mr. Mathis received 235 votes and Mr. Morgan received 186 votes. Mr. Mathis' term of office began August 28, 1939.

In the Arizona Section of the Southwestern Division Mr. Marson B. Hull, W6KMM, and Mr. John K. Oliver, W6KOL, were nominated. Mr. Hull received 39 votes and Mr. Oliver received 34 votes. Mr. Hull's term of office began September 5, 1939.

(Station Activities on page 100)

RADIO'S NEWEST TUBE

TAYLOR TW-150

WITH

THIN WALL CARBON ANODES

GUARANTEED TO STAND 800% OVERLOAD OR MORE

Taylor Thin-Wall Carbon Anode Tubes are guaranteed to stand-up under temporary overloads of 600% to 800% without releasing gas or damaging the emission. Several thousand amateurs have witnessed demonstrations which prove the truth of *this* statement.

TAYLOR LEADS

In presenting the Taylor TW-150, we have introduced several major constructional improvements to the transmitting tube field. Study the features shown here and prove this statement. Taylor Tubes is constantly engineering NEW ideas—not merely copying.

The use of THIN-WALL CARBON ANODES is an original Taylor conception—other tube developments will follow. Yes, Taylor has again led the way. In the TW-150, the grid mount is novel—and insures Puncture-Proof operation. The ratings are extremely conservative and yet *no other tube* in this price range *permits full 1KW Input* telephone operation, to a pair in push-pull.

$15.00

CHARACTERISTICS

Fil. Volts*	10.0	As RF Power Amp.....Class C	
Fil. Amps.*	4.1	DC Plate Volts.....max.....	3000
Amp. Factor	35	DC Plate Current..m a....max...	200
Interelectrode Capacities		DC Grid Current..m a....max...	60
Grid to Plate.....mmf..	2.0	RF Driving Power..watts..max...	20
Grid to Filament..mmf..	3.9	Plate Dissipation....watts..max...	150
Plate to Filament..mmf..	0.8		

*Can be supplied on special order only with 5.0 volt 8.2 Amp. Filament and standard UX 4 prong base.

FEATURES

•VISIBLE OPERATING TEMPERATURE
Operates at cherry red heat at rated plate dissipation.

•COMPLETE ELECTRON CONTROL
One-piece enclosed Anode .015" thick, affords complete "Electron Control" assuring added efficiency — preventing glass failure due to electron bombardment.

•PUNCTURE PROOF
New Scientific method of mounting the grid structure guarantees against punctures due to heating of glass.

•LOWER INTERELECTRODE CAPACITIES
Can be operated in class C amplifiers at full rated input — at frequencies up to 60 MC.

•PROCESSED GRID
A new exclusive Taylor feature makes possible a more abuse-proof grid.

•WARP PROOF ANODE
Thin-Wall Carbon Anode — Heat-proof—retains its shape under any heat condition.

•LARGE INSULATORS
Big size caps — plus Alsimag insulators protect grid and plate leads mechanically, the safe, sensible way.

•LOW DRIVING POWER
Low driving power requirements. A single TZ-20 will do the job easily.

•HEAVY DUTY FILAMENT
Heavy duty Thoriated Tungsten Filament. Available in both 10 volt and 5 volt types.

•NONEX GLASS

•STANDARD BASE
Standard (50W type) 4 prong base.

"More Watts Per Dollar"

TAYLOR TUBES, INC., 2341 WABANSIA AVE., CHICAGO, ILLINOIS

DX Contest Scores

(Continued from page 66)

Oregon

W7AMX	24090	66	122	B-77
W7GBW	6346	38	62	AB-55
W7AHX	3775	25	51	C-60
W7CHT	1800	20	30	B-20
W7EZX	1566	18	25	B-13
W7FMX*	858	13	22	B- -
W7ENN	486	6	26	AB-17
W7CYU	270	6	15	A-15
W7CQE	232	8	10	B-14
W7GPY	231	7	11	- - -
W7GPP	110	5	8	- - -
W7GUP/7	12	2	2	- - -
W7GUA*	3	1	1	- - -
W7GXJ	3	1	1	- - -

Washington

W7CMB	29230	74	132	B-62
W7DL	28116	71	132	C-81
W7AVL	7995	40	65	B-58
W7GEW	6615	35	63	A-55
W7RT	4144	28	51	B-88
W7DYQ	3108	28	39	C-16
W7FJQ	2205	21	35	B-25
W7QB	1215	15	27	B-22
W7FWD*	1152	16	24	- - -
W7JB	1008	14	24	B-27
W7EJD	1008	12	28	B-17
W7GUU	636	12	18	A-24
W7FMK	189	7	9	B-10
W7CKH	105	5	7	- -11
W7DQX	45	3	5	B-11
W7HBL	33	3	4	A- 5

PACIFIC DIVISION

Nevada

W6QQL	1008	14	24	B-17

Santa Clara Valley

W6AHZ	20988	66	106	C-56
W6JWT	18645	55	113	C-63
W6QNK	4050	27	50	C-57
W6NHW	1050	14	25	A-36
W6PBV	756	12	24	B-15
W7MF/6	126	6	7	B- 9
W6CFK	76	4	7	- - -

East Bay

W6ONQ	26625	75	121	C-53
W6LPC	14076	51	92	B-56[12]
W6TT	10296	44	78	C-36
W6PFD	6231	31	67	A-81
W6PEV	4780	30	53	AB-44[13]
W6LTM	4692	34	46	B-79
W6LMZ	3744	26	48	B-27
W6ABE	2877	21	46	B-47
W6LDD	1649	17	33	- -36
W6PHS	1536	16	32	C-17
W6EJA	1053	13	27	B-15
W6SQ	1008	14	24	C-14
W6HJE	315	7	18	B-12
W6MQL	315	7	15	A-10
W6LVI	12	2	2	A- 2

San Francisco

W6BIP	32148	76	141	C-44
W6LEV	21018	62	113	C-79
W6CIS	15785	55	96	B-66
W6MCQ	7720	40	65	B-37
W6ZS	5742	33	58	C- -
W6DIX*	360	9	14	- - -
W6MUF	294	7	14	A- 9
W6LMD*	180	5	12	- - -
W6GPB*	108	6	6	- - -
W6WN	27	3	3	B- 2

Sacramento Valley

W6AJD	25938	66	131	C-85
W6NHA	8979	41	73	B-53
W6EFM	4172	28	51	C-33
W6GVM	660	10	22	C-20
W6GCM*	189	7	9	- - -
W6NKT*	75	5	5	B- 1

San Joaquin Valley

W6MVK	51084	99	178	C-63
W6MEK	35392	79	152	C-87
W6KEV	30810	78	136	C-87
W6MRB	8600	40	80	B-63
W6HIP	4650	30	52	C-23
W6BIL*	18	2	3	- - -

ROANOKE DIVISION

North Carolina

W4CEN	111186	142	263	C-83
W4OG	16830	55	102	B-62
W4FIX	13084	49	89	AB-27
W4MR	11178	46	81	B-50
W4NC	6384	38	56	C- -[14]
W4BVD	4158	33	42	B- -
W4DGF	4030	31	44	B-39
W4ACA	2376	24	35	B-31
W4ATC	1980	20	34	B-55[15]

South Carolina

W4BPD	92625	125	247	C-71
W4AUW	26320	70	126	B-54
W4FEH	9372	27	48	B-15

Virginia

W3CHE	178200	165	360	C-09
W3EMM	172044	163	354	C-83
W3FQP	75240	110	228	C-90
W3AG	5040	30	56	B-25
W3BIW	3190	29	38	B-19
W3GBK	2208	25	31	B-26
W3CYV	605	11	19	B- -
W3FQO	333	10	11	B-27
W3ALF	161	7	8	A-25
W3ELN	84	4	7	B- 2[1]
W3CFL	75	5	5	B- 4

West Virginia

W8LCN	16874	59	96	C-42
W8KKG	16443	63	87	B-50
W8HGA	4309	31	47	B-38
W8PMA	2100	20	35	B-60
W8JKN	858	13	22	B- -
W8PTJ*	90	5	6	B- -
W8JM	18	2	3	A-10
W8PSR*	6	1	2	- - -

ROCKY MOUNTAIN DIVISION

Colorado

W9PGS	48450	95	129	A-70
W9FYY	32562	81	134	C-69
W9WTW	9200	40	77	B-37
W9QOE	1159	19	21	C-26
W9VZZ*	60	4	5	- - -

Utah-Wyoming

W6DTB	12690	47	74	B-38
W6KKG	7140	34	70	B-29
W7AOU	5544	33	64	B-57[17]
W6PDV	2071	19	37	B-43
W7GCO	259	7	13	B- 9
W7ADF	189	7	9	B-28
W7GGG*	3	1	1	- - -

SOUTHEASTERN DIVISION

Alabama

W4ECI	60102	106	189	C-49
W4APU	13794	58	81	- -46
W4EHH	11040	46	80	B-51
W4ELQ	2530	22	39	B-24
W4AIH	473	11	15	A-30

E. Florida

W4QN	22032	68	110	B-64
W4DCZ	21600	60	120	- -35
W4EGL	9399	39	81	B-25
W4EFK	5270	34	54	B-21
W4EQK	2550	25	34	BC-29[18]
W4COV	1501	19	28	A-14
W4EEO	663	13	17	B-12
W4DBF	189	7	9	B- -
W4DZ	105	5	7	A-14
W4FAO	48	4	4	B- 9
W4EPV	3	1	1	- - -

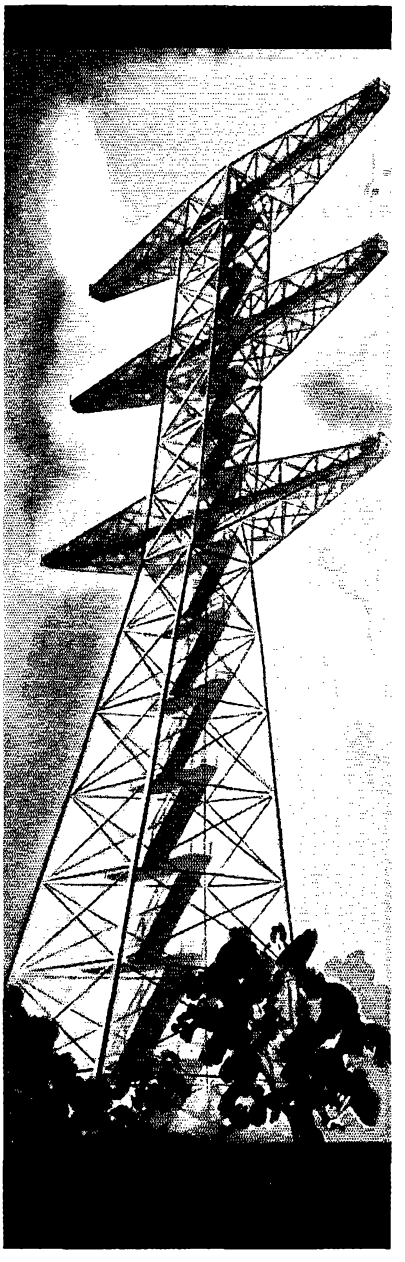
W. Florida

W4CDE	12815	55	80	B-34
W4EPT	5565	35	53	AB-22
W4DAO*	90	5	6	B- 4

Georgia

W4FIJ	33360	80	139	B-73
W4YC	82913	119	233	C-76[19]
W4IO	19116	59	108	C-63
W4AQL	4228	28	51	B-50[20]
W4FKA	1596	19	28	B- -

For the
HIGHER FREQUENCY BRACKETS

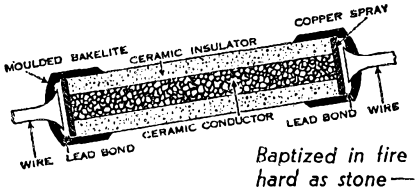


At the "run of the mill" frequencies radio parts designed and produced with "average" care will deliver a satisfactory performance.

But today's ultra-high frequencies demand corresponding ultra-precision parts unaffected by the vagaries typical of these frequencies.

. . . **CENTRALAB** Fixed Resistors have an excellent frequency characteristic less affected by voltage, humidity and frequency changes.

Again we suggest . . . SPECIFY **CENTRALAB.**



Baptized in fire at 2500 degrees — hard as stone — center ceramic core and ceramic jacket fired together to form a single shock-proof unit. Pure copper applied by Schoop metal spray process forms intimate end contact to conducting area.

Radio engineers are now tapping the resources of frequency bands formerly used only in laboratories. In order to make these bands operative parts must now be used that adhere strictly to the limitations of these bands. Centralab engineers have successfully met these problems with Centralab parts.

Centralab
AXIAL LEAD RESISTORS
DIVISION OF GLOBE-UNION, INC., MILWAUKEE, WISCONSIN

SOUTHWESTERN DIVISION

Los Angeles

W6GRL	159543	171	311	C	86
W6CXW	79544	122	218	C	90
W6CUH	52839	103	171	C	54
W6GRX	51548	98	178	B	81
W6QD	41010	95	144	C	81
W6GHU	36000	79	150	BC	76
W6AM	35680	80	150	C	87
W6FZL	30720	80	128	C	65
W6NLZ	20313	61	111	AC	61
W6VB	19108	62	105	C	49
W6PNO	13344	48	93	BC	53
W6NEP	12642	49	82	BC	57
W6FKZ	12408	48	88	C	-
W6NLI	8280	40	69	B	49
W6EAK	6195	35	59	B	-
W6GM	5247	33	53	B	37
W6BXU	4350	29	56	B	68
W6GK	2109	19	37	C	54
W6KNF	1344	14	32	B	18
W6PXQ	1296	16	27	A	47
W6ACL	1176	14	28	B	23
W6DIO	1104	16	23	B	10
W6HJV	900	12	25	B	15
W6PHZ	897	13	23	A	21
W6HEW	832	13	22	-	19
W6EVM	732	12	21	B	12
W6PMW	594	11	18	A	31
W6CPG	510	10	17	B	25
W6NNV	273	7	13	B	5
W6DTY*	36	3	4	-	-
W6MYT*	27	3	3	-	-
W6PDF	18	2	3	A	31
W6EA	12	2	2	A	25
W6OKP*	12	2	2	-	-
W6LVQ	3	1	1	B	1

Arizona

W6QAP	40317	89	153	BC	88
W6OVK*	252	7	12	B	-
W6PWW	120	4	10	B	22
W6PQQ	69	3	8	A	8

San Diego

W6LYM	45630	90	169	C	67
W6GCX	28080	72	130	C	86
W6ITY	27521	73	126	B	85[21]
W6BAM	16968	56	101	C	81
W6AXC	6882	37	62	A	32
W6LVB	3600	24	50	B	17
W6QLA*	3432	26	44	B	-
W6OLU	2530	22	39	B	13
W6GCT	1377	17	27	C	9
W6BVX	924	14	22	B	15
W6POI*	360	8	15	B	-
W6ISG*	162	6	9	-	-
W6NRM	30	3	4	A	-

WEST GULF DIVISION

No. Texas

W5DM	35952	84	144	B	49
W5PJ	20561	66	105	B	91
W5DQD*	2046	22	31	-	-
W5DXA	1881	19	33	B	11
W5YF	1275	17	25	C	14
W5ELE	1260	15	28	B	18
W5FOR	945	11	22	A	60
W5ATY	648	12	18	B	20
W5GSE	540	9	20	B	17
W5DAA	390	10	14	B	14
W5GJG	90	11	16	A	26[22]
W5HIY	75	5	5	A	-
W5GXP	24	2	4	-	-

Oklahoma

W5YJ	28689	73	131	B	70[23]
W5CJZ	3680	23	54	C	23
W5FFW	1660	20	28	B	24
W5FCM	1008	16	21	B	23
W5GC	30	2	5	B	2

So. Texas

W5VV	55848	104	179	B	66
W5VQ	13200	50	88	B	47
W5EUL	9798	46	71	B	31
W5FNA	6156	36	57	B	33
W5FJM	3402	27	42	B	39
W5FI	3240	2	40	-	-
W5EDX	1350	17	25	B	28
W5ARO	540	12	15	A	27
W5CXS	297	9	11	-	-
W5GRF	120	4	10	A	17
W5FTM*	72	4	6	A	-
W5GWL*	12	2	2	A	-

New Mexico

W5CJP	1066	13	28	B	20
W5HAG	693	11	22	A	27

CANADA

Maritime

VE1EA	37433	83	151	B	90
VE1DG	3872	32	41	A	21
VE1MK	2256	24	32	A	17[24]
VE1FB	6052	34	60	B	34
VE1CO	594	11	18	AB	-
VE1CU	36	3	4	A	5

Ontario

VE3QD	38590	85	152	B	81
VE3KE	19370	65	100	A	76
VE3ES	12050	50	81	B	49
VE3AIB	4200	30	47	A	28
VE3VN	1440	18	28	B	39
VE3AMK	1314	16	28	A	40
VE3AQB	1200	16	25	A	16
VE3AUN	1173	17	23	B	13
VE3OO	663	13	18	-	21
VE3DU	330	10	11	A	5
VE3XY*	264	8	11	A	-
VE3VD	259	7	13	B	8
VE3HB	189	7	9	B	9
VE3QT	36	3	4	A	9
VE3AET	30	3	4	A	3

Quebec

VE2AX	26572	73	122	B	66
VE2EE	8190	42	65	B	36
VE2EP	7344	34	48	A	23
VE2HF	3100	25	42	B	41
VE2EW*	2046	22	32	B	23
VE2FC	374	11	12	B	24
VE2OL	27	3	3	-	-

Alberta

VE4GD	3888	27	48	A	37
VE4WJ	1824	19	32	A	33
VE4GE	1615	19	30	AB	-
VE4ADD	966	14	23	A	13
VE4EO	884	13	24	-	41
VE4ADW	135	5	11	A	5

British Columbia

VE5ZM	13524	49	100	AB	52
VE5VO	7474	37	67	B	57
VE5QP	5432	28	70	AB	42
VE5AAD	2277	23	33	A	26
VE5HR	2016	18	54	B	23
VE5HQ	195	5	13	A	18
VE5AFG	190	5	14	B	27
VE5ALR	108	6	6	A	5

Manitoba

VE4RO	52272	99	176	C	76
VE4ED	4698	29	54	B	70
VE4IF	3640	20	61	B	20
VE4AGP	147	7	7	B	12

Saskatchewan

VE4JV	1404	18	27	B	46
VE4BN	872	14	16	A	20
VE4GF	75	5	5	A	13
VE4CK*	3	1	1	-	-

AFRICA

Algeria — FA

FA3RY	4620	14	110	A	40
FA8CR	2385	15	53	A	16
FA8RY	1272	8	53	-	-
FA3JY	1030	10	36	A	10

Egypt — SU

SU1SG	20675	25	276	A	56
SU1WM*	856	8	37	-	-
SU1AX	486	6	27	A	7

Madeira — CT3

CT3AB	46575	27	575	A	55
CT3AN	22220	22	340	A	54

Mauritius — VQ8

VQ8AI	2220	10	76	A	-

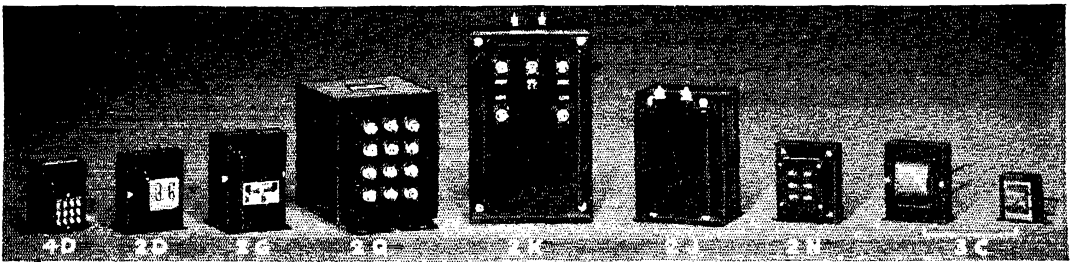
Morocco — CN8

CN8MQ	4194	18	87	A	35
CN8AG	2160	9	81	A	13

Mozambique — CR7

CR7AK	4455	16	99	A	21
CR7AF	2400	8	100	A	19
CR7AL	637	7	31	A	13
CR7BC	39	1	13	A	12

Especially for hams



THE "19" SERIES

The complete line—designed especially to meet every amateur requirement. The "19" Series provides Thordarson quality in the popular price field. The illustration above shows typical units from the line. Included in the line are: plate, driver, bias, modulation, and filament transformers; chokes; and a combination plate and filament transformer. Free Catalog No. 400-D gives complete information on the full series. See your parts distributor or write the factory now for your *free* copy.

TYPICAL CATALOG LISTINGS FROM THE "19" SERIES

"19" SERIES UNIVERSAL DRIVER TRANSFORMERS

Through the use of five ratios on each transformer, this series will handle all driver transformer requirements usually encountered in amateur transmitter circuits. All of them are encased in mounting style 4-D.

Type No.	*Ratio Primary to ½ Secondary*	*Amateur Price*
T-19D01	1:1, 1.2:1, 1.4:1, 1.6:1, 1.8:1	$3.60
T-19D02	2:1, 2.2:1, 2.4:1, 2.6:1, 2.8:1	3.60
T-19D03	3:1, 3.2:1, 3.4:1, 3.6:1, 3.8:1	3.60
T-19D04	4:1, 4.5:1, 5:1, 5.5:1, 6:1	3.60
T-19D05	1:3.15, 1:2.75, 1:2.5, 1:2.25, 1:2, 1:1.75, 1:1.4, 1:1.25, 1:.85, 1:.75	3.60

"19" SERIES UNIVERSAL MODULATION TRANSFORMERS

Tapped coils enable the experimenter to match any modulator tubes to any class C R.F. load. All except T-19M17 are in case style 2N.

Type No.	*Cap. Watts*	*Pr. M.A. Per Side*	*Secondary M.A. Series*	*Par*	*Amateur Price*
T-19M13	15	50	50	100	$2.40
T-19M14	30	75	75	150	4.20
T-19M15	60	125	125	250	6.00
T-19M16	100	175	175	350	9.00
T-19M17	250	225	225	450	14.40

"19" SERIES TRANSMITTER INPUT AND FILTER CHOKES

Matched input and smoothing chokes for amateur, amplifier, or experimental applications. Inductance values are measured under full load conditions and adequate insulation is provided or recommended service.

INPUT OR SWINGING CHOKES

Type No.	*Cap. D.C. M.A.*	*Inductance Henries*	*D.C. Res. Ohms*	*Volts Insulation*	*Mtg. Fig.*	*Amateur Price*
T-19C39	150	5-20	215	3000	2F	$1.95
T-19C35	200	5-20	130	3000	2D	2.40
T-19C36	300	5-20	105	5000	2D	3.90
T-19C37	400	5-20	90	5000	2J	6.00
T-19C38	500	5-20	75	5000	2J	8.40

SMOOTHING CHOKES

T-19C46	150	12	215	3000	2F	$1.95
T-19C42	200	12	130	3000	2D	2.40
T-19C43	300	12	105	5000	2D	3.90
T-19C44	400	12	90	5000	2J	6.00
T-19C45	500	12	75	5000	2J	8.40

THORDARSON ELECTRIC MFG. CO.

500 W. HURON ST., CHICAGO, ILL.

Demand "Power by Thordarson"

Southern Rhodesia — ZE

ZE2JC	115-	5-	8-	A- -

Tanganyika — VQ3

VQ3TOM	6666-	22-	101-	A- -

U. of So. Africa — ZS

ZS2AL	147414-	41-	1338-	A-100
ZS6DW	103311-	39-	907-	A-80
ZS1AN	7700-	20-	129-	- -21
ZS4U	5015-	17-	101-	A-24
ZS1CJ	2142-	9-	80-	A- -
ZS6GI	2130-	10-	71-	A-25
ZS5CX	1440-	10-	48-	A-11
ZS5DC	602-	7-	29-	A-14
ZS5S*	120-	5-	8-	- - -
ZS5BB*	63-	3-	7-	- - -
ZS5B*	51-	3-	6-	- - -
ZS6FD	42-	3-	5-	A- -
ZS6FN	12-	2-	2-	A- 1

ASIA

Burma — XZ

XZ2DX	9-	1-	3-	- - -

China — XU

XU4XA	3368-	8-	143-	B-17

Chosen (Korea) — J8

J8CA	4180-	11-	128-	A-24

Hong Kong — VS6

VS6AG	7020-	18-	133-	A-21
VS6AO	3159-	13-	81-	A-14

India — VU

VU2FX	1413-	9-	51-	B-28
VU2FO	850-	10-	57-	A-34

Japan — J

J2JJ	22609-	23-	331-	A-40
J2KN	12294-	18-	233-	A-45
J3DF	8580-	20-	143-	A- -
J3FZ	3872-	10-	76-	B-21
J2IX	1485-	5-	101-	A-20

EUROPE

Azores — CT2

CT2BJ	3530-	10-	119-	- - -

Belgium — ON

ON4NO	59080-	35-	564-	A-73
ON4NW	56508-	34-	558-	B-88
ON4FE	38280-	33-	387-	B-63
ON4IF	26560-	32-	281-	B-44
ON4PW	10902-	23-	161-	A-46
ON4SG	10104-	24-	143-	AB-37
ON4IW	5344-	16-	122-	A-41
ON4LX	3021-	19-	53-	AB-23
ON4AW*	1606-	11-	49-	A- 7
ON4AZ	756-	9-	36-	A-16
ON4GU	744-	8-	31-	A- 9
ON4OU	496-	8-	21-	- - -
ON4HS	378-	6-	22-	A- -

Danzig — YM

YM4AS	1287-	11-	39-	A-15

Denmark — OZ

OZ9Q	61914-	34-	616-	A-76
OZ7CC	1545-	15-	35-	- - -
OZ8B	432-	6-	24-	A- -
OZ7S	336-	8-	16-	A- -

Eire — EI

EI4J	70770-	35-	674-	- -90
EI6G*	50200-	32-	496-	A-60
EI5G	1834-	14-	45-	A-11
EI5F	3-	1-	1-	- - -

Estonia — ES

ES5D	5066-	18-	114-	A-30
ES1E	18-	2-	3-	A- 2

Finland — OH

OH2PS	63-	3-	7-	A- 9

France — F

F8RR	38160-	30-	443-	A-55
F3LE	20139-	27-	253-	A-85
F8VJ	15392-	26-	201-	A-31
F8TQ	14224-	28-	175-	A-17
F8IZ	12084-	19-	220-	A-22[25]
F8WK	9036-	18-	172-	A-19
F8CT	6331-	13-	163-	B-19
F3LG	3600-	16-	78-	A-22
F3JR	2601-	17-	57-	A-16
F8BS	1152-	8-	48-	A- 5
F3IB	100-	5-	6-	A- 1
F8IL	45-	3-	5-	A- -
F8XK*	39-	3-	5-	A- -
F8XP	27-	3-	3-	A- 1
F8NV*	27-	3-	3-	- - -

Germany — D

D4GAD	54510-	36-	535-	A-90
D4AFF	20130-	30-	236-	A-70
D4WER	17250-	25-	234-	A-62
D4QET	15428-	28-	195-	A-36
D4FND	12875-	25-	173-	A-51
D4BUF	12432-	28-	149-	A-44
D4WXD	10428-	22-	158-	- -49
D3CUR	5814-	19-	102-	A-17
D4KPJ	5658-	23-	82-	A-35
D3GKR	4872-	21-	81-	A-42
D3CDK	2655-	15-	59-	A-32
D4HNG	2295-	17-	45-	A-21
D4VRR	1778-	14-	44-	A-25
D4BFU	1530-	15-	37-	A-25
D4YTM	1044-	12-	29-	A-22
D3FVI	384-	8-	16-	A- 9
D4MLF	264-	11-	15-	A- -
D4PQU	180-	5-	15-	A-15
D4YUM	168-	7-	8-	A- 8
D4QBT	72-	3-	8-	A- 6
D4DTC	60-	4-	5-	A- 4
D4YYK	36-	3-	4-	A-10
D3AUK	12-	2-	2-	A- 5

Great Britain — G

G6NF	70041-	37-	635-	B-85
G6WY	59465-	35-	569-	B-68
G6RB	31756-	31-	313-	B-71
G2MI	26248-	31-	261-	AB-73
G6QS	21390-	30-	241-	A-77
G6MC	10498-	29-	126-	A-29
G5SO	8970-	23-	130-	A-27
G6CJ*	8004-	24-	124-	- - -
G8IG	7277-	19-	131-	- -29
G6BQ	5544-	14-	132-	A-38
G6CL	3705-	19-	65-	A- -
G6YR	3392-	16-	73-	A-19
G3SD	2928-	16-	61-	A-25
G8RL	1853-	17-	37-	A- -
G8QZ	1110-	10-	37-	A-25
G3RN	592-	8-	25-	A-22
G8PI*	494-	9-	20-	- - -
G5FN	336-	7-	16-	A- 7
G5BD	234-	6-	14-	- - -
G2RO	198-	6-	11-	A- 3
G2UX*	175-	7-	9-	A- -
G8AH*	126-	6-	7-	A- -
G3MF	120-	5-	8-	A- 9
G3HG*	33-	3-	4-	A- -
G5JF*	27-	3-	3-	A- -
G8FL*	18-	2-	3-	- - -
G8NO*	18-	2-	3-	A- -
G5ZD*	12-	2-	2-	- - -
G6XA*	12-	2-	2-	- - -
G5OJ*	3-	1-	1-	- - -

Hungary — HA

HA4H	35310-	33-	368	A-75
HA8D	33132-	33-	339-	A-71
HA3H	1377-	17-	31-	A- -

Italy — I

I1TKM	31800-	30-	358-	B-42
I1MH	17992-	26-	126-	A-36
I1ER*	483-	7-	24-	A-12

Latvia—YL

YL2BZ	320-	8-	16-	A-14

Lithuania—LY

LY1KK	14490-	30-	161-	A- -
LY1S	12624-	24-	172-	B-59
LY1J	160-	5-	12-	B- 4

Netherlands—PA

PAΦPN	44800-	34-	443-	A-64
PAΦQQ	24861-	32-	265-	A-70
PAΦEA	24831-	31-	267-	A-39
PAΦUV	23360-	32-	244-	A-67
PAΦAZ	20039-	29-	231-	A-45
PAΦEP	13068-	18-	246-	A-52
PAΦOO	6969-	23-	101-	A-43
PAΦXF	6660-	20-	111-	A-28
PAΦAD	5760-	18-	107-	- - -
PAΦDA	4116-	14-	100-	A-37
PAΦJX	3465-	21-	57-	A-30
PAΦFLX	3300-	20-	56-	A-57
PAΦOK	2130-	10-	71-	A-25
PAΦCN	1064-	14-	26-	A-15
PAΦQK	707-	7-	36-	- - -
PAΦNN	660-	10-	22-	A- -
PAΦXR	546-	7-	26-	A- 5
PAΦLO	288-	8-	12-	A- 6
PAΦJR	72-	4-	6-	A- 4
PAΦQZ	12-	2-	2-	- - -

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Take your choice!

Low and medium power transmitting types at economical prices for every amateur application. Recommended uses and nominal ratings given below for the amateur's convenience.

Type	Plate voltage	Watts output
XTAL OSCILLATOR		
6L6GX tetrode	400	15
HY60 tetrode	425	15
HY61 tetrode	600	25
DOUBLER		
6L6GX tetrode	400	18
HY60* tetrode	350	12
HY61* tetrode	600	25
HY25 triode	750	25
HY40Z triode	1000	40
HY51Z triode	1000	65
BUFFER		
HY60* tetrode	425	16
HY61* tetrode	600	37.5
HY40-Z triode	1000	75
HY51A-B-Z triode	1000	115
POWER SUPPLY		
866 Jr.	1000 DC	250 ma. per pair
866 2350 DC		500 ma. per pair

6L6GX—$1.25

HY61—$3.00

HY40Z—$2.75

Type	Plate voltage	Watts output
FINAL AMPLIFIER (Class C unmodulated)		
6L6GX tetrode	500	30
HY60* tetrode	425	16
HY61* tetrode	600	37.5
HY25 triode	750	42
HY40-Z triode	1000	86
HY51A-B-Z-triode	1000	125
MODULATOR (Two tubes in push-pull)		
6L6GX tetrode	500	65
HY60 tetrode	300	25
HY61 tetrode	600	80
HY25 triode	800	75
HY40-Z triode	1000	175
HY51A-B-Z triode	1000	225
U-H-F OSCILLATOR		
HY114 triode	180	2.0
HY615 triode	300	4.0

Engineering bulletins available upon request.

*Beam tetrodes fully shielded for unneutralized operation at radio frequencies. Require less than ½ watt driving power.

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Northern Ireland—GI

GI5QX	21576-	29-253-	A-55
GI6YW	3408-	16- 71-	A-14

Norway — LA

LA2B	1265-	11- 39-	A-13
LA6F	539-	7- 26-	A-13
LA7W	520-	8- 22-	A-17
LA7Z	475-	5- 34-	A-20
LA7A	468-	6- 26-	A- 8
LA7Y	260-	5- 18-	A- 6
LA5B	241-	7- 11-	A- 8
LA8J	135-	5- 9-	A- -
LA2U	12-	2- 2-	A- -
LA4K	12-	2- 2-	A- 3
LA7N	5-	1- 2-	A- 1

Poland — SP

SP1MX	12038-	26-158-	B-84
SP1YX	12030-	30-137-	B-42
SP1AR	7414-	14-106-	C-60
SP1EB	1610-	14- 40-	A-36
SP1MJ	765-	9- 29-	A-23
SP1LS	510-	10- 18-	A- 6
SP2FU	39-	3- 5-	B- 2
SP1CO	33-	3- 4-	A-40
SP1IB	22-	2- 5-	A- 4
SP1WJ	12-	2- 2-	A- 4
SP2PF	10-	2- 2-	A-40

Portugal — CT1

CT1JU	18725-	25-254-	B-50
CT1ZA	13575-	25-182-	A-30
CT1GG	5160-	10-172-	- - -
CT1CO	4980-	10-179-	A-25
CT1PC	3094-	13- 83-	A- -
CT1QF	854-	7- 44-	A- 8
CT1ET	300-	6- 17-	A- -

Roumania — YR

YR5CF	39184-	32-423-	B- -
YR5VV	15818-	22-241-	B-41
YR5AR	70-	5- 5-	A-10
YR5IT	46-	2- 8-	A-15
YR5CJ	12-	2- 2-	A- 1

Scotland — GM

GM6NX	23100-	28-275-	A-52
GM8CN	12432-	21-202-	A-40
GM8SV	9300-	13-126-	A-28
GM5GK	2470-	10- 87-	A-18
GM8MN	2061-	9- 79-	A-25
GM3OM	666-	9- 28-	A-11
GM8FR	336-	7- 18-	A-33
GM8SQ	245-	7- 13-	A- 9
GM8RJ	63-	3- 7-	A- 1

Sweden — SM

SM7MU	27020-	28-325-	B-43
SM7UC	24931-	29-287-	B-54
SM5NV	2652-	13- 72-	A-23
SM6UJ	1716-	13- 45-	AB-10
SM5SI	405-	9- 17-	B- 5
SM6WL	240-	6- 14-	- - -
SM6UA	162-	6- 9-	B- 6
SM5XW	150-	5- 10-	A-11

Switzerland — HB

HB9AW	18150-	25-246-	A-39
HB9J	11310-	26-146-	A-18
HB9AC	4266-	18- 79-	- - -
HB9DB	2171-	13- 57-	A-41

Wales — GW

GW3QN	3060-	15- 68-	A-24
GW3JI	2910-	10- 97-	A-24

Yugoslavia — YT/YU

YU7LX	124-	4- 11-	- -12

NORTH AMERICA

Alaska — K7

K7GSC	22350-	25-302-	B-30

Barbados — VP6

VP6YB	588-	7- 28-	- - 3

Bermuda — VP9

VP9X	17880-	20-304-	A-32

British Honduras — VP1

VP1WB	3-	1- 1-	A- -

Canal Zone — K5/NY

K5AF	91020-	10-841-	C-66[28]
NY1AA	50015-	35-486-	A-63
NY1AD	47985-	35-457-	B-35
NY2AB	8316-	21-132-	B-11
K5AM	2730-	10- 91-	- - -
K5AA	1270-	10- 46-	- - -
K5AN*	3-	1- 1-	- - -

Costa Rica—TI

TI2FG	35910-	35-342-	B-22

Cuba—CM

CM2OP	31062-	31-334-	B-22
CM7AC	23550-	30-269-	B-28
CM2AP	1080-	9- 74-	A-11

Haiti — HH

HH2MC	19006-	13-511-	- -66
HH2ES	13986-	14-333-	A-17[26]

Honduras — HR

HR4AF	67896-	36-648-	B-55
HR7WC	34017-	29-392-	A-50

Martinique — FM8

FM8AD	67394-	31-729-	A-46

Mexico — XE

XE2N	230584-	41-1910-	B-85
XE1CM	111000-	14-1000-	B-60
XE1AM	57519-	33- 581-	B-60
XE1AX	33376-	32- 349-	B-28

Newfoundland — VO

VO1D	8551-	10-168-	B-24
VO1O	150-	5- 10-	A- -

Panama — HP

HP1X	1110-	10- 37-	A-12
HP1A*	336-	7- 16-	- - -

Puerto Rico — K4

K4DTH	176778-	42-1406-	B-87
K4FCV	114228-	38-1020-	B-58
K4KD*	53712-	36- 499-	B-40
K4EWJ	4658-	17- 100-	A-12

Salvador — YS

YS2LR	97992-	14-914-	A-53

Windward Islands—VP2

VP2LB	26730-	22-405-	A-38
VP2LC	25278-	22-383-	A-34

OCEANIA

Australia — VK

VK2ADE	107040-	40-892-	A-82
VK2EO	52635-	33-556-	A-75
VK3IW	28080-	30-314-	A-49
VK2RA	27270-	30-303-	AB-38
VK4UR	22680-	28-275-	A-48
VK3UM	21424-	26-279-	A-62
VK2TI	16936-	29-200-	B-32
VK3XB	12705-	21-205-	A-40
VK6SA	8448-	24-118-	A-20
VK4JU*	7154-	14-172-	A- -
VK2QL	3315-	17- 65-	- -19
VK3CX	3136-	16- 66-	A-13
VK3HT	2871-	11- 89-	A-30
VK2AJU	2508-	11- 77-	B-15
VK3JA	2224-	16- 47-	A- 9
VK2ACX	2040-	10- 68-	- - -
VK3EH	2028-	13- 52-	A-14
VK3PG	1990-	10- 67-	A-15
VK3HG	1728-	16- 36-	A- 6
VK3QB	1672-	11- 51-	A- -
VK3YS	1512-	9- 56-	A- -
VK4CG	1476-	12- 41-	A- 8
VK3NQ	450-	6- 25-	A-19
VK2AFJ*	351-	9- 13-	A- -
VK3QV	304-	8- 13-	A- 4
VK3RJ	240-	5- 16-	- - -
VK2ZJ	156-	6- 9-	A- 5
VK5TX*	60-	5- 4-	- - -
VK2PV*	12-	2- 2-	- - -

Hawaii — K6

K6FAZ	103284-	36-960-	B-74
K6LKN	93366-	39-808-	B-77
K6CGK	79809-	37-726-	B-64
K6PSB	38082-	33-391-	B-40
K6LBH	31128-	24-448-	C-42
K6PGQ	29357-	31-331-	B-48
K6PUS	20194-	23-294-	B-85
K6MVF	19250-	22-294-	B-36
K6PHD	17248-	22-273-	B-44
K6PTY	5850-	15-130-	A-15
K6QYI	3300-	11-113-	A-15
K6QBI	1848-	11- 58-	A-14

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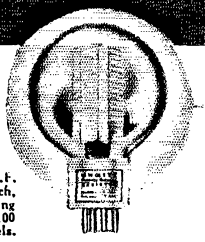
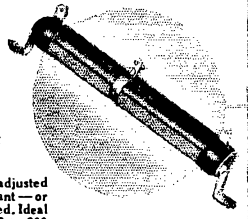
Be particular about the parts that go in your rig. Use *Ohmite*—the kind that has been time-proved and adopted as standard equipment by leading manufacturers of amateur, commercial and broadcast transmitters and receivers. You'll be sure, then, of continuous, trouble-free performance and maximum efficiency in every stage. Get these and other Ohmite parts from your Jobber. *Send today for Ohmite Catalog 17 — it's free!*



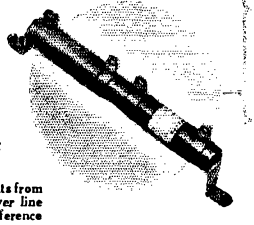
Dummy Antenna

Used in checking R.F. power, impedance match, line losses, etc., for tuning up to peak efficiency. 100 watt and 250 watt models.



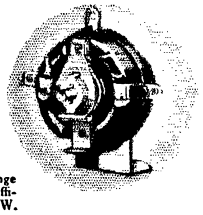
Adjustable Dividohms

Easily, accurately adjusted to resistance you want — or tapped where needed. Ideal voltage dividers. 10 to 200 watts.



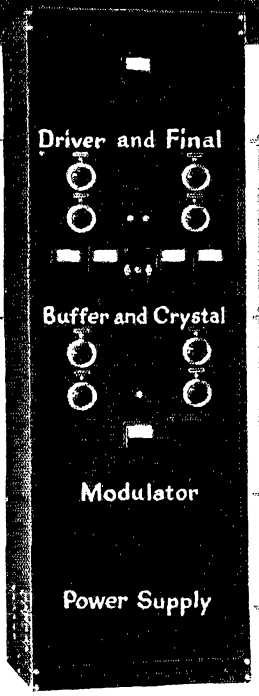
Power Line Chokes

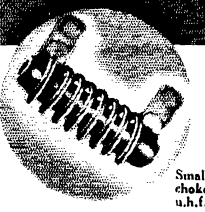
To keep R.F. currents from going out over power line and causing interference with radio receivers.



Band Switch

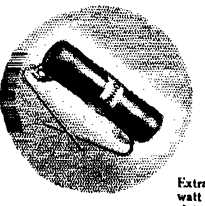
Quick, easy band change with really low-loss efficiency. For rigs up to 1 K.W.





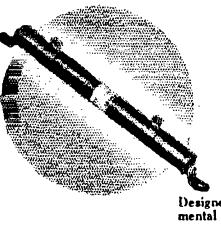
Parasitic Suppressor

Small, compact resistor and choke designed to prevent u.h.f. parasitic oscillations.



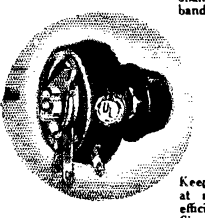
Brown Devils

Extra-sturdy 10 and 20 watt vitreous-enameled resistors for voltage dropping, bias units, bleeders, etc.



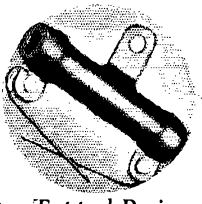
R.F. Plate Chokes

Designed to avoid fundamental or harmonic resonance in the amateur bands. 1000 M.A. rating.



Vitreous Enameled Rheostats

Keep power tube filaments at rated value for best efficiency and long life. Sizes from 25 to 1000 watts.



Center-Tapped Resistors

Used across transmitter tube filaments to provide an electrical center for the grid and plate returns.

OHMITE Manufacturing Company, 4864 Flournoy Street, Chicago, U. S. A.

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RHEOSTATS ★ RESISTORS ★ TAP SWITCHES

K6PAL*	291-	7-	15-	A- -
K6QMA	251-	5-	17-	A-42
K6NSD*	234-	6-	13-	- - 5
K6QOF	45-	3	5-	- - -

New Zealand — ZL

ZL1MR	120042-	39-1032-		A-86
ZL4DQ	84591-	39-723-		A-75
ZL1BT	48230-	35-462-		A-64
ZL2MM	11791-	13-305-		A-56
ZL2GL	9060-	12-253-		A- -
ZL1LC	4932-	12-137-		A-10
ZL3GR	3465-	11-105-		A-13
ZL1CI	2268-	12- 65-		A-12
ZL2US	1672-	11- 52-		A-27

Philippine Islands — KA

KA1SP	196-	2- 33-		- - -

Phoenix Islands — KF6

KF6DHW	7344-	18-136-		A- -

Sumatra — PK4

PK4KS	10890-	15-243-		B-40

Tasmania — VK7

VK7CM	17688-	22-268-		A-28
VK7LZ	10846-	22-170-		A-32
VK7DS*	3-	1-	1-	A- -

SOUTH AMERICA

Argentina — LU

LU5AN	110592-	36-1017-		A-82
LU1EP	80771-	37-743-		A-85
LU9BV	78741-	39-688-		A-86
LU9AX	61050-	37-562-	AB-	81
LU7AZ	16362-	27-202-		A-14
LU4DQ	2988-	9-112-		A-23
LU1CA	1903-	11- 59-		A-19
LU3EV	420-	7- 20-		A- -

Brazil — PY

PY2AC	41076-	36-381-		B-41
PY5AG	4303-	13-112-		A-20
PY2AL	1780-	10- 62-		B-12
PY2KT	1320-	8- 63-		A-13
PY5QJ	918-	9- 34-		- - -
PY1FM	350-	7- 18-		A- 6
PY1CI	315-	7- 15-		A- 2
PY4FK	264-	8- 11-		A- 9
PY2IH	150-	5- 10-		B- 4

Chile — CE

CE4AD	31920-	28-382-		A-38

Curaçao — PJ

PJ5EE	105-	5-	7-	A- 1

Ecuador — HC

HC1PZ	3300-	11-100-		A- 6

Trinidad — VP4

VP4TO	20042-	22-317-		A-36
VP4TN	1760-	16-101-		A- -

Uruguay — CX

CX1FB	19278-	27-238-		- -39

Venezuela — YV

YV4AE	15764-	14-383-		- -45
YV4AX	936-	8- 39-		- - -

'Phone Scores

ATLANTIC DIVISION

E. Pennsylvania

W3EOZ	87282-	78-373-		C-77
W3FJU	26400-	55-160-	BC-	46
W3BET	4840-	27- 60-		B-32
W8OKC	4104-	24- 57-		B-21
W3FKO	2268-	18- 24-		A-17[28]
W3FFG	1305-	15- 29-		B-11
W3UA	1005-	15- 23-		C-11
W3GTL	660-	10- 22-		- - -
W3ACF	648-	12- 18-		B-11
W3FPR*	324-	9- 12-		- - -
W8AGE	315-	7- 15-		B-11

Md.-Del.-D.C.

W3BNC	31472-	56-188-		C-59
W3FII	15962-	46-116-		- -42
W3HLH	11200-	35-107-		A-63
W3AKX	3078-	18- 57-		B-26
W3AED	1980-	22- 30-		C-12
W3BCS	1953-	21- 33-		B-18
W3GKN	1458-	18- 27-		A-17
W3EJX	540-	12- 15-		C- 9
W3AIB	450-	10- 15-		A- -
W3HPU	300-	10- 10-		B-25
W3DUK	285-	8- 12-		B- -
W3FZH	234-	9- 9-		- - -
W1HJ/3	150-	5- 10-		A- 4
W3LE	147-	7- 7-		B- -
W3EWC*	27-	3- 3-		B- -

So. New Jersey

W3PC	8844-	44- 67-		C-16
W3BVE	3762-	22- 57-		B-39
W3BEI	2124-	18- 41-		- -16
W3HOH	2052-	18- 38-		B-20
W3AXU	900-	15- 20-		- -12
W3GPU	297-	9- 11-		B- -
W3ZX	126-	6- 7-		- - -
W3BCV*	36-	3- 4-		A- -
W3FHY	12-	2- 2-		B- 1

W. New York

W8DST	85455-	81-353-		C-71
W8BDO	18148-	52- 76-		C-71
W8ACY	4056-	26- 52-		C-15
W8NKA	1092-	14- 26-		B-32
W8CKY	977-	16- 21-		B-23
W8RQB*	48-	4- 4-		B- 2

W. Pennsylvania

W8QXT	25080-	55-152-		C-48
W8KBJ	2616-	21- 42-		C-12
W8ANC	420-	10- 14-		A-17
W8CMK	408-	8- 18-		B-11
W8QVM	384-	8- 16-		- - -
W8SWK*	264-	8- 11-		A-30
W8OUT	105-	5- 7-		- - -
W8QGH	90-	5- 6-		- - -
W8RED	48-	4- 4-		B- 2
W8QVQ*	25-	5- 5-		- - -
W8SLC*	3-	1- 1-		- - -

CENTRAL DIVISION

Illinois

W9DKU	58275-	75-259-		C-76
W9QI	29295-	63-155-		C-75
W9GYK	20700-	50-138-		B-65
W9CBJ	14361-	39-126-		B-56
W9NLP	12972-	47- 92-		C-35
W9ROQ	7533-	27- 93-		- -45
W9TYJ	5133-	29- 59-		A-32
W9VXL	3096-	24- 43-		- -42
W9ZYL	3096-	24- 43-		B-51
W9CIU*	2772-	21- 44-		- - -
W9FJB	2622-	23- 38-		B-14
W9AGM	1488-	16- 31-		A-19
W9UAZ	1258-	17- 26-	AB-	43
W9VMV	1767-	19- 31-		B-11
W9CUX	900-	15- 20-		B-21
W9GY	798-	14- 19-		C-14
W9BBR*	672-	12- 28-		- - -
W9NBT*	580-	10- 20-		A- -
W9OF	576-	8- 24-		B-15
W9PEQ	470-	10- 16-		- -18
W9OLM	384-	8- 16-		A- -
W9VSX	378-	9- 14-		A-10
W9WXT*	288-	8- 12-		- - -
W9TB	216-	8- 9-		- - -
W9LO	210-	7- 10-		B-14
W9WC	137-	7- 7-		- - -
W9QGN*	108-	4- 9-		B- -
W9BCQ*	90-	5- 6-		B- -
W9UBS	48-	4- 4-		B- -
W9NQI	12-	2- 2-		A- 7
W9SGL	12-	2- 2-		A- 9

Indiana

W9MM	20592-	48-143-		- -64
W9LQ	18144-	49-126-		B-72
W9LZP	5022-	27- 62-		B- -
W9USU	1848-	14- 44-		B-23
W9UUN	1260-	15- 28-		A-26
W9JKK	1092-	13- 28-		B-50
W9AKJ	1078-	14- 26-		A- -
W9DJU	384-	8- 16-		- - 4
W9FXI*	216-	8- 9-		- - -
W9CP	198-	6- 11-		- - 6
W9CTT*	105-	5- 7-		- - -
W9DMH*	12-	2- 2-		- - -

Kentucky

W9ELL	58167-	69-281-		C-69
W9WMI	1596-	19- 28-		A-21
W9YHQ*	726-	11- 22-		B- -

Michigan

W8NJP	93104-	88-354-		C-77
W8KML	86856-	88-333-		- -72
W8QDU	28096-	64-147-		C-44
W8JLJ	9348-	41- 78-		- -44
W8RLT	8410-	29- 94-		B-75
W8QQE	3150-	21- 50-		B-16

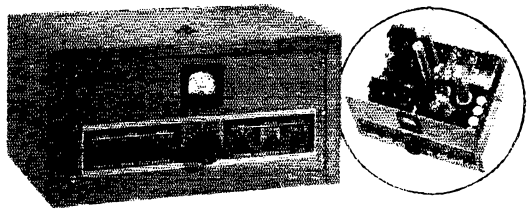
STANCOR'S *New 1940 Kits*

Stancor unveils two more of the new 1940 kits. Although the prices are extremely attractive, no compromise of design or quality has been tolerated. Additional information may be obtained from the new Hamanual.

STANCOR 100MB TRANSMITTER

At last a real band-shifting transmitter wherein one switch rotation completes the change-over of all circuits. The approximate amplifier input is 100 watts delivered by a self-contained power supply. The 100MB has meter and crystal switching, safety features and commercial appearance at an unbelievable figure.

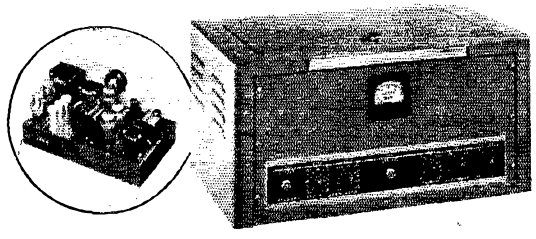
Approximate net price (less accessories) — $42.00



STANCOR 440M MODULATOR

A companion unit permitting radiotelephony with the 100 MB and having equally attractive features. Some of the highlights are 40 watts of undistorted audio power output, an over-modulation indicator, and both high and low gain inputs.

Approximate net price (less accessories) — $37.50



Never before has such value been offered. The 100MB and 440M provide a complete 100 watt phone-CW band-switching transmitter for less than $80.00 net. The standard panel dimensions of both units allow them to be mounted on a relay rack, in a single cabinet, or in separate cabinets.

TRANSFORMER CATALOG

Stancor's Catalog No. 140-A lists transformers for all types of application. Contains valuable charts. Assures the correct unit being used at all times.

STANCOR THOROBRED

America's first safety plate Transformer. The only transformer of its kind — anywhere. Your Stancor jobber has it — be sure to see it.

STANCOR

HAMANUAL *FREE*

The Fourth Edition Hamanual, available from your Stancor distributor about October 1st, will reveal many interesting transmitter and amplifier kits, and will contain a transformer catalog.

STANDARD TRANSFORMER CORPORATION

1500 NORTH HALSTED STREET, CHICAGO

W8QGZ	1782-	18-	33-	- - -
W8CFQ	1638-	21-	26-	C-13
W8MCC	1260-	15-	28-	A-25
W8JAH*	924-	14-	22-	- - -
W8QBR	840-	14-	20-	B- -
W8NJT	756-	12-	21-	C-13
W8KO	598-	13-	16-	B-35
W8MCB	507-	13-	21-	C-15
W8KSL	470-	10-	16-	B- -
W8SJL	429-	11-	13-	- - -
W8PSU	288-	8-	12-	A- -
W8SDR*	162-	6-	9-	- - -
W8QAG*	48-	4-	4-	- - -
W8NML	45-	3-	5-	B- 9
W8IQS	27-	3-	3-	B- 5
W8BTP	12-	2-	2-	- - -
Ohio				
W8LFE	21390-	46-	155-	B-48
W8AAJ	20280-	46-	147-	- -62
W8NV	13275-	45-	99-	C-35
W8NXF	8277-	31-	89-	B-31
W8PEN	4048-	23-	59-	B-44
W8NK	4002-	23-	58-	B-25
W8GFF	3942-	27-	49-	B-17
W8EHZ	3300-	20-	50-	B-42
W8KZD	3036-	22-	46-	B-53
W8DJJ	2640-	22-	40-	B-31
W8LAX	2576-	23-	38-	B-39
W8FGV	1995-	19-	35-	B-26
W8QBF*	1728-	18-	32-	- - -
W8SAF	1050-	14-	25-	B-21
W8SDD*	960-	16-	20-	- - -
W8VZ	897-	13-	23-	- - -
W8JXY	510-	10-	17-	B-19
W8LCO	264-	8-	11-	B-10
W8IWS	168-	7-	8-	C- 7
W8PMP*	36-	3-	4-	- - -
W8JLQ*	12-	2-	2-	A- 2
Wisconsin				
W9BCV/9	39123-	63-	207-	C-71
W9NMH	11316-	41-	92-	B-46
W9RBI	8448-	32-	88-	- -48
W9OFL	1881-	19-	33-	B-11
W9ESJ	1104-	16-	23-	C-10
W9IZQ	216-	6-	12-	- - 9
W9DRN	198-	6-	11-	B- 9
W9DDD	75-	5-	5-	B- 5
W9VDY*	56-	4-	5-	- - -
W9QIH	27-	3-	3-	- - -
W9YKH	3-	1-	1-	A- 1

DAKOTA DIVISION

North Dakota				
W9VSK	1488-	16-	31-	B-20
W9RPJ	798-	14-	19-	A-65
W9ANL	216-	6-	12-	B-31
W9ZLP	12-	2-	2-	A- -
South Dakota				
W9PZI	4623-	23-	67-	B-46
W9HBA	1485-	15-	33-	A-27
No. Minnesota				
W9PFR	2875-	23-	43-	B-55
W9RIL	1620-	18-	30-	B-11
W9WDA*	1428-	14-	34-	B-49
W9NIM	198-	6-	11-	A-10
W9QVP	36-	3-	4-	A- -
So. Minnesota				
W9NNO	20130-	55-	123-	B-57

DELTA DIVISION

Arkansas				
W5ASG	44280-	72-	205-	B-84
W5AKZ	32198-	62-	173-	B-37
W5FPD	5790-	30-	65-	B-25
Louisiana				
W5ACY	7755-	33-	80-	B-38
W5CXH	7030-	37-	64-	B-21
W5EB	6528-	34-	64-	B-23
W5FTA	4107-	17-	37-	A-21
W5FUS	1710-	19-	30-	B-12
W5HTT*	1680-	20-	28-	- - -
W5BHL*	840-	14-	20-	- - -
W5KC	378-	9-	14-	A- 5
W5HCE	27-	3-	3-	A- -
Mississippi				
W5DNV	27144-	58-	156-	B-36
Tennessee				
W4SW	29928-	58-	174-	C-53
W4FQT	7344-	34-	72-	C-62
W4DQH	3384-	24-	47-	B-37
W4AXV	847-	11-	27-	B-20

HUDSON DIVISION

E. New York				
W2IKV	49968-	72-	232-	BC-52
W2EOA	47424-	76-	208-	BC-63[39]
W2LSB	13209-	37-	119-	B-83[36]
W2HCE	5643-	27-	71-	C-15
W2JLH	2625-	21-	43-	B-48
N. Y. C. & Long Island				
W2UK	106533-	89-	399-	C-85
W2JWW	47510-	71-	224-	B-60
W2KHR	3795-	23-	55-	- - -
W2GHK	3667-	19-	67-	B-21
W2IXY	2331-	21-	37-	C- 9
W2ICI	2106-	18-	39-	B- -
W2KDS*	1615-	19-	29-	- -30
W2FHJ	1072-	16-	23-	B- 6
W2IFL	360-	10-	12-	B- -
W2KAZ	210-	7-	10-	B- 5
W2CKO	196-	7-	10-	- - 6
W2DN	189-	7-	9-	- - -
W2JEB*	144-	4-	12-	B- -
W2KOT	90-	5-	6-	B- -
W2ECR	24-	3-	4-	- - -
No. New Jersey				
W2JT	82698-	77-	358-	C-75
W2IUV	44070-	65-	226-	B-73
W2DYR	40296-	73-	186-	B-86
W2GRG	29811-	57-	175-	C-51
W2GIZ	19872-	46-	144-	- -40
W2AOG	9690-	34-	97-	B- -
W2ALK	6405-	35-	61-	B-26
W2GW	5022-	31-	54-	C-14
W2FMP	3036-	23-	44-	C-19
W2BYD	2457-	21-	39-	B-19
W2BDQ	2391-	21-	38-	B-43
W2CAY	1425-	19-	25-	- -12
W2BYM	1350-	18-	25-	B-10
W2JLZ	672-	14-	18-	B-34
W2BUK	648-	12-	18-	A-22
W2JUJ	420-	12-	12-	B- -
W2CSS	280-	7-	14-	B-19
W2DOE	147-	7-	7-	- - -
W2DBY	144-	6-	8-	- - 8
W2DOZ	120-	5-	8-	B- 4
W2KHK	90-	5-	6-	B- 2
W2DZA	36-	3-	4-	- - -
W2GE	18-	2-	3-	- - -
W2HID	3-	1-	1-	- - -

MIDWEST DIVISION

Iowa				
W9MCD	30561-	61-	167-	C-81
W9WIP	12000-	40-	100-	B-61
W9UOP	3552-	24-	50-	C-35
W9WLT	1485-	15-	33-	B- -
W9ZYS	792-	12-	22-	A-26
W9BFL	416-	8-	18-	- - -
W9ZQI	27-	3-	3-	A- -
W9VJF*	8-	2-	2-	- - -
W9JHB	3-	1-	1-	- - -
Kansas				
W9CVN	30855-	55-	187-	C-55
W9TTS	11931-	41-	97-	B-81
W9IGQ	798-	14-	19-	B- 9
W9QNB*	684-	12-	19-	- - -
W9QZS	612-	12-	17-	B- 8
W9AVQ	72-	4-	6-	A- 8
W9ZFV*	12-	3-	4-	- - -
W9CKV*	2-	1-	2-	- - -
Missouri				
W9ARA	78075-	75-	347-	C-75
W9BEU	37805-	53-	241-	C-83
W9VAV	6603-	31-	71-	B-24
W9UCK	6541-	31-	67-	B-54
W9HVT	4374-	27-	54-	B-13
W9TFQ	4026-	22-	61-	A-29
W9VXV*	1824-	19-	33-	B- -
W9VMU	495-	11-	15-	A- -
W9ZFF	462-	11-	14-	- - -
W9EYM*	360-	10-	12-	- - -
W9SOO	216-	8-	9-	A- -
W9WVQ*	216-	8-	9-	B- 5
W9EAG*	126-	7-	18-	C- -
Nebraska				
W9ZNA	9090-	30-	101-	- -35
W9BBS	7740-	36-	72-	C-59
W9MGV	1116-	12-	31-	B-25
W9YDC	150-	5-	10-	B- 3
W9COU	105-	5-	7-	- - -
W9GDB	36-	4-	5-	A- 5
W9HGV	24-	3-	4-	- - -

AMATEURS— YOUR THOUGHTS MAY BE WORTH MONEY

ZENITH RADIO CORPORATION

6001 DICKENS AVENUE

CHICAGO

OFFICE OF
E. F. McDONALD, JR.
PRESIDENT

August 14, 1939

To Radio Amateurs:

This is another invitation to every "ham" in the world.

In my opinion, nothing in radio has been more neglected than loops -- particularly for reception.

Amateurs can profitably apply their ingenuity in this great field of loops (for reception both on standard and short wave).

If you know how to build a better loop, tell us and if your suggestion is a novel one we have not before had and is adopted, we will reward you.

Radio amateurs and laboratory engineers have apparently been misled by the superior signal strength received from standard antennas as compared with loops. The ratio of signal strength to noise level in the loop is the important factor and the field of what can be done with loops of various types for reception, is practically unexplored.

We have no products to sell to the amateurs, but, if you are interested in experimenting with loops, drop us a line and without cost, we will give you a starting point for research by sending you details of interesting experiments you can perform with simple apparatus easily constructed at home. We will also send some of the major developments we ourselves have found in our investigation on loop antennas.

You amateurs developed short wave. If you interest yourselves you can develop loops. Your ideas may be worth many dollars to you. Write me today for the starting point -- the information mentioned above.

Cordially yours,

E. F. McDonald Jr.

NEW ENGLAND DIVISION

Connecticut

W1COJ	10956–44– 83–	B-41
W1BEQ	10812–34–106–	B-49
W1JRV	5070–30– 57–	–42
W1ACV	4200–28– 50–	B-29
W1WR	2600–22– 40–	B-19
W1FUY*	2516–17– 50–	B-17
W1JOS	1080–15– 24–	– – –
W1JWX	567– 9– 21–	A-22
W1AJS	216– 8– 9–	B-38
W1IMV	27– 3– 3–	B– 7
W1LGZ	24– 2– 6–	– – –
W1LPN*	18– 2– 3–	– – –
W1TS	5841–33– 59–	B-30[9]
W1EH	1170–15– 26–	B-14[9]

Maine

W1GKJ	5508–27– 68–	A-73
W1AUR	3750–25– 50–	B-40
W1DAY	2420–20– 41–	B-21
W1BPY	1728–18– 33–	B-13
W1BUZ	1040–14– 26–	A-26

E. Massachusetts

W1HKK	60000–80–252–	C-82
W1ADM	57942–74–261–BC-	63
W1ME	37800–56–237–	B-57
W1JCX	36080–55–219–AB-	60
W1BLO	26649–47–193–	C-35
W1AKY	12423–41–103–	B-31
W1HX	11026–37–100–	B-60
W1FJN	8181–27–101–	B-45
W1QM	4150–25– 56–	B-26
W1JNX	3979–20– 59–	B-22
W1KQN	3960–24– 55–	B-28
W1TW	1680–16– 35–	B– –
W1WV	1479–17– 29–	B-41
W1LEU	944–14– 22–	B-30
W1FLZ	340–10– 12–	A-14
W1IF*	189– 7– 9–	– – –
W1JIS	168– 7– 8–	– – –
W1EHF	126– 6– 7–	B– 6
W1IQO	120– 5– 8–	A-23
W1HZU*	120– 5– 8–	–20
W1LKM	96– 4– 8–	A– 9
W1GYZ*	75– 5– 5–	– – –
W1LOK	44– 4– 4–	A– 3
W1ZR*	15– 1– 5–	– – –

W. Massachusetts

W1COI	22313–53–143–AB-	48
W1GZL	19941–51–133–	B-49
W1AEP	19250–50–129–	B-39
W1DSK	10500–35–100–	B-57
W1KUD	6090–29– 70–	B-37
W1AUN	384– 8– 16–	B-35
W1DLY*	105– 5– 7–	– – –

New Hampshire

W1IVU	408– 8– 17–	C-11

Rhode Island

W1DQ	54339–59–307–	C-69
W1JFG	35808–48–253–	B-63
W1CJH	20592–48–143–	B-73
W1ITQ*	432– 9– 16–	B– –

NORTHWESTERN DIVISION

Idaho

W7ACD	4002–23– 58–	B-23
W7GGH	594–11– 18–	A-22
W7FRA*	3– 1– 1–	– – –
W7GPB*	3– 1– 1–	– – –

Montana

W7EOI	6300–30– 72–BC-	55[21]
W7GBI	1470–14– 35–	B-41
W7CPY	384– 8– 16–	– – 6

Oregon

W7GAE	10416–28–124–	C-30
W7CHT	3875–25– 52–	B-39
W7HIA	552– 8– 23–	A-16
W7BEE*	180– 5– 12–	– – –
W7GOP*	6– 1– 2–	– – –

Washington

W7ESK	37620–60–209–	B-79
W7DX	32050–50–214–	B-73
W7FP	9840–41– 80–	C-42
W7AXS	2457–21– 39–	B-40
W7BQX	1584–16– 33–	A-38
W7QB	1377–17– 27–	B-20
W7RT*	6– 1– 2–	– – –

PACIFIC DIVISION

Nevada

W6HCE	2226–21– 36–	A-28
W6QQL	1736–14– 42–	B-17
W6GSB	450–10– 15–	B– 7

Santa Clara Valley

W6LXA	5865–23– 85–	C-42
W6BCF	2020–17– 32–	A-23
W7MF/6	1938–17– 38–	B-45
W6MPS	1806–14– 43–	B-30
W6QQJ*	627–11– 19–	A-10
W6AHZ*	135– 5– 9–	B– 5
W6OHA*	48– 4– 4–	A– –

East Bay

W6ITH	99296–84–398–	C-89
W6OCH	98175–85–386–	C-80
W6KR	33951–63–180–	B-59
W6IDY	19360–40–162–AC-	41
W6TT	11433–37–103–	C-34
W6IKQ*	5088–32– 53–	– – –
W6SQ	975–13– 25–	C-19
W6DJK	234– 6– 13–	– – –

San Francisco

W6BIP	24900–50–166–	B-65
W6NCW	10168–31–110–	B-41
W6MWK	2982–21– 48–	B-34
W6GPB*	189– 7– 9–	– – –

Sacramento Valley

W6GVM	15885–45–121–	C-56
W6IMV	1188–11– 36–	A-25
W6KFY	768–12– 22–	B-19
W6KKL	27– 3– 3–	B-12
W6NKT*	4– 2– 3–	– – –

San Joaquin Valley

W6MEK	24647–49–169–	B-76
W6FKK	9637–37– 87–	C-28
W6IWU	2086–14– 50–	B-77

ROANOKE DIVISION

North Carolina

W4BMR	92461–89–347–	C-82
W4DCQ	33264–66–168–BC-	42
W4AHH	28836–54–178–	C-53
W4FT	22176–42–176–	C-73
W4GW	12848–44– 96–	C-30
W4OC	8670–31– 85–	–31
W4AAU*	1188–18– 22–	– – –
W4CLB*	27– 3– 3–	B– 1

South Carolina

W4BPD	85050–80–350–	C-73
W4CQG	9348–41– 76–	B– –
W4BQE	3749–23– 55–	B-28

Virginia

W3EMM	142002–98–483–	C-88
W3FQP	54315–71–255–	C-78
W3BIW	3560–20– 60–	B-26
W3EZR*	858–13– 22–	B-10
W3BZ*	105– 5– 7–	– – –

West Virginia

W8JKN	650–13– 18–	B-10

ROCKY MOUNTAIN DIVISION

Colorado

W9WJJ	8154–27–101–	B-39
W9IVT	5684–29– 66–	B-26
W9QMS	1444–19– 26–	C-20
W9PGS	528–11– 16–	A– 9
W9MJA*	3– 1– 1–	– – –

Utah-Wyoming

W6DTB	15456–46–112–	B-47
W6NPU*	56– 4– 5–	– – –
W7GGG*	12– 2– 2–	– – –

SOUTHEASTERN DIVISION

Alabama

W4ECF	34020–60–189–	B-65
W4EJQ	10608–34–104–	C-30
W4ERX	10395–33–105–	B-32
W4FUM	8019–33– 81–	C-32
W4EHH	4536–28– 54–	B-34
W4EKI	1326–17– 26–	B-15

E. Florida

W4AGB	78570–81–324–	B-86
W4DRZ	61636–76–273–	B-80
W4EQK	35786–58–207–BC-	68[32]
W4TZ	8942–34– 90–	B-77[33]
W4EZK	4075–25– 55–	B– –
W4DCZ	1404–18– 27–	C-12
W4DDB	273– 7– 14–	A-17
W4EPV	189– 7– 9–	A-10
W4DSC*	189– 7– 9–	B– –
W1LFX/4*	126– 6– 7–	– – –

W. Florida

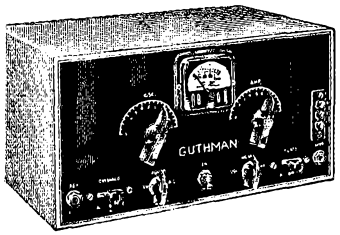
W4FWY	7998–31– 86–	B-56

(*Continued on page 106*)

MATEUR **Guthman** GEAR

J-36 SIX BAND PHONE-CW TRANSMITTER

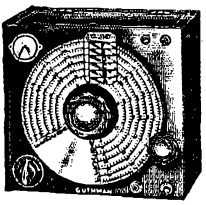
6- and 110 Volts



tube transmitter. Switch choice of three l frequencies. Selects between standby or ıer of two ant. matching coils. Modulator l power supply, 105-125 volt, 50-60 cy. A.C. tput up to 10 watts. Controls: Key-jack, 3 . xtal switch, 6-110 volt selector, oscillator ling, on-off, meter-selector, amp. tuning, out- coupling, standby, mike jack. Panel cut for meter. 6 volt socket on chassis rear. Uses 4, 7C7, 83V, two 7C5s. Ship. weight, 16 lbs. e 12¼"x7"x7½".

	List	Net
36K KIT, less meter, crystals and tubes; with 5-10 meter coils	$49.95	$29.97
36W WIRED, tested	62.45	37.47
36 TUBE KIT	8.25	4.95
37 CABINET	4.00	2.40
9-440 Coils for 20-40 meters	3.00	1.80
1-02 Coils for 80-160 meters	3.00	1.80

U-10A FREQUENCY METER-MONITOR



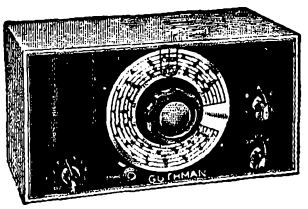
Temperature stabilized. Fundamental range 840-1030 kc. strong harmonics covering 5 thru 160 meters. 7¾" dial may be set with extreme accuracy on WWV or 19 broadcast stations. Voltage regulated. Added frequency standard thru built-in 100 kc. oscillator. Detector tube provides audio monitoring and zero beating; cathode ray tube connected to monitoring detector gives visual deviation. For 105-125 volts, 25-60 cycle, A.C.-D.C. Uses one each 43, 25A7, 6J5, 6E5. VR-105, 55-A.

Size: 10½"x9½"x7¼".

Shipping weight: 15 lbs.

	List	Net
U-10A WIRED, less tubes	$48.75	$29.25
U-11 TUBE KIT	8.75	5.25

U-42 HIGH GAIN PRE-SELECTOR

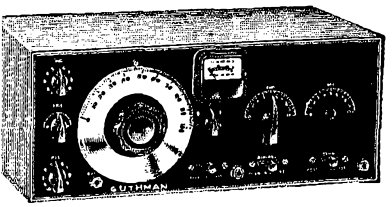


Complete, independent power. Connect between ant. and any receiver to improve gain, selectivity, signal-to-noise ratio. Five bands, low C regenerative R.F. amplifier tuning 490 to 46,000 kc. Dial 5½", calibrated over 324 degrees, 5:1 vernier knob. Amplification controlled by regenerative knob. High selectivity. Controls: regeneration, on-off, band switch, in-out switch, ant.-gnd. doublet and output terminals at rear. Phone jack allows monitoring phone-c.w. When oscillating, serves as heterodyne frequency meter.

Size: 12¼"x7"x7½".

	List	Net
U-42K KIT	$27.50	$16.50
U-42W WIRED, less tubes, cabinet	33.00	19.80
U-37 CABINET	4.00	2.40
U-42T TUBE KIT, one 7A7, 80	2.30	1.38

U-31 "SEND-'CEIVER"

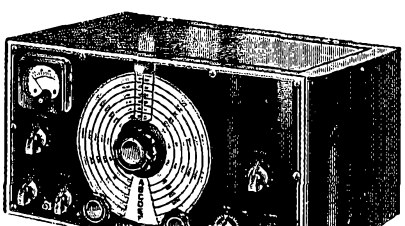


Three tube regenerative receiver, six bands, 10-700 meters. Basic xmitter one tube. 3 band xtal controlled oscillator, band switching. Output nearly ten watts. Three position crystal, operation on 3 bands in xmitter circuit, and 6 bands when 7C5 amplifier tube added. 3 position lever selects coils which cover 5-10, 20-40 or 80-160 meters. Space on panel and chassis for adding power amplifier, or 1 or 2 tube modulator. Key, mike, jacks on panel. A.C. power supply and 0-150 plate m.a. included. Size 17"x7"x7½".

	List	Net
U-31K KIT	$49.95	$29.97
U-31W WIRED	62.45	37.47
U-32 CABINET	4.95	2.97
U-33 AMPLIFIER KIT: 3 coils, tuning condenser, knob, socket, condenser, resistors, to add power amplifier	6.50	3.90
U-34 MODULATOR KIT: mike transformer, socket, resistors, condensers, for adding a 7C5 modulator tube for phone	6.00	3.60
U-31T TUBE KIT: 1—7C7, 80 and 2—7C5	5.30	3.18

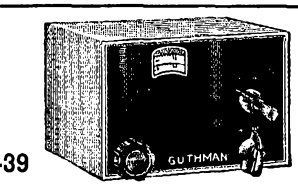
U-50 "SUPER"

es controlled regeneration. Excellent image rejectivity, selectivity and signal-to-noise ratio. ree gang condenser. Eleven tubes, extra socket to add 100 kc. oscillator. Spread-band ing in 6 bands. Illuminated gun-sight dial indicator magnifies figures 2½ times. Uses 7A7, , 6SF5, 6K8, VR-105, 6B8, 80, two 6SK7; two 7C5. Controls: S-meter, silencer, tone and -off, phone jack, send-receive, ant. trimmer, dial, vernier tuning, AVC on-off, a.f.gain, , switch, selectivity, beat-pitch, $79.88 net, WIRED with cabinet, speaker, tubes. $72.38 net T, with cabinet, speaker, tubes. Size: 17⅞"x9½"x10½".



11 Tubes

	List	Net
50K "SUPER" assembled, ready-to-wire, less cabinet, tubes, speaker	$83.25	$49.95
50W "SUPER" WIRED, less cabinet, tubes, speaker	95.75	57.45
51 Hinged Top CABINET	5.84	3.50
52 SPEAKER, 8" case	16.50	9.90
53 TUBE KIT	15.05	9.03

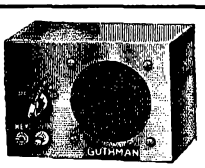


-39

5-10 METER CONVERTER

bile or home use. Has steering-post clamps. nnect between antenna and any set, output nsformer of converter tunable any frequency ween 1500-1600 kc. Tuning condenser rigid. gang 20 mfd. capacity, excellent band ead through 7:1 tuning knob. Drain 3/10 peres filament, and 12 ma. B current from ne or auto set. Size: 6"x4"x4½".

	List	Net
39 KIT	$22.00	$13.20
39W WIRED	27.00	16.20
— 68K Tube	1.75	1.05

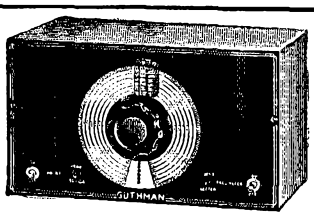


U-35 KEYTONER

Learn code rapidly with this unit. Plug-in key, connect to A.C. or D.C., and every dot-dash reproduced through built-in speaker. Knob selects one of five pitches between 300 and 3000 cycles. Ideal both for code mastery and class-room sending. Learn with Keytoner, and master hardest part of becoming an amateur. Size 7"x5"x4".

SIMPLIFIES CODE-LEARNING

	List	Net
U-35K KIT	$11.50	$6.90
U-35W WIRED, less tube	16.50	9.90
1—70L7GT Tube	2.35	1.35



U-44 FREQUENCY METER

Temp. stabilized. 100 kc. standard oscillator. Calibration against WWV. 5½" dial, 5 thru 160 meters. Voltage reg. socket provided. Controls: dial, on-off, standard freq. on-off switch, calibration zero-setter, freq. standard zero-setter, 105-125 volts, 25-60 cycles, A.C.-D.C. Size 12¼"x7"x7½". 70L7GT, 35A5, VR-105.

	List	Net
U-44K KIT	$25.00	$15.00
U-44W WIRED	33.00	19.80
U-44 TUBE KIT	5.00	3.00

See These Guthman Products at Your Leading Nearby Jobber or order direct, giving jobber's name if out of stock.

W1HRX, with its cobwebs, looks as though the QTH should be Sleepy Hollow; those 75-footers, hurricane-produced, are still lying on the sod. A serious case of algae has overrun the sides of the swimming pool; badminton is but a pleasant memory and the tennis court has sprouted a most healthy crop of weeds. Even so, summer at the Farm has been grand fun!

Doing what? Lots of serious dreaming, planning and figuring that has resulted in something tangible — our own outfit, producing a line of gear we believe to be right down the amateur's alley. Not being bogged down with the problems that often confront a large company has been advantageous, allowing us to set our own pace. And not until just now have we seen the finished products of our earlier machinations.

Being an active amateur, and thus a personal constructor of amateur gear, we know from first-hand experience the application difficulties encountered only too frequently by the average amateur: parts that require square holes in chassis or panel; parts having terminals in awkward or inappropriate places; sockets with contacts that fill up with gobs of solder; neutralizing condensers that take up more space than the tubes themselves; ceramic coil forms through which even a magician could not pull the leads; hardware that rusts during the first damp spell; etc.; etc. So, in addition to incorporating the latest advances in lab technique in designing our new products, we have endeavored to lay them out for practical and easy application. It seems logical, therefore, that we might well adopt the slogan, "*Designed for Application.*"

Our new catalog lists and describes new items. These are but an indication of others soon to follow — others that are in the embryonic or laboratory form, or even at the tooling stage. They will be announced from time to time in the pages of *QST*. The products shown in the catalog will make their appearance on dealers' shelves about the middle of September. The catalog will be distributed from these same dealers at that time. Ask your gear merchant for your copy.

It has been rather a mountainous task concocting new designs, marking out a course and setting up a base of operations, preparing and producing a catalog, negotiating patent licenses and a host of other things incidental to the establishment of a new manufacturing company. We have, however, been fortunate indeed in the help we have received from our many amateur friends in the form of product ideas and suggestions. Thanks, gang!

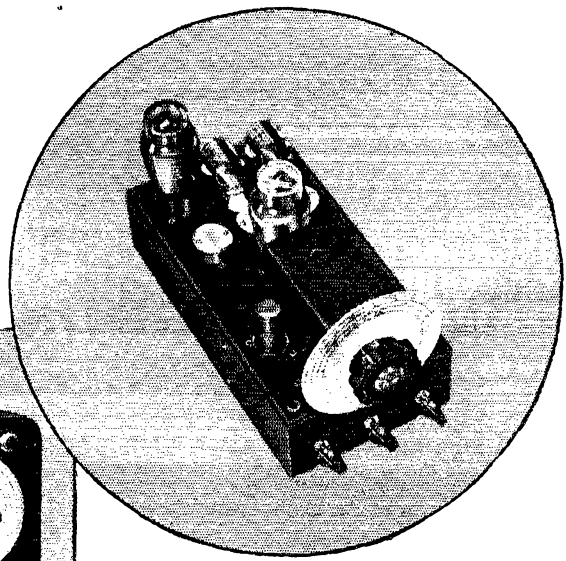
Jim Millen

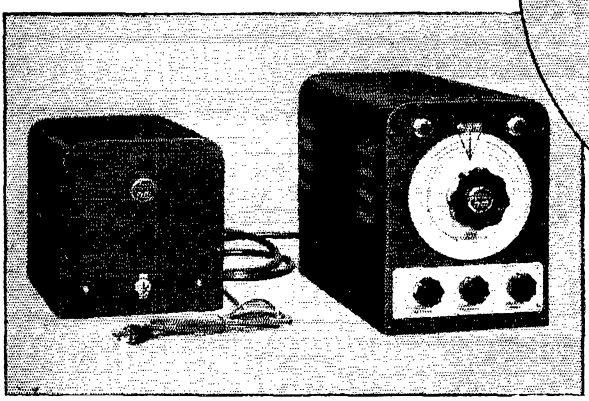
"X-EC"

Trade Mark

●

COMBINED "EC" and CRYSTAL OSCILLATOR





Upper: Chassis view of RF portion of the "X-EC."

Left: Complete "X-EC" with isolated power supply and connecting cable.

THE "X-EC" IS NOT AN ORDINARY ELECTRON COUPLED OSCILLATOR FOR SHIFTING FREQUENCY. IT IS A DEFINITE, ABSOLUTE METHOD OF FREQUENCY CONTROL.

The "X-EC" at a glance:

1. **Positive "X-EC" Stability**
2. **Isolated Power Supply**
3. **"EC" or "Xtal"**
4. **RF Isolation**
5. **No Plug-In Coils**
6. **Vibration-Free Mounting**
7. **Regulated Bandspread**
8. **40 or 80 Meter Output**
9. **Calibrated Vernier Dial**

The "X-EC" incorporates the new design principles of electron coupled oscillators as described by Charles Perrine, W6CUH in June RADIO, and September QST.

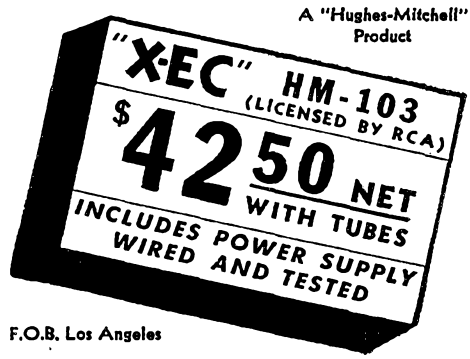
● **A stable "ECO" must be vibrationless, humless, and supplied with constant voltage.** The well regulated power supply for the "X-EC," being isolated, also eliminates heat which would otherwise affect the stability.

● Zero voltage coefficient is obtained by the accurate adjustment of the cathode tap. A special resistor network is employed for the screen voltage supply. Temperature compensation is used to further stabilize the "X-EC."

● The "X-EC" floats on "shock absorbers" to exclude external jar or vibration. The objectionable features of other electron coupled oscillators are not found in the "X-EC" and its stability has been raised to such a high degree that it is the most outstanding, variable frequency control unit thus far presented.

● The two-band output will prove advantageous. No plug-in coils are used, all of them being permanently mounted. You will like the calibrated bandspread dial. This dial incorporates a smooth action reduction drive unit, and it is direct reading for the 10, 20, and 40 meter bands. Band calibration covers approximately the whole of the 180 degree rotation.

A "Hughes-Mitchell" Product



F.O.B. Los Angeles

● Use the "X-EC" to drive the lowest frequency stage in your transmitter, 40 or 80 meters. You may use your present crystals (40 or 80 meter), and have 40 or 80 meter output, either "EC" or "Xtal," by flipping a switch. For working the band edges, spot frequency crystals are suggested, and accommodations for three crystals are provided.

● The "X-EC" comes to you COMPLETE . . . with isolated well regulated, power supply, four feet of shielded connecting cable, and a set of RCA tubes. It is WIRED and TESTED, and licensed by RCA. The richly finished cabinets are only 6½ inches wide, 9" h. and 12" d., and will make a fine appearing unit beside your receiver.

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RADIO-TELEVISION SUPPLY CO.

"Where Ham Spirit Prevails"

1701 So. Grand Ave. Los Angeles, Calif.

I.A.R.U. News

(Continued from page 69)

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Finland: S.R.A.L., Pohjola, Box 42, Helsinki
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Germany: D.A.S.D., Cecilienalle 4, Berlin-Dahlem
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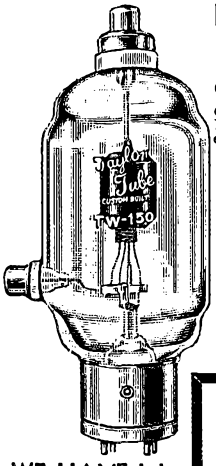

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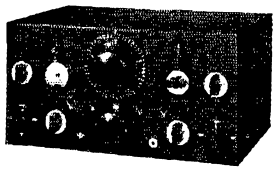

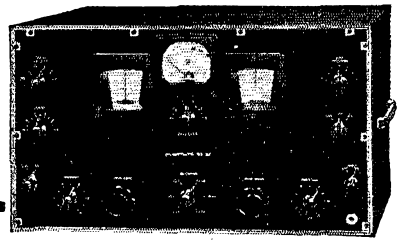

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NC44	49.50	*
NC80-81X	99.00	19.80
HRO DeLuxe	179.70	35.94
RME 70	$138.60	$27.72
69	152.88	30.58
70 DB20 Combination	181.80	36.36
HALLICRAFTERS		
SX 24	$ 81.50	$16.30
SX 23	127.50	25.50
Sky Buddy	29.50	*
Sky Champion	49.50	*
Sky Rider 510	69.50	13.90
Sky Rider Marine	64.50	12.90

* *Indicates sets sold for cash only*

PLATE AND FILAMENT TRANSFORMERS

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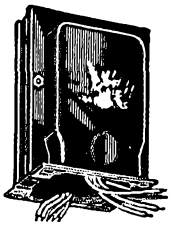

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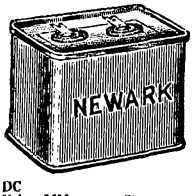

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1500	3	5 x 3¼ x 1⅝	1½lbs.	1.50
1500	4.4	5 x 3¼ x 1¾	1⅞lbs.	1.75
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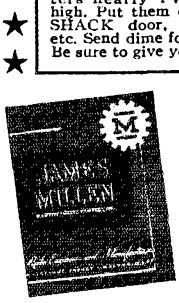

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Station Activities

ATLANTIC DIVISION

EASTERN PENN — SCM, John B. Morgan, W3QP. Asst. SCM in charge of E.C.: W3AKB. R.M.'s: 3AKB, 3AQN, 8ASW. Our brother, Bob Shaw, 3AOC is still in the hospital, but has acquired some "haywire" which he is assembling and hopes to have it going before long. 3BIL reports a very efficient A.E. Net on 1.75-Mc. 'phone. He is in charge of the Penna. W3 group, and the Net extends all along the Atlantic Seaboard. 3EML thinks sleep is a waste of time: here is a typical evening of schedules at his shack: 3.5 Mc.: 2ICZ, 2CGG, 3CIZ, 3BWT; 14 Mc.: K5AA, 6IOX; 7 Mc.: 4PL, 5MN, 9AIL. 3EWJ dropped in to see 6USA. 3HRS's trunk is working well and steadily from 2LOQ, 3HRS, 6PGB, K6KA. 3KJ got the first new 5-year license for Radiotelephone First Class in this inspection district. 3QP is struggling with a schedule with KA1HR daily. 8ASW complains that traffic is growing light, but his score is OK.

Traffic: **W3**AQN 45 3BES 18 3CHH 5 3EML 1817 3GHD 4 3GYK-3GYY 6 3HBJ 66 3HDB 4 3HQE 21 3HRS 53 3HSR 3 3HYD-3HZK 9 3IBG 8 3IEG 5 3MR 12 3QP 292 8ASW 182 8ATF 9 8RHE 8.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, E. L. Hudson, W3BAK, 3CQS, 3CXL: R.M.'s, 3BWT: Chief R.M. EZN has new rotary on 14 Mc.; also is building new rig with P.P. T125's. AKR is building "2½ meter" gear. HUM erected new antenna at new QTH. BAK is planning a trip to Calif. for several months; will take portable station along and work the Jr. ops. back home. GYQ handled traffic from the Virgin Islands; he was one of the radio operators at Bethany Beach, Del. with the Delaware National Guard Camp there. ICT put up new "V" beam and is DX-ing on 14 Mc. FFF is visiting in North Carolina.

Traffic: **W3**CIZ 621 BWT 198 ICT 33 HUP 12 GYQ 6 CXL 227 (WLM 2181).

SOUTHERN NEW JERSEY — SCM, Lester H. Allen, W3CCO — Ass't SCM, Ed. G. Raser, W3ZI — R.M.'s: 3BYR, 3BEI, 3ZI — P.A.M.: 3GNU. The South Jersey Net which operates on 3700 kc. has room for more stations and your support is cordially urged to help increase the coverage. For the O.P.S. the P.A.M. announces a new net being formed on 1.75-Mc. 'phone to assist the S. J. Net when necessary and to bring forward the ideals of the Official Phone Stations. There is a place for you in the South Jersey Section organization so let's hear from you. We welcome FLC to A.E.C. Supporting Div. FMR reports FB DX accomplishments with new 4-element beam; also schedules 9CAC of Denver, Colo. daily at 8 A.M. RV returned to amateur frequencies after renewal of old license. IGB, new operator in Zarephath is working 7 Mc. BEI keeps daily schedules with GM8MN on 14-Mc. 'phone. HKO is touring the middle west with portable gear and will be operating on 3535 and 7150 kc. Congratulations to FBT on his recent marriage; EGE was best man. EFE reports from Calif. he is proud papa of a 7 lb. girl. AQ has new 1 kw. all-band transmitter. ZI and EUH were operators of 2USA during their visit at the World's Fair. The Ladies Auxiliary of the Delaware Valley Radio Assn. celebrated their second anniversary at the August meeting; new officers were elected: Pres., Natalie Hannah; Vice Pres., Helen Allen; Secy., Marie Whyno; Treas., Ruth Hirsch. GMY is building emergency equipment and schedules 2KRG at 10 P.M. daily. GCU is building new skyhook for antenna. FJP is back on 3.9-Mc. 'phone after completing the Police installation at Pleasantville and Margate City. BIN is experimenting with recording equipment. BBG has portable 5 watt emergency rig on 3.9-Mc. 'phone. GYN, formerly of Phillipsburg, is now operating 1.75-Mc. 'phone from New Hope, Penn. The Delaware Valley Radio Assn. set new record in Outing attendance, with 660 persons present from 28 different states and all districts but W7. BZX reports his receiver working FB after general overhauling. ASQ has new audio equipment for 28-Mc. rig. VE has new rig with T-55 final. OQ is new O.P.S. Welcome to our Section, Warren. GHK on motorboat cruise to Norfolk, Va., kept in touch with home port via the amateur bands. HTP, FNL and HTJ are new members of Delaware Valley Radio Assn. HPE and IDY are experimenting on "2½ meters." AIR demonstrated some of latest frequency control and measuring devices at meeting of the T.R.S. GFQ is back on 7 Mc. with new rig. HCL is rebuilding receiver. HW has new rig on 1.75-Mc. 'phone. EUH broadcasts Official information from A.R.R.L. headquarters daily except Sat. and Sun. at 7:45 P.M. EDST., on 1993 kc. IEQ is new Trenton call. CCO has new exciter unit for the 1 kw. rig. CCC has new rig finished with '03A final. 3FTU is experimenting with antennas. GEV has new field strength meter. MI gave demonstration of emergency equipment at the D.V.R.A. Outing using the Western Union mobile unit. FSI keeps daily traffic schedules with points west. CFS rebuilt final using a T-40. GRW revamped sky-wire. HAZ runs 300 watts to P.P. T-40's in new 7-Mc. rig. ACC is working out FB with new rotary on 28 Mc. ABS is rebuilding exciter for 28 Mc. rig. AC is back on 1.75-Mc. 'phone after experimenting with "2½ meters" during summer months. A suggestion for an evening's enjoyment: Don't fail to see "Grand Jury Secrets," a movie dealing with amateur radio. Let's keep South Jersey ahead with a report now and then. Until next month, 73.

Traffic: **W3**FSI 70 BZX 55 HKO 48 GMY 19 CCO 12 ZI 11 BEI 5 EUH 4.

WESTERN NEW YORK — SCM H.E. Preston, W8CSE — R.M.'s: 8BJO, 8DSS, 8FCG, 8JTT. P.A.M.: 8CGU. E.C.'s: 8GWY, 8RGA, 8RVM. Section O.R.S. net freq.: 3720 kc. The Central New York Radio Club of Syracuse held a picnic at Cross Lake on August 20th with about 100 hams and their families attending. The usual games and contests were held and a good time was had by all. EJH is trying for DX on 14 Mc. HJM works 7 Mc. on weekdays and 1.8 Mc. 'phone on Sundays. PLA works 3.5 and 7 Mc. with portable from his summer cottage on Conesus Lake. RKM, EPM, KDY, CSE and their families and NWZ had a picnic at Onondaga County's "Highland Park" on August 18th. IY moved back to Homer, New York. GWZ won a nice crystal mike at the Syracuse Club's picnic. Married life has kept NA off the air a little, but he managed to make a few contacts. His many friends wish him the best of luck. DHU visited 1JAH while vacationing in New England. FFU, GYO, OBB, OMM, SPE and SOT are all hot and bothered over 112 Mc. after FFU and OBB demonstrated how good the band was. ALP is on 3.9-Mc. 'phone after about 10 years on c.w. TEP has been having a very interesting season at the boys camp at Lake Bonapart; it has been surprising to learn what could be done with low power. Thanks to GYO for dope on Watertown activities. It looks as though JTT would remain in our Section after all. SZK is new O.R.S. in Buffalo. GPN is active on 3700 kc. after a layoff of several years. SBV and family visited PLA. This issue of *QST* carries notice of the coming election of a new S.C.M. for Western New York. The present S.C.M. is not a candidate for reëlection due to other pressing interests. It has been a pleasure to have held the position and I have very much appreciated the coöperation shown.

Traffic: **W8**CSE 18 FCG 147 SZK 21 PLA 29 DHU 2.

WESTERN PENNSYLVANIA — SCM, Kendall Speer, Jr., W8OFO — 704 were registered at the Annual S.H.B.P. & M. outdoor hamfest at South Park on August 6th. WLMA/8YA says 92 of the 94 of his traffic total were handled in one evening that they were alternating for WLM. The Asst. S.C.M., 8AVY reports that Emergency Coördinators have been appointed for Sharon and McKean County. NQQ returned from N.C.R. sea duty where he was aboard the U.S.S. *Reuben James*. KTM was aboard the U.S.S. *Barry*. QAN says his crystal frequency standard, vibrator, electron coupled rig (3.5 to 28 Mc. inclusive) are all completed and he is all set for winter schedules. RAP is putting in a modulator for 28-Mc. 'phone. NCJ has been very active this summer visiting hams, attending hamfests, conventions, etc. KBJ says the 3rd Corps Area A.A.R.S. 'phone net was active on 3994 kc. all summer. QEM has new Sky Champion receiver and HT4 transmitter. DGL is building an emergency power supply using a.c. alternator and motorcycle engine. RBQ moved back to this Section from Ohio and is on 1.75-Mc. 'phone and 3.5 Mc. c.w. GJM says TSO, a new ham, will be on soon with ½ kw. LRL erected his rotary for 28 Mc. UK expects to be on the O.R.S. net at least three times per week this fall. ROA is active on 1.8-Mc. 'phone. KXP is after Asia for W.A.C. RAU visited JMP and TU in Steubenville, Ohio. RYC received Class A ticket. RBI has new portable-emergency transmitter (20 watts, all bands). HKU is busy with E.C. work.

Traffic: **W8**QAN 39 RAP 17 NCJ 16 KBJ-OFO 7 QEM 6 DGL-RAT 5 AXD 4 RBQ 2 8YA (WLMA 94).

HUDSON DIVISION

EASTERN NEW YORK — SCM, Robert E. Haight, W2LU — HXQ, our YL, leads the boys again with FB total. Our congrats to HXQ. LSD's traffic is all on 7 Mc. through F.T.S. KWG is pounding out well on 3730 kc. LU is erecting new mast. JRG leaves 14 Mc. after a year for 7 Mc. with 400 watts. MHW, new Port Jervis station, uses single '47 crystal osc., 36 watts. JRG reports EWD and KBB in Larchmont, both on "2½" with transceivers. EAF has new 100-watt 'phone on 14 Mc. HCE moved to Calif. VJ is operating portable-mobile on "2½". EGI is building for "2½". BFB leaves Bronxville for New Jersey. LLU made his first successful DX contact, with G3NZ on 14 Mc. HNH had visit from FIS. LEL is getting lined up for fall and winter traffic schedules. KFB has station set up for 1.75-Mc. 'phone activities. DVC has new Howard 460 receiver. KUD is hard at work as general chairman for Hudson Division Convention. We welcome his station as new O.B.S. LEI and BEW are new O.R.S. Don't forget the 14th Annual Hudson Division Convention at Hotel Van Curler, Schenectady, Oct. 6th, 7th and 8th. Your S.C.M. will be glad to meet you.

Traffic: **W2**HXQ 629 LSD 141 KWG 66 LU 35 JRG 11 MHW 10.

NEW YORK CITY & LONG ISLAND — SCM, Ed. L. Baunach, W2AZV — LGK is out for O.R.S. LQP sends his first report. Ex-2MS is now MIQ operating on 7 Mc. in Rockville Centre. MBI is using a three-element rotating beam on 28 Mc. CHK operated portable in Wurtsboro, N. J. AZV operated portable at Montauk Point, L. I. HS had a fire in his shack. CCD purchased the two 130-foot towers of B.C. station WGNY and is going to use them at his country estate at Port Jervis, N. Y. PF went on active duty with the First Radio Intelligence Company of the Regular Army during the war games. ELK is now on 3.5 Mc. JBL/1 is on 7006 kc. HMJ is working on his dream of an e.c.o. and ten crystals. IXQ is helping to convert an S.W.L. JWW has gone in for antennas in a big way. ESO has worked all states. EC built new amplifier using RK12's, 160 watts input. LGK finds that end fed Zepps work better than all other types at his QTH. LEN's new rig has HK 54's in the final. LHP completed new rig using 809's P.P. and complete break-in operation. KKW is rebuilding. KYV reports new station in Richmond Hill, MJL. LOQ is rebuilding his 150-watt final and is trying M.O.P.A. LZR rebuilt his rig. LPJ raised Nev. to complete W.A.S. in nine months' operation on 7 Mc. with 60 watts input. MKM is the call of the "Wall Street Radio Club," 67 Exchange Place, N.Y.C.; GXS, Pres.; BZS, Treas.; CEB, Corresponding Sec.; 3FHJ, Technician; LAL, HJS, Ultra High Freq. Committee. A.P. trunk line is now on 3630 kc. every night. The N.Y.C. and L.I. Section Net on 3710 kc. is operating at 8:30 P.M. E.S.T. every night.

Traffic: **W2**HMJ 476 SC 367 JZX 148 DBQ 134 (WLNB 132) AZV 101 ITX 91 LOQ 83 PF 74 LZR 66 GDF 40 IBI 37 KKW 24 AEU-LPJ 16 IOP 50 AXZ 14 LHP 12 LGK-CCD 11 BYL 10 CET 9 LQP-KYV 8 HYL 7 JWW-DMM-AA 6 KI 5 CIT 4 KYO-EC 3 JBL/1-FRQ-BGO-ADW 2 HGO-GRJ 1 HYC (WLNX 88).

NORTHERN NEW JERSEY — SCM, Joseph P. Jessup, W2GVZ — The whole Section thanks GMN for the fine job he turned in as S.C.M. the last two years. Fred worked hard and conscientiously. He is now E.C. for Elizabeth, KTR made Al Opr. club. Congrats. He wants a Section QSO party. Are you interested? MEO is new O.R.S. and N.C.S. for N.J. in American Legion Net. JT is new O.P.S. The Section now has 24 O.R.S., 15 O.P.S., 4 O.O.'s, 3 O.B.S., 1 P.A.M. and 3 R.M.'s. JT and GRG are working hard for DX C.C. on 'phone. KHA has made W.A.S. gotten a Sky Challenger and is surrounding the heap with a relay rack. As of August, N.N.J. Section had 11 Century Clubers and one more on the verge, which isn't bad. VK2ALF and 8OSL visited the DX gang in Ridgewood. ISF is on 3725 kc. 6:30 to 8 P.M. weekdays looking for N.N.J. traffic anywhere in the band. The N.N.J. net on 3630 kc. starts again in Sept., 8:45 to 9:30 P.M. weekdays. Present members are CGG, CMC, GVZ (N.C.S.), HCO, KHA, KMI and KTR, with LMN as a prospective member. Any traffic station that can work break-in on 3630 kc. is welcome. LMN has W.A.C., 65 countries, and 46 states with 1626 QSO's using not more than 50 watts. FB. A sizable gang from N.N.J. attended the D.V.R.A. Trenton hamfest and got trimmed at baseball by the W3's. 3MI was on hand with the FB Western Union emergency truck and transmitter and kept schedules with 2USA. JRU is looking for traffic schedules on 7 Mc. KDO is building a 500-watt job on 28 Mc. ISZ is gradually putting up a beam on 28 Mc. FGV is newcomer on 1.75 Mc. after working 28, 14 and 3.9 for years. Many more A.E.C. members and E.C.'s are badly needed. With 170 large communities in the Section, we only have 7 E.C.'s and less than 70 A.E.C. members, of whom only 14 have emergency power supplies. Whether self-powered or not, we need your registration. Ask the S.C.M. for your application blank.

Traffic: **W2**CGG 179 LMN-JKG 35 JUC-MEO 22 HXI 20 KTR 11 GVZ 7 CJX 6 JRU 5 LAO-KHA 3 IZV 2.

NEW ENGLAND DIVISION

CONNECTICUT — SCM, Frederick Ells, Jr., W1CTI — Thanks are due AW and TD, the only traffic reporters! At AW work is progressing on a temperature control oven to house marker frequency crystals. Two Kato units for emergency power have been installed and AW is all set with 4 kw. of emergency juice. DWP visited some of the gang in Maine. EH on his "vacation" fixed up antenna system, put up new 56-Mc. antenna and installed 56-Mc. receiving gear, wrote two technical articles for *QST*, filed his QSL cards by a new system, got up a record system for DX contacts and worked two new countries. Busman's holiday! On August 12th and 13th two portable stations were set up at Goshen by members of the Conn. Brasspounders Association, 1CBA. One station worked 28- and 14-Mc. 'phone in one tent and a second station used 3.5-Mc. c.w. in the other tent. Equipment belonging to EER and JYQ was used on 28 and 14 Mc., powered by a Homelite 1-kw. gas engine driven power supply. On 3.5-Mc. equipment belonging to BCG, KWF and CTI was used, powered by BCG's gas engine driven emergency power supply. Good contacts were made on the three bands used and experience was gained in setting up and operating emergency powered stations. Is TD the only Conn. O.R.S. that can keep the General Traffic Hour and give guaranteed traffic service? See page 75, September *QST*. The Nutmeg Net will resume about September 25th, on 3640 kc. unless you are advised otherwise. See you there.

Traffic: **W1**AW 242 (WLMK 10) TD 2.

MAINE — SCM, H. W. Castner, W1IIE — Thanks to all the boys in the Maine Section, who are giving the S.C.M. such material support. New appointments continue and before long we will have one of the finest organizations of any Section. HSE took the little woman to the altar Aug. 31. Congratulations! Jack, 3FXZ and the OM, 3MG, spent their vacation in one of IIE's cottages. GXY has done a perfect job in completing an Emergency set-up at Bath. GMD is aiming at auxiliary power. LSK is putting up a rotary beam with an improved rig. IGW is improving his rig. KYT is moving from 1.75-Mc. 'phone to 3.9 Mc. About everyone who has ever whacked a key or growled into a mike knows old "Hunk" Beardsley, who was DZU. He's about to burst out with a lot of soup on 3.9 Mc. and "2½". FJP has installed push to talk. John has a swell lot of dope on this; better write him if you're interested. LRP is going to handle the 7-Mc. department of the Pine Tree Net. The new shack of LHM is coming fine. "Cres" is looking for all the 1.75-Mc. boys who want to be in the 1.75-Mc. division of the Pine Tree Net. W1BDI vacationed as usual at Augusta. Say, fellows, I have to report to Headquarters by the 20th. Won't you boys be a little more prompt with your reports? ITH and KVK have excellent auxiliary power available for emergency work. "Warden Joe," LJG/1, is way over and up on Mt. Bigelow tower in Flagstaff with about 4 watts on 7144 kc. AFA schedules 5VV, 5GGS and 5QL on 14 Mc. IBR is all set with a greatly improved rig. He is planning a campaign to put traffic anywhere there's a ham or a telephone. He's a new R.M. but a dandy. We're mighty proud of all the boys who did such a grand job in the Mount Katahdin incident when the boy was lost. 2HXQ in Rye, N. Y., was calling CQ Maine and as near as I can find, about half the boys in Maine went after her. "Old Faithful" DHH was in there with both feet. At first it seems that some hams near Augusta telephoned the Chief of Police at Millinocket and he got HSD out of bed and in no time had a direct contact. "Ben" had all official reports from searchers given him plus a doctor's comments. He passed them to 2HXQ as they came in and when the boy was found he shot the good news at once. There were over 100 people at 2HXQ at the time and they staged a celebration. When the boy was taken to the Eastern Maine General Hospital in Bangor they set up a circuit through IUP and together with DHH they still had

(*Continued on page 104*)

★ A.R.R.L. QSL BUREAU ★

For the convenience of its members, the League maintains a QSL-card forwarding system which operates through volunteer "District QSL Managers" in each of the nine United States and five Canadian districts. In order to secure such foreign cards as may be received for you, send your district manager a standard No. 10 *stamped* envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six-cents postage. Your own name and address go in the customary place on the face, and *your station call should be printed prominently in the upper left-hand corner.*

W1 — J. T. Steiger, W1BGY, 35 Call Street, Willimansett, Mass.
W2 — H. W. Yahnel, W2SN, Lake Ave., Helmetta, N. J.
W3 — Maurice Downs, W3WU, 1311 Sheridan St., N. W., Washington, D. C.
W4 — G. W. Hoke, W4DYB, 328 Mell Ave., N. E., Atlanta, Ga.
W5 — E. H. Treadaway, W5DKR, 2749 Myrtle St., New Orleans, La.
W6 — Horace Greer, W6TI, 414 Fairmount Ave., Oakland, Calif.
W7 — Frank E. Pratt, W7DXZ, 5023 So. Ferry St., Tacoma, Wash.
W8 — F. W. Allen, W8GER, 324 Richmond Ave., Dayton, Ohio.
W9 — Alva A. Smith, W9DMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Fader, VE1FQ, 125 Henry St., Halifax, N. S.
VE2 — C. W. Skarstedt, VE2DR, 236 Elm Ave., Westmount, P. Q.
VE3* — Bert Knowles, VE3QB, Lanark, Ont.
VE4 — George Behrends, VE4RO, 186 Oakdean Blvd., St. James, Winnipeg, Manitoba.
VE5 — H. R. Hough, VE5HR, 1785 First St., Victoria, B. C.
K4 — F. McCown, K4RJ, Family Court 7, Santurce, Puerto Rico.
K5 — Norman F. Miller, K5AF, 15th Air Base Squadron, Albrook Field, Canal Zone.
K6 — James F. Pa, K6LBH, 1416D Lunalilo St., Honolulu, T. H.
K7 — Jerry McKinley, K7GSC, Box 1533, Juneau, Alaska.
KA — George L. Rickard, KA1GR, P. O. Box 849, Manila, P. I.

* VE3QB advises that in spite of the suspension of amateur work by VE's he expects to clear the QSL file completely by early October.

Vermont Convention

(Continued from page 62)

a special surprise by W1AAJ. Director Noble and SCM Parker will be the principal speakers.

The price for everything is $1.50. Send word to R. C. Teachout, Sec'y, Green Mountain Radio Club, 42 Pine St., Rutland, Vt., that you are coming.

(Continued from page 101)

direct news from the boy. As S.C.M. I thank the Maine boys and half of the rest of New England for the excellent work in the public interest, as so many were too modest to report their part in the fine piece of work. I cannot refrain from mentioning the part Ed. Hudon of Lewiston played in the drama. Ed is a comparatively new ham, although a man of mature age and member of the Maine Bar. He is W1LYK. No one had to tell Ed. what to do. He got busy. He backed up DHH with so many expensive 'phone calls and such material help that he had UP in Bangor, DHH in Hallowell and 2HXQ in Rye, N.Y., hooked up in about fifteen minutes and at that UP had to QSY from 14 Mc. Quite a few new hams around Maine with "M" calls and we all say, "Welcome, fellows." BIG is on with an 807 final. Clint. Hoar at Rangeley, APX (ex-9AAA and 8RRK) is back on the home roost and is going to come into the official activity with both feet. LML would be glad to take any Univ. of Maine traffic; he's on 3712 kc. and A.A.R.S. I have two more applications for Emergency Coördinator. That's great business. Come on, fellows!! Who's next to write his intention of being Coördinator for his vicinity? We also need wider coverage for the Pine Tree Net which does such a fine job and is such a grand bunch of boys. You'd like it and you don't need to be a "speed merchant" to belong either. Have you heard the new slogan around the state in ham radio? "The Maine Idea is Public Service." We've got the old ball rolling. Let's "Whoop it up." They can't stop us now. We'll give those other Sections such a high mark to shoot at they'll never make it. Write me for any help, information or official supplies and I'll come back faster than that old rotary gap wheel of mine went through the window when it flew off the shaft years ago. — W1IE.

Traffic: **W1**DHH 68 IIE 3 AFA 11 LRP 3 LML 19 GXY 2.

EASTERN MASSACHUSETTS — SCM, Larry Mitchell, W1HIL — Ass't. S.C.M., Chief R.M.: IJJY. Ass't S.C.M., P.A.M.: 1GAG. R.M.'s: 1JSM, 1EPE, 1KZT, 1QW, 1HH. New O.R.S.: HSA (ex-3GKN). New O.O.: LNN, BHW. This is a good time to list the ACTIVE A.R.R.L. appointees in this Section. If you wish to be listed or hold your appointment show activity and REPORT. E.C.'s: HXE, KBQ, JJY, QW. O.O.'s: GAG, BHW, LNN. O.B.S.: ASI, JJY, GAG, LMO. O.P.S.: HIL, HKK, GAG, JGQ, AAR, JCK, LMB. O.R.S.: LMO, KH, EPE, JJY, BDU, HWE, KCQ, QW, FWQ, AKS, EMG, AGX, JCK, JSM, KZT. The Eastern Mass. Net started September 5th and will meet daily at 7:30 P.M. on 3745 kc. with KZT as net control. More members are wanted. MEU is call of New Bedford Armory. MAD, new ham in N.B., is on 1.75-Mc. 'phone. The annual Boston Hamfest will be held at the Hotel Bradford, Saturday, October 21st. FSK is Chairman and ALP Vice-Chairman. Hamfest will be sponsored by South Shore and Eastern Mass. clubs. A big time is promised for all, lots of prizes, etc. Let's go, gang. BVL recently got married. BB worked 9PQH and 9VHG on 56 Mc. JJY is getting lined up for big traffic season. GAG is back on from new QTH. LWH is now on 28 and 1.75-Mc. 'phone as well as c.w. GCU is completing new receiver for "1¼" and "2½." ASI keeps O.B.S. schedules. JCK is active in O.R.S. and Army Net work. LZW is on 3.5 and 7 Mc. LBW reports from Attleboro. Welcome, Bill. WV, the DX king, worked HB1CE, CR4MM and VU7BR for 114th, 115th and 116th countries on 14 Mc. MCF is new reporter from W. Townsend. KCQ entered D.J.D.C. contest. Waltham Radio Club bought 250-watt gas driven generator. BDU reports lots of traffic from Forty Traffic System. LMO is also active in F.T.S. HIL had nice call from LMO and got him on 1.75-Mc. 'phone on HIL's new 15-watt portable 'phone à la *QST*. KH attended the Roanoke Division Convention. LMB worked couple ZL's on new rig. FHW and LO are increasing power. KZK is working on new four element beam. KTG was visited by G8JQ. The Merrimack Valley Amateur Radio has new officers: Pres., BMO; Vice-Pres., JNU; Treas., HXE; Secy., JJE; Activities Comm., KQV, COX, IQH. MEZ is new in Attleboro. LNN and LSA are on 1.75-Mc. 'phone. EFM is working DX from portable location near N.B. LOC has been sent to New London, Conn., on U.S.S. *Semmes*, so we lose an active O.R.S. and E.M.N. man. Good luck, Chris. When you read this report we will be well into the active season. Let's get going and make it the most active ever. 73 and luck. — HIL, GAG and JJY.

Traffic: **W1**KH 104 LMO 57 JJY 52 BDU 38 GWK 34 JCK 34 (WLGV 70) HWE 14 LWH 26 BB 10 GCU 11 KCQ 8 MCF-LBW 4 WV 2. (June–July: W1LWH 222 JCK 67 (WLGV 28)).

WESTERN MASSACHUSETTS — SCM, William J. Barrett, W1JAH — AJ schedules NY1AA and also the F.T.S. on 7 Mc. JAH is helping keep West. Mass. on the traffic map by way of A.A.R.S. EOB took cruise with N.C.R. KRX and LJF are building emergency equipment. KIK has new crystal job on 56 and 28 Mc. in his car. BVR has new NC81X. HPJ worked 56- and 28-Mc. portable all summer. COI reports his new a.m.c. working fine. LRS moved to Holyoke. AZW is again O.R.S. HNE is on portable from Rutland with flea-power. Well, fellows, by the time you read this the active season will be here. How about some activity? Our Section O.R.S. net on 3732 kc. has languished for lack of interested members. How about getting behind a real Section net? IJT has 801 final with 50 watts input, while his OM, MAX, has 100 watts to pair of 807's. KUW gave 3.9 Mc. a whirl with his new Class A.

Traffic: **W1**AJ 52 JAH 13 (WLGH 9) KRX 9 DCH 2 BVR 2 (WLG 48) IJT 4.

NEW HAMPSHIRE — SCM, Carl B. Evans, W1BFT-DMD — MANCHESTER on SEPTEMBER 23rd . . . SIXTH ANNUAL N. H. STATE A.R.R.L. CONVENTION and HAMFEST at the HOTEL CARPENTER . . . CU There!! The Nashua Mike and Key Club held an outing at Ashby, Mass., on August 20th. JKH has small Collins transmitter in operation on 7 Mc. IVU vacationed in Bermuda at VP9L's. AWU is experimenting with new e.c.o. using two RK23's. JBA is on an extended U.S.N.R. cruise. Ex-IOC, now 3HMB, visited old friends in N.H. LVG has an HY-615 on "2½." The results of our 4th mobilization of the N.H.E.N. held on August 6th: 26 stations in 22 different towns and cities reported in, several from localities not previously represented in our tests. Several portables were in the field, some checking in on several nets. The date of our next test will be some time this fall and due notice will be given. Regular N.H.N. schedules will start up on 3600 kc. nightly except Sundays at 6:30 P.M. about the first of October.

Traffic: **W1**KIN 128 DMD 25.

RHODE ISLAND — SCM, Clayton C. Gordon, W1HRC — A letter from G6BY comes from "Dear ole Lunnen" in which Bill takes us to task for not recognizing W1DQ ("Ole Doc. Quack") as the "greatest and most consistent 'phone signal in the whole of the U.S.A. — bar none." That's a mighty fine compliment from any place, but when it is backed up by a report that up to 19th July 1939 there have been 105 consecutive QSO's totalling more than 338 hours between these two stations we commence to get the idea of what is meant by consistent, especially when it's 14 Mc. that's being referred to. DDY has 300 watt job perking. JNO has been working with a compressor amplifier in the 'phone rig. Effective about a month before you receive this W1JEZ, Walter B. Marshall, 257 Massachusetts Ave., Providence, was appointed Asst. S.C.M. in complete charge of all the Emergency Coördination work in Rhode Island. He will make all future appointments and cancellations of Emergency Coördinators and E.C.'s will please handle all work of that nature through Walter instead of through me. Emergency work and organization is right up Walt's alley and there is every reason to believe that things will go ahead much faster and on a solid foundation under his leadership. KRQ put up new 7-Mc. antenna. KOG received a form card postmarked in Providence signed with obscene names and containing remarks of a similar nature. Since there are only two known sources of official forms at the present time (myself and DDY) and I can vouch for both of these sources not being responsible for such an act, suspicion naturally falls on some resident of this vicinity who may have held an O.O. appointment at some time in the past and had a supply of cards left. Whoever did this job may have thought they were being humorous, but they couldn't have given any thought to what KOG's mother would think of Amateur Radio and the A.R.R.L. when she saw this sort of thing coming in the open mail to her son. Any further reports of any such a thing happening around these parts and I shall make it my personal affair to see that the Postal Authorities are given all the facts which can be gathered for their investigators to work on.

Traffic: **W1**QR 2.

VERMONT — SCM, Clifton G. Parker, W1KJG — DQK erected new 3-element 28 Mc. beam. JZF has FB new transmitter on 14 Mc. with 500 watts. AVP has installed new Premax 24-footer on shack roof. KOO has been appointed Emergency Communications Chairman of Orleans County Red Cross. FPS is lining up emergency set-up down southern end of the Section. KVB has been trying out flea-power 1.75-Mc. 'phones. Results! KVB is now back on c.w.

AD is now in Bellows Falls, address: Box 88. ND is welcomed to the Section at Brattleboro. DPO had relapse and is now taking a sun cure at No. Ferrisburg. FGO reports a fine and flexible arrangement of station units with complete emergency power from vibropaks, batteries and auto-powered a.c. generator. KJG received welcome visits from KUY, KXL, LFM, KVB, KWB and ND. LFM has FB new rig with 6L6G-TZ40 line-up. Emergency survey cards are coming in slowly and we cannot get the line-up printed and to the M.V. patrol until have all the dope — less than 30% in to date. While you read this, jot down your answers and drop in the mail, please. Second Vt. A.R.R.L. Convention to be held at Hotel Bardwell, Rutland, Saturday, October 14th. Registration at noon, banquet at 5:30 P.M., dancing 9–12. Plenty of entertainment for YL's and XYL's. A.A.R.S., 'phone, traffic and emergency meetings in p.m. with code contests. Regular old-fashioned Vermont turkey dinner with all the fixin's and plenty of seconds — prizes galore and a floor show thrown in. Perce, 1BVR/WLG, our N.E. Director and Natl. Radio Aide of A.A.R.S. will speak — complete details being mailed Vt. amateurs shortly; everything included in the moderate registration fee of $1.50. Remember that extra ultra good time last year! Hope to see you there. Come loaded with your ideas on Vermont station activities, traffic and emergency plans and problems.

Traffic: **W1**FSV 44 AVP 8 KVB 2.

ROANOKE DIVISION

NORTH CAROLINA — SCM, W. J. Wortman, W4CYB — BHR has some nice schedules coming up this fall, and will be active on the A.A.R.S. DGU has new T-125 final. TO schedules I7AA and VQ3HJP. DGV is rag chewing on 3.9- and 14-Mc. 'phone. AAK may be found on 3.9 Mc. FSE returned from a trip up the East Coast. EJ got his 'phone W.A.C. HX and KI are back on 14 Mc. QA and ECW have new commercial tickets. FVD is passing around the cigars — it's a boy. FSE spent nice vacation in Washington, and at Division Convention. FSF has swell rig ready for fall. FWT is on 1.75-Mc. 'phone. ESB works 28 and 1.75 Mc. ESO has Class A ticket. FIY works 28 Mc. with an 807. FKU has Class A and is experimenting on 3.9- and 14-Mc. 'phone. BAH is very active on 1.75 Mc. GFD is new Wallace ham. GAV is new Pink Hill ham. FPH is trying parallel T-55's on 1.75 Mc. DRJ is using grid modulation on 1.75 Mc. Seen at Division Convention: CLB, BX, FSE, CJH and DW. All had a swell time. BMR has new 75-foot high rotary to take the output of his four 250TH's. BNG is on 3.9 Mc. at new QTH. Let's get going gang with plenty of activity. BQE, the S.C.M. of South Carolina, has sworn that they are going to beat us to pieces this year. I say we can't let that happen. Line up some schedules, originate some good traffic, join the Emergency Corps — Let's go, gang.

Traffic: **W4**TO 7 BHR 4 DGV 3 CYB 2.

SOUTH CAROLINA — SCM, *Ted Ferguson*, W4BQE — CZN keeps regular schedules on 3.5 and 7 Mc. EZF divides time between 1.75-Mc. 'phone and 3.5, 7 and 14 Mc. c.w. BPD has cards from 131 countries. GAR keeps regular schedules with FXH, ERF, CYT and DXF. DPN reports his rig working FB on 1.75 Mc. COL expects to return to the air about October 1st. AZT is now O.P.S. and works 3.9- and 14-Mc. 'phone. FXH is new Sumter ham. EJK is working on a directional antenna for 1.75 Mc. FNC likes his e.c.o. and can be heard on 1.75-Mc. 'phone. CHD is on 3.5 Mc. c.w. and 1.75-Mc. 'phone. FYG is new Tigersville ham. FNS and EJH are working DX. GCH is pounding brass on 3.5 Mc. EBT changed QTH to Fort Moultrie. Welcome to the Section, OM. FRY, South Carolina's youngest op (13 years), pounds away on 3.5 Mc. c.w. CUS and CZA have been busy with plans for the Charleston hamfest. Thanks. EZF, for FB report on the gang upstate. Fellows, September brings with it full operation of the various nets. Let us all take part and give South Carolina a good start. Thanks and 73. — Ted.

Traffic: **W4**CZN 41 GAR 39 EZF 34 EJK 15 FFH 14 BPD 12 EXJ 8 DPN-FNC 7 FHE 4 EHF 2.

VIRGINIA — SCM, Charles M. Waff, Jr., W3UVA — R.M.'s: 3GTS, 3HDQ — P.A.M.'s: 3AIJ, 3GWQ. FQY will be back on this fall. 11 schedules ELN daily. HNX experiments 30% of the time. FHF works lots of DX on 14-Mc. 'phone. GWQ is now operating 4- and 14-Mc. 'phone as well as 1.75 Mc. DJC has been transferred to New Orleans, La., temporarily. Hurry back, Joe. ALF, BDQ, BRE, CSY, EXQ and HDD are active members of the Old Dominion Radio Association. ALF needs only New Mexico for W.A.S. HAE won an Astatic mike at the Division Convention. HBH/IFZ has new 802 E.C. crystal osc. and 803 final with 300 watts input, and a Comet Pro receiver. ICQ is new Emergency Coördinator at Cape Charles. HLC has new 300 watt rig with capabilities of 500 soon. BIG uses 3995 kc. mostly. ELN would like to see more hams in the A.A.R.S. Interested? Write 3GTS. HOY is leaving Virginia to attend Port Arthur Radio School. Good luck, George! AIJ is rebuilding with 300 watts in mind. BFW has 1 kw. and new antenna on 3.5, 7, 14 and 28 Mc. CFV reports activity in Norton distributed as follows: 1.75 Mc. BRD and CFV; 7 Mc., BLE and CFV; 14 Mc., BAD and CZJ. HBF has new e.c. osc. and a rotary beam for 14 Mc. IEY is new Norfolk ham on 1.75-Mc. 'phone with designs on 28 Mc. HFL is rebuilding. IEW, ex-4DZP, is new Norfolk ham. FZM uses 18 watts input and needs only a card from Idaho for W.A.S. FQP has new Mims rotary beam antenna. HJC is experimenting with voice operated control. DGG uses 1819 kc. every night. EFO is building a new hum-free rig for 1.75-Mc. 'phone. GAL heard DX on 56 Mc. UVA has 20 watts on 4 Mc. 'phone. UVA/8 was operated at the Division Convention. CA announces the VIRGINIA FLOATING RADIO CLUB will meet at Roanoke on October 15th; for details write 3CA. GTS worked 35 stations in the July O.R.S. Party, but none in Virginia! Where were the other Virginia ORS? IEO, ex-9NOL is new Falls Church ham. HSE visited 6USA. HRC, EK, FJ, GPV and HDE were at Manassas for Army maneuvers. Norfolk Radio Club has following officers: HRC, Pres.; GAL, V-Pres.; HAE, Secy.; HFL, Treas.; DGG, publicity director. With 28 members, 2 club transmitters, a code class, a series of technical talks, and regular Friday night meetings this newly organized club is off to a fine start. Visitors and new members are welcome at the club quarters, 726½ Boush St. Is any Virginia city interested in handling the 1940 Roanoke Division Convention? If so, write 4DW. REPORT PROMPTLY ON THE 16TH OF EACH MONTH.

Traffic: **W3**ELN 272 IFZ 60 II 35 HLC 18 HJC 9 ALF 5 HFL 5 HNX 4.

WEST VIRGINIA — SCM, C. S. Hoffmann, Jr., W8HD — This is my last report as S.C.M., as I am retiring after 10 years in this chair. I want to thank each one of you for all reports, which have been useful to keep the A.R.R.L. spirit in this Section alive, and make West Virginia one of the most progressive Sections on the Division. By the time this appears in *QST*, your votes will have chosen my successor and I hope you will coöperate with him in every way, especially in striving to keep none of his list of potential appointments unfilled. The Trunk Lines this fall deserve your closest attention, and with that the development of a Club-O.R.S. Net on 3770 kc. I shall hope to see you all on 3770 kc. this fall, as will all the old timers in the Section. The Division Convention at Charleston, pulled a crowd of 225 and all said they enjoyed the Charleston Radio Club's efforts. The Director, Alternate Director and four S.C.M.'s were there besides the only existing R.M. from this state. It was good for us all to meet. Most of the gang from the Northern part of the state attended the Pittsburgh hamfest on that week-end, at which there were 750 present. New appointees: TNC, O.R.S. and O.P.S.; Emergency Coördinators: SES for Dunbar; SYJ for Wellsburg; TNM for Nitro. SES is Mayor of Dunbar! KSJ married! AOB visited TCP/KSJ. TOK is new Charleston ham. SKD and SES are on 1.75-Mc. 'phone. KKG has worked 135 countries. PQQ now has 96 worked and 88 confirmed. DFC is rebuilding for fall traffic. QJS is new Sutton station. TNC has new 56-Mc. set giving 200 watts output at W. Va. Univ. CXU was heard in England and Australia on 3.9-Mc. 'phone. 3ZD visited KKG and tried portable 3ZD/3 in Romney, making some nice QSO's on 3.9 Mc. 'phone. HD visited MOL and 8RJG. 3ZD visited Wheeling and Huntington. KYJ is on 3.9-Mc. 'phone! AFX, CXR and FVU are rebuilding for the fall. OXO, GBF, BTV are getting ready for fall trunk lines.

Traffic: **W8**QJS 8 TCP 6 SKD 5 PHY 3 DFC 2.

DX Contest Scores

(Continued from page 94)

Georgia

W4FLJ	6036-28-	79-	B-39
W4YC	21996-52-141-		C-48[34]
W4DYH	4725-27-	60-	B-34[35]
W4IS	3861-27-	49-	C- -
W4FBE	1860-20-	31-	- -24
W4EGT	1482-19-	26-	B-15
W4FHW*	96- 6-	6-	- - -
W4ERT*	3- 1-	1-	- - -

SOUTHWESTERN DIVISION

Los Angeles

W6GRL	110763-93-397-		C-86[36]
W6AM	57150-75-254-		C-87
W6NHK	19890-51-130-		B-63
W6GRX	16500-44-125-		A-67
W6NMI	11124-36-103-		C-39[37]
W6POZ	10880-32-114-		C- -
W6FZL	8880-37-	80-	B-45
W6MEP	8619-31-	93-	B-46
W6PDB	7830-29-104-		B-68
W6CGY	5742-29-	66-	B- -
W6KYT	5544-28-	66-	B-58
W6PKK	4872-28-	58-	B-31
W6QOZ	3480-20-	58-	A-37
W6LIP*	3174-23-	46-	B- -
W6QGI*	3120-20-	52-	- - -
W6MBD	2925-25-	39-	- - -
W6FPV	2451-19-	43-	B- -
W6JZL	2142-17-	42-	B-28
W6KNF	2091-17-	41-	B-17
W6MUM	1008-12-	28-	A- 9
W6PEN*	462-11-	14-	- - -
W6BUK*	264- 8-	11-	B- 8
W6HLZ	120- 5-	8-	B-10
W6PBG	120- 5-	8-	B- -
W6NCP	88- 4-	8-	A-29
W6DZH*	60- 4-	5-	- - -
W6QJ*	60- 4-	5-	- - -
W6PYV*	48- 4-	4-	A- -
W6QFB*	30- 5-	6-	- - -
W6QKS	3- 1-	1-	- - -

Arizona

W6OJK	8910-30-	99-	C-55
W6PNX	6570-30-	74-	B- -[38]
W6QJL	1840-20-	31-	B-13
W6PQQ	299-13-	23-	A-19
W6PWW	246- 6-	14-	B-33
W6QNC*	96- 6-	8-	- - -
W6QLZ	75- 5-	5-	- - -
W6IMR	72- 4-	6-	- - -
W6OIF	45- 3-	5-	A- 9
W6HRH	24- 2-	4-	A- 2

San Diego

W6GCT	10836-42-	86-	C-28
W6GCX	7644-28-	91-	B-54
W6CHV	3690-18-	69-	A-50
W6EOW*	378- 9-	14-	- - -
W6NAV*	30- 2-	5-	- - -

No. Texas

W5VU	16942-43-132-		C-47
W5YF*	12510-38-111-		C-47[39]
W5EKF*	5010-30-	56-	- -10
W5HDU	700-14-	25-	A-19
W5APW	231- 7-	11-	B-37
W5FVE	108- 6-	6-	A- 7

Oklahoma

W5BEE	15502-46-113-		C-46
W5GZK	5292-27-	66-	B-51
W5EHT	4075-25-	55-	B-46
W5FXD	1500-20-	25-	B-29
W5FFW*	270- 9-	10-	B- -
W5GVP	216- 8-	9-	B-20

So. Texas

W5EDX	10560-44-	80-	B-73
W5VV	6954-38-	61-	B-13
W5FGQ*	3784-22-	58-	C-41
W5HMQ	3096-24-	43-	A-28
W5BVH	1620-20-	27-	B-26
W5CCU	756-14-	18-	B-33[40]
W5BCU	741-13-	19-	A-23
W5HEG*	120- 5-	8-	A- -
W5EIN*	42- 6-	7-	B- -
W5GGS*	3- 1-	1-	- - -

New Mexico

W5DWP	5668-26-	73-	B-40
W5GGX	210- 7-	10-	B-10

CANADA

Maritime

VE1GH	12543-37-113-		A-75
VE1EL	10605-35-101-		A-46
VE1CR	9801-43-	76-	B-30
VE1DC	6025-25-	81-	A-23
VE1BK	5453-19-	97-	A-30
VE1DQ	4830-21-	77-	B-35
VE1EI*	1368-12-	38-	B- -
VE1FQ*	378- 9-	14-	B- -
VE1KK*	210- 7-	10-	- - -
VE1CO*	108- 6-	6-	- - -
VE1KQ*	12- 2-	2-	- - -

Ontario

VE3QL	22464-54-140-		B-84[41]
VE3FB	22005-45-163-		B-46
VE3LL	14700-35-140-		B-79
VE3WV	7084-28-	85-	A-45
VE3KE	4455-27-	55-	A-40
VE3QP	4446-26-	57-	B-51
VE3AFD	4134-26-	53-	B-37
VE3OC	3840-24-	54-	B-26
VE3PJ	3528-24-	49-	A-25
VE3NX	2037-21-	33-	A-22
VE3PE	1440-16-	30-	B-12
VE3OO*	1296-16-	27-	A-22
VE3AIB	1092-14-	26-	A- 9
VE3HB	1040-13-	28-	B-18
VE3TB	360- 9-	14-	A- 7
VE3QB*	294- 7-	14-	A- -
VE3MZ	180- 6-	10-	A- -
VE3LB	147- 7-	7-	- - -
VE3QD*	125- 5-	9-	- - -
VE3AUQ	120- 5-	8-	- - -
VE3PZ*	36- 3-	4-	- - -
VE3ADH	27- 3-	3-	- - -
VE3AHS	3- 1-	1-	- - -

Quebec

VE2EE	11080-35-	96-	B-45
VE2EW	9614-38-	85-	B-50
VE2BO	6318-26-	81-	A-44
VE2FE	1260-15-	28-	B-25
VE2AA*	352-11-	12-	A- -

Alberta

VE4WJ	3168-24-	44-	A-34
VE4AHZ*	144- 9-	16-	- - -
VE4GE	36- 3-	4-	- - -
VE4ACF*	36- 3-	4-	A- -

British Columbia

VE5VO	16842-42-135-		B-74
VE5VP	12768-38-112-		BC-67
VE5BF	5544-33-	56-	B-48
VE5AEJ	4536-21-	73-	B-55
VE5FO	3024-21-	48-	- -17
VE5AAD	2193-17-	43-	A-30
VE5ZM	540-10-	18-	A-16
VE5FZ*	90- 5-	6-	- - -

Manitoba

VE4SS	24453-57-143-		BC-65
VE4NI	9801-33-	99-	B-61
VE4ACP	7110-32-	79-	B-66
VE4VD	6786-29-	78-	B-25
VE4ADV	4004-26-	54-	B-31
VE4ZK	2268-21-	36-	B-30
VE4SR	1440-16-	30-	B-18
VE4YR	663-13-	19-	B-15
VE4AIX*	72- 4-	6-	- - -

Saskatchewan

VE1BF	2340-20-	39-	B-43
VE1GA	1792-18-	33-	B-17
VE4GU	540-10-	18-	B-10

AFRICA

Algeria — FA

FA3JY	650-10-	22-	A- 5

Egypt — SU

SU1CR	3300-10-110-		A-27
SU1RD	1892-11-	58-	A-28
SU1AX	18- 2-	3-	A- -

Morocco — CN8

CN8BA	6012-18-112-		A-20
CN8AU	2960-10-102-		A-27
CN8BD	1809- 9-	67-	A-15

U. of So. Africa — ZS

ZS6DW	61452-27-765-		A-71
ZS4H	36840-24-520-		A-64

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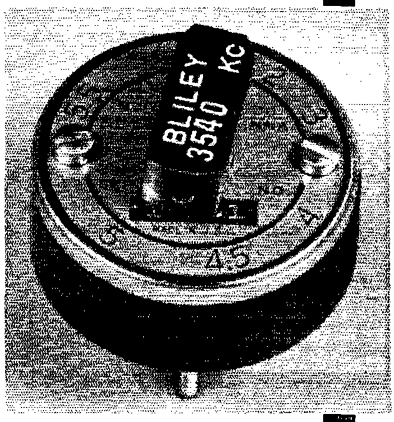

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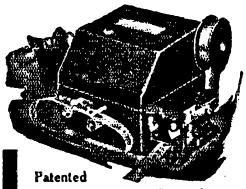

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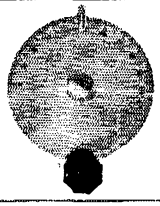

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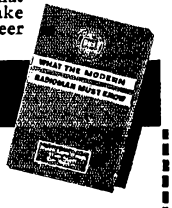

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ZS6W	10668-14-256-	A- -		
ZS6AD	4015-11-123-	A- -		
ZS6AQ	2760-12- 77-	- -20		
ZS5Q	1791- 9- 69-	- -13		
ZS6L	1360- 8- 57-	A- -		
ZS6DV*	488- 4- 41-	- - -		
ZS1BL*	264- 4- 22-	A- 4		
ASIA				
Burma — XZ				
XZ2DX	1246- 7- 60-	- -16		
XZ2EX	45- 3- 5-	- - 2		
China — XU				
XU8AM	2475-11- 75-	B-27		
Chosen — J8				
J8CI	705- 5- 48-	- - -		
Japan — J				
J3FZ	3610- 7-119-	B-36		
J2MI	3608-11-111-	- -19		
J2KN	1600- 8- 69-	A-17		
J2NQ	1326- 4- 73-	A-20		
J2NG	1224- 6- 68-	A-14		
J2PU	375- 5- 25-	A- -		
J3DF	48- 2- 8-	- - -		
EUROPE				
Azores — CT9				
CT2AB	360- 5- 24-	A-10[42]		
CT2BC	360- 5- 24-	A-10[42]		
CT2BP	360- 5- 24-	A-10[42]		
Belgium — ON				
ON4AK	12210-22-191-	B-27		
ON4HS	2010-10- 67-	A- -		
Eire — EI				
EI2L	31211-23-455-	A-47		
EI3J	2340-10- 78-	- - -		
EI2P	440- 8- 19-	A-40		
Estonia — ES				
ES5D	3042-13- 78-	A-20		
France — F				
F8QD	25001-23-363-	A-54		
F8NT	21912-22-332-	A-61		
F8XT	7599-17-149-	- - -		
F8JQ	7562-19-142-	A-28		
F8WK	5200-16-109-	A-15		
F8NX	3590-10-121-	A-23		
F3DC	1377- 9- 51-	A-21		
F8SI	1188-12- 36-	A- 8		
F3OO	984- 8- 41-	A- -		
F8BM	840- 8- 35-	- -31		
F8VC	504- 8- 21-	- - -		
F3ER	468- 9- 18-	A- 3		
F8PQ	228- 6- 13-	A- 1		
F3LE	195- 5- 13-	A- 7		
F3LG	48- 4- 4-	A- 1		
F8BA	3- 1- 1-	- - -		
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G6LK	35880-26-460-	B-63		
G5LU	32010-24-448-	A-58		
G6BW	14972-19-264-	- -41		
G2WD*	7860-19-140-	B-32		
G8JQ	7395-17-147-	A-41		
G8MX	6066-18-114-	A-19		
G8TD	5181-16-108-	A-21		
G8QX	5149-19- 91-	A-25		
G5SO	4976-16-105-	A-43		
G5ZG	4070-15-114-	A-18		
G6WY	4736-16-100-	B-20		
G2MI	3960-15- 87-	- -26		
G6XN	3192-14- 76-	- -29		
G3BM	3091-11- 96-	- - -		
G5BD	2926-19- 53-	A- -		
G8DM	2450-14- 59-	A-11		
G6BC	2290-10- 83-	A-23		
G8GQ	1488- 8- 62-	A- -		
G8SW	1263- 3- 14-	- - -		
G4AS	1089- 9- 42-	- -11		
G8IG	1053-13- 27-	- - -		
G8SA	896- 7- 43-	A-23		
G2XY	872- 7- 37-	B-22		
G2IS	720- 6- 41-	A- 5		
G2IW	477- 9- 18-	- - -		
G6AH	322- 7- 19-	- - -		
G6QS	156- 4- 13-	A- 4		
G3RI	132- 4- 11-	A-30		
G3YM	45- 3- 5-	A- -		
G8QH*	45- 3- 5-	- - -		
G3JG*	36- 3- 4-	- - -		
G3MK	36- 2- 4-	- - -		
G4CG	24- 2- 4-	- - -		
G6AY	12- 2- 2-	- - -		
G5OJ*	3- 1- 1-	- - -		
Hungary — HA				
HA8C	54- 3- 7-	B- 4		
Italy — I				
I1TKM	6307-17-126-	B-27		
I1IT	1290-12- 36-	A- 8		
Lithuania — LY				
LY1J	4560-20- 76-	A-32		
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Netherlands — PAØ				
PAØUN	25344-22-394-	A-56		
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PAØEO	4496-16- 94-	A-25		
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PAØIDW	150- 5- 10-	- - -		
Northern Ireland — GI				
GI8TS	1248-12- 35-	A-19		
Norway — LA				
LA1F	2607-11- 79-	A-23		
LA1G	78- 3- 9-	A- -		
LA3K	12- 2- 2-	- - -		
Poland — SP				
SP1DC	1820-13- 47-	A-19		
Portugal — CT1				
CT1ZA	12597-19-224-	A-27		
CT1QG	11254-17-225-	A-34		
CT1PK	9685-13-251-	B-27		
CT1QA	2475- 9- 92-	A-31		
CT1OO	1016- 8- 45-	A- 5		
Roumania — YR				
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YR5VV	18- 2- 3-	B- 1		
Scotland — GM				
GM6RG	41075-25-531-	- -53		
GM2UU	10365-15-237-	A-32		
GM8MN	8190-14-196-	A-43		
GM8RJ*	2784-16- 58-	A-10		
GM3OL	300- 5- 20-	A- -		
Sweden — SM				
SM7UC	8280-18-155-	A-18		
SM5SI	1820-13- 47-	B- 8		
Wales — GW				
GW6JW	5104-16-108-	A-13		
GW3KY	1914-11- 58-	A-12		
GW3AX*	1826-11- 57-	- - -		
GW3JI	1431- 9- 53-	A-11		
GW8HI	84- 4- 7-	- - -		
NORTH AMERICA				
Alaska — K7				
K7AOC	1239- 7- 59-	B-22		
Bahamas — VP7				
VP7NS	10542-14-251-	A-20		
Barbados — VP6				
VP6YB	81027-27-1015-	B-59[43]		
Bermuda — VP9				
VP9L	45520-20-764-	A-64		
VP9X	4382-14-107-	A-11		
British Honduras — VP1				
VP1WB	32453-23-478-	A- -		
Canal Zone — NY/K5				
NY1AA	27672-24-388-	A-60		
K5AN	1080- 9- 40-	- - -		
K5AF*	780-10- 27-	- - -		
Costa Rica — TI				
TI2FG	27621-27-341-	B-14		
Cuba — CO				
CO2WM	109536-28-1312-	B-60		
CO2JJ	65013-27-810-	B-83		
CO2JM	16632-24-236-	A-31		
CO7EV	14812-14-358-	A-42		
CO2WL	7431-14-177-	A- -		
CO2MA	4017-13-103-	A-15		
CO2GY	2520-12- 70-	- - -		
CO2LY*	1122-11- 34-	B- -		
Guatemala — TG				
TG9AA	13915-23-202-	A-16		
Haiti — HH				
HH2B	567- 9- 21-	- -44		
HH5PA	78- 6- 13-	- - -		
Leeward Islands — VP2				
VP2AT	252- 6- 14-	A- -		
Mexico — XE				
XE1A	96000-25-1305-	B-65		
XE2HD	35628-26-460-	- -75		

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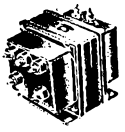

Type No.	*Max. Audio Watts*	*Net Price*
T-19M13	15	$2.35
T-19M14	30	4.12
T-19M15	60	5.88
T-19M16	100	8.82
T-19M17	250	14.11

FILAMENT TRANSFORMERS

Type No.	*Volts C.T*	*Amps.*	*Net Price*
T-50F61	2.5	3.5	$.88
T-19F89	2.5	10	1.32
T-19F81	6.3	1	.88
T-19F97	6.3	3	1.03
T-19F98	6.3	6	1.62
T-19F93	7.5	4	1.32
T-19F94	7.5	8	1.76
T-19F95	10	4	1.62
T-19F96	10	8	2.06

INPUT CHOKES

Type No.	*D.C. M.A.*	*Ind. Hen.*	*Net Price*
T-19C39	150	5-20	$1.91
T-19C35	200	5-20	2.35
T-19C36	300	5-20	3.82

SMOOTHING CHOKES

T-19C46	150	12	$1.91
T-19C42	200	12	2.35
T-19C43	300	12	3.82

PLATE TRANSFORMERS

Type No.	*D.C. Volts*	*D.C. M.A.*	*Net Price*
T-19P54	400	150	$3.36
T-19P56	750	225	4.70
	600		
T-19P69	1000	300	7.64
	750		
T-19P59	1250	300	9.41
	1000		
T-19P60	1500	300	10.88
	1250		

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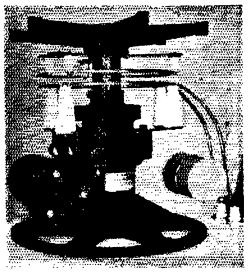

	Amateur Cash Net Price	*Down Payment*	*Per Mo. for 6 Mos.*	*Per Mo. for 12 Mos.*
Dual 3-Element 10- and 20-Meter Deluxe kit.....	$159.00	$31.80	$22.98	$11.66
3-Element 20-Meter Deluxe kit	124.50	24.90	17.93	9.13
2-Element 20-Meter Deluxe kit	116.50	23.30	16.77	8.54
3-Element 10-Meter Deluxe kit	116.50	23.00	16.77	8.54
2-Element 10-Meter Deluxe kit	110.00	22.00	15.84	8.06
2-Element 10-Meter Standard kit.....	57.50	11.50	8.28	4.21

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XE2IY	1764-12- 49-	A- 7	
XE2IK*	1332-12- 38-	- - -	
Newfoundland — VO			
VO1Y	5980-10-206-	A-27	
Nicaragua — YN			
YN1IP	12138-14-289-	- - -	
YN3DG	4596-12-128-	B- 6	
Panama — HP			
HP1A	3840-16- 80-	- - -	
Puerto Rico — K4			
K4SA	24552-22-372-	A-26	
K4DSD	8041-11-247-	A-44	
Salvador — YS			
YS2LR	1539- 9- 58-	A- 8	
Windward Islands — VP2			
VP2LC	2343-11- 72-	A- 6	
OCEANIA			
Australia — VK			
VK4JP	45072-24-626-	A-56	
VK2UC	38100-25-512-	- - -	
VK2ADT	24702-23-358-	- - -	
VK3XP	24025-25-323-	A-59	
VK2IQ	22872-24-321-	A-41	
VK3EH	20907-23-203-	A-54	
VK4JU	11074-14-276-	- - -	
VK3GP*	9601-14-229-	- - -	
VK3CP	3168-11- 96-	- - -	
VK3HG	2310-12- 65-	A- 8	
VK4RC	2088-12- 58-	A-33	
VK5XJ*	1590-10- 53-	A- 8	
VK3MX	1130-10- 38-	A- 4	
VK3DH	696- 8- 29-	A- 7	
VK2AFA	306- 6- 17-	A- -	
VK3BW*	306- 6- 17-	- - -	
VK6BW	231- 7- 11-	A- -	
VK2JZ*	84- 4- 7-	- - -	
VK3ZD	63- 3- 7-	A- -	
VK6MU*	54- 6- 9-	- - -	
VK2AFQ	40- 2- 7-	- - -	
VK4CG	36- 3- 4-	- - 1	
VK3VP	12- 2- 2-	- - -	
Hawaii — K6			
K6LKN	23064-24-325-	B-61	
K6MTH	5040-16-105-	B-13	
K6OTH*	3795-15- 85-	- - -	
W9YMZ/K6*	396- 6- 22-	A-10	
W8FUE/K6*	348- 6- 29-	- - -	
K6QNX*	165- 5- 11-	A-11	
Java — PK			
PK1RI	4836-13-116-	B-21	
PK3WI	1710- 9- 64-	B- 6	
PK2LZ	441- 7- 21-	A- 5	
PK2DF	189- 3- 21-	A- 4	
New Guinea — VK9			
VK9DK	2002-11- 62-	A-25	
New Zealand — ZL			
ZL1LC	18774-14-447-	A-47	
ZL1HY	11693-11-358-	A-51	
ZL1MR	7800-12-217-	A-33	
ZL3AY	1620- 9- 60-	A- -	
Philippine Islands — KA			
KA1LB	22488-24-315-	B-45	
KA2OV*	690- 5- 46-	- - -	
Phoenix Islands — KF6			
KF6DHW	135- 5- 9-	A- -	
Sumatra — PK4			
PK4KS	6708-12-188-	B-29	
Tasmania — VK7			
VK7CM	1680-10- 56-	A- 9	
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Argentina — LU			
LU5AN	47068-28-569-	A-77	
LU7BK	45240-26-584-	- -62	
LU9BV	43791-28-548-	A-81	
LU9AX	5412-12-151-	A-28	
LU1DA	2910-15- 97-	- - -	
LU8AG	1026- 9- 39-	B-15	
LU3BAC	688- 8- 29-	B- 5	
LU3HA	408- 8- 17-	- - -	
LU5CK	120- 5- 9-	B- -	
LU1AH	45- 3- 5-	- - -	
LU3AN	3- 1- 1-	A- 3	
Brazil — PY			
PY2AC	50568-28-602-	B-65	
PY5AQ	7812-21-128-	B-26	
PY2LN	2563-11- 78-	- - -	
PY2GC	1749-11- 54-	- - -	
PY3DZ	912- 8- 38-	A-12	
PY2BH	84- 4- 7-	- - -	
Chile — CE			
CE2BX	49968-24-691-	B-86	
CE1AH	10521-21-169-	B-32	
CE1AO	9416-22-145-	- - -	
CE4AC	5892-12-167-	B-46	
CE3AI	623- 7- 30-	B-12	
Colombia — HK			
HK3CG	39147-27-490-	B-66	
HK3CO	24570-27-308-	A-35	
Ecuador — HC			
HC1PZ	59556-28-710-	A-52	
HC2CC	24012-23-354-	B-58	
Peru — OA			
OA4AI	3003-11- 91-	- - -	
Uruguay — CX			
CX2CO	19170-22-295-	- -39	
CX1FB	6255-15-139-	- -32	
CX3BL*	780-10- 26-	- - 5	
Venezuela — YV			
YV4AE	17402-14-424-	B-40	
YV5ABC	2781-12- 83-	B- -	

The Infinite Impedance Detector

(*Continued from page 21*)

not impaired. The modulation capability is excellent, reaching 100 per cent with normal values of resistors. Typical values would be $R_1 = 150{,}000$ and $R_2 = 250{,}000$ ohms. Any trouble with r.f. getting on the grid of the audio amplifier can be eliminated by making R_1 a 50,000- and 100,000-ohm resistor in series, with the lead to C_2 connected at the juncture so that the audio load is tapped one-third down on the load resistor. A medium-μ tube like the 6C5 is recommended, since the higher amplification tubes do not have as good modulation capabilities.

The two advantages of the infinite impedance detector over a diode are that it will readily handle high percentages of modulation without distortion and it will not load the i.f. transformer.

The latter advantage is shared with the ordinary plate detector, but the plate detector does not have the high modulation capability. The infinite impedance detector has the disadvantage, along with the plate detector, that there is no convenient source of a.v.c. voltage.

While not an infinite impedance detector in the true sense of the word, the circuit [1] shown in Fig. 1-C is interesting because it permits the use of a diode rectifier (for a.v.c. purposes) without loading the i.f. transformer. It is related to the infinite impedance detector only in that it is another member of the family of cathode-coupled circuits. A 6C5 or similar tube should be used in this application, and representative values would be R=1000 ohms, C=0.01 μfd., R_1=25,000 ohms, C_1=500 μμfd., C_2=0.01 μfd., R_2=250,000 ohms, R_3=500 ohms, C_3=0.1 μfd., R_4=500,000 ohms and C_4=0.01 μfd. For an i.f. of 465 kc., L should be of the order of 1 mh., which can be obtained readily by removing some of the turns from one of the small 2.5-mh. chokes available. L should be as low-resistance as possible, to avoid bias of the diode. If some capacity is added across the coil, the amplifier will become regenerative, and the circuit presents itself as a possibility for small receivers using a regenerative i.f. amplifier and a.v.c. — *B. G.*

[1] W. T. Cocking, "Cathode-Coupled Circuits," *Wireless World*, December 15, 1938.

What the League Is Doing

(*Continued from page 25*)

forwarding, and we have despatched them to the foreign societies for distribution. The war now makes it impossible for us to continue this service to the major amateur countries; the amateur societies have suspended and their QSL bureaus are closed. While we're always ready to help when a QTH isn't in the callbook, we must now ask our members ordinarily to despatch their outgoing QSL's direct to foreign amateurs.

ALWAYS BE CAREFUL

★ ★ ★

(A) Kill all transmitter circuits completely before touching anything behind the panel.

(B) Never wear 'phones while working on the transmitter.

(C) Never pull test arcs from transmitter tank circuits.

(D) Don't shoot trouble in a transmitter when tired or sleepy.

(E) When working on the transmitter, avoid bodily contact with metal racks or frames, radiators, damp floors or other grounded objects.

(F) Keep one hand in your pocket.

(G) Develop your own safety technique. Take time to be careful.

★ ★ ★

Death Is Permanent!

A Compact Amplifier

(*Continued from page 38*)

the photographs. The two condensers are supported by vertical metal strips attached to the 5½ by 4 5/16-inch sub-base. This sub-base, or platform, not only serves to mount the tubes and coils, but also acts as a shield between the two condensers. Standard Barker & Williamson coils are used in both the plate and grid circuits, and require no pruning. The amplifier is suitable for operation on 80, 40, 20, and 10 meters with the condensers illustrated. Since the series minimum capacity is in the neighborhood of 9 $\mu\mu$fd., there is no difficulty in obtaining resonance throughout the 10-meter band with proper L/C ratios.

The excitation requirements for the two HK-24's are quite modest; only some 10 watts are required. An amplifier or oscillator delivering around 15 or 20 watts should do the trick very nicely and provide an ample reserve of power for good regulation in the driving stage.

Slight changes in the amplifier can be made without difficulty. For example, variable link coils can be used in the plate circuit and other types of tubes requiring from 1000 to 1500 volts on the plate can be substituted. Last, but not least, few modifications would be needed for operation on 5 meters.

Massachusetts State Convention

(New England Division)

Boston, Mass., October 21st

CORRECTION! September *QST* mentions the Boston Hamfest to be held on October 14th; this is not correct, the date is October 21st. The plans now are to have a Massachusetts State Convention and Boston hamfest combined to be held at the Hotel Bradford, Boston, Mass., October 21st, under the auspices of the South Shore and the Eastern Massachusetts Radio Clubs.

A good array of speakers, lots of prizes, contests, meetings and a real turkey supper with all the fixings make up the program.

Those of you who are looking for some foreign QSL cards and don't send in your envelope, it will be good news to you to learn that W1BGY, J. T. Steiger, QSL Manager for the First District will be present with his QSL Bureau; it's worth making the trip just to see the exhibit. Demonstrations and display booths will be of interest to every one. Registration is $1.00 and this will entitle you to one chance for a prize. Banquet and registration is $2.50 and entitles you to three chances for a prize. For tickets and information write W1ALP, Frank L. Baker, Jr., 21 Colby Road, North Quincy, Mass.

Strays

Antenna halyards may be water- and weather-proofed by boiling in paraffin until the air is expelled. My halyards have been in use for six or seven years without sign of rotting.

— *W. W. Braden*

A Compact ¼-Kw. Rig

(*Continued from page 14*)

ma. at resonance, depending upon frequency. If the oscillator plate circuit is tuned to the crystal fundamental, it should not be tuned too close to resonance to permit ready starting and stopping of crystal oscillation. Tuning the 807 plate circuit to resonance should cause grid-current flow to the final amplifier. This current should run between 35 and 50 ma., depending upon frequency.

The next step is that of neutralizing the final amplifier. This is done, of course, with plate voltage *not applied* to the final amplifier. When not neutralized, there will be a fluctuation in grid current to the amplifier when its plate tank circuit is tuned through resonance with excitation applied. The neutralizing condenser should be adjusted until there is no change in grid current when the final tank circuit is tuned through resonance. Neutralization may be checked by touching a neon bulb to the plate terminal of the 75T while tuning the tank circuit through resonance with excitation applied. The neon bulb should not show any indication of r.f. in the plate circuit.

It is highly desirable that plate voltage for the final be reduced whenever this stage is being tuned up. This applies to tuning in regular operation. This can be done quite readily by inserting a 150-watt 110-volt lamp in series with the primary winding of the plate transformer. With the amplifier neutralized, low voltage may be applied and the final tank tuned to resonance. For testing the power output, a 150-watt lamp may be connected across the output terminals of the coupling coil with which the tank coil is fitted. This coil should first be adjusted to a position at right angles to the tank coil. Full plate voltage may now be applied and the coupling coil rotated *very* slowly, bit by bit, watching the plate-current meter carefully. Whenever the plate current rises above 175 ma., the tuning of the tank circuit should be adjusted for minimum plate current. This process is continued until the plate current reading at minimum dip is 175 ma. With a 1500-volt plate supply, no difficulty should be experienced in lighting the 150-watt lamp to more than normal brilliancy on all bands.

Checking Voltages and Currents

With the final amplifier running with the lamp dummy load, various voltages and currents should be checked. The voltage of the plate supply for the exciter should be as close to 600 as possible. The voltage dividers recommended will then provide voltages close to the following values: os-

oscillator plate, 300 v.; oscillator screen, 150 v.; 807 screen, 300 v.

A check should be made on the biasing voltage for the 75T together with its grid current while operating under full load. The biasing voltage should be not less than 300 with a grid current of not less than 25 ma. If the voltage is 300 or higher but the grid current less than 25 ma., the slider on the bias-pack voltage divider should be moved slightly towards the positive end of the resistor until grid current is up to normal. Under operation, grid voltage for the 807 should be 200 to 250. Grid current at this voltage should run 2 to 5 ma. Corrections may be made by adjustment of the slider on the biasing resistor. If it is now found that the biasing voltage with the key open is insufficient to cut off plate current, the slider at the negative end of the biasing resistor should be advanced until plate current is cut off. Biasing should again be checked under operating conditions and readjustments made if required. It is preferable that these biasing adjustments be made at the highest frequency to be used. Final-amplifier grid current at the lower frequencies may then be held to a maximum of 30 ma. by tuning of the oscillator plate tank circuit. In cases where the 807 is keyed and grid-leak bias only is used, any grid current between 3 and 8 ma. should give satisfactory performance.

In the tests which were run at 28 Mc., the manufactured coil developed considerable heat when allowed to operate continuously for appreciable periods. This is, of course, rather to be expected with coils wound on solid forms when operated at the higher frequencies. Although less convenient, those who wish highest efficiency will probably prefer a self-supporting coil.

In coupling to the antenna, the best method will depend upon the type of antenna system to be used. The coupling coil of the Johnson tank coil is suitable for coupling directly into any untuned line of impedance up to 600 ohms. When coupling into a tuned line, a separate antenna tank or series tuner should be provided and link coupling used between the final tank circuit and the antenna tank or series tuner.

How Would You Do It?

(*Continued from page 57*)

Next, the paper is placed on a piece of process film of the right size, exposed and developed and the result is a film negative of the paper negative. This film negative is again laid on a piece of process film and exposed and developed and the result is a film positive of the paper negative. These films should be rather thin, i.e., the "black" portion should be rather weak or greyish. Then, the film positive and negative are placed on top of each other in the printing frame but one is moved so that it just doesn't match up with the other, offset to one side about one-sixty-fourth inch. A piece of "scotch" tape is excellent for holding the two pieces of film in the correct position. From this double film we print cards in the usual man-

ner. The result, as shown in Fig. 2 is rather weird and interesting. — *John Doremus, W3EDA.1*

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We have received numerous inquiries on the details of processing our photographic QSL cards. In the first place, photographic QSL's are easy to make, are fun to make, are economical and lend themselves to no end of possibilities in design and individuality. As in the case of all new hams, we cast about looking for a suitable solution to the QSL problem and, after scrutinizing numerous samples, decided that the cartoon type was most desirable. The theme we chose was the ham shack with the rig, operator, antenna, call letters and space for reports. The result is shown in Fig. 2.

We first set up the camera and made several shots of the rig and processed them in the usual manner. Our next step was to obtain a suitable transparent material which would take drawing ink without running and which would be used as the foundation for the cartoon. "Glacene," obtainable at stores handling drafting supplies, was found to be just what we wanted. A sketch of the cartoon was made in pencil on a piece of plain paper, starting with the space marked in which the photograph would appear. Around this space was built the ham shack, antenna, call letters, etc. The glacene was then placed over the sketch and the lettering was applied in india ink, tracing from the original sketch.

The next step was mounting the photo negative in its allotted space. First, the edges of the film were trimmed with a pair of scissors to produce a jagged edge and parts of the film not wanted were cut off. The film was then fastened in place with a small drop of model airplane cement at a few points. The jagged outline of the cut film was then emphasized by tracing around it with black ink on the reverse side of the glacene with extending cracks to simulate the broken wall of the shack.

With the negative finished, we obtained a stock of sensitized post-cards and went to work on the printing. Working alone, we were able to print a gross of cards in a little over three hours. The cartoon being a positive, resulted in a negative reproduction, that is, one with white letters on a black background. This results in a very attractive and contrasty study, simulating a night scene. — *Robert B. Sladek, W9ASF*

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Contrary to general belief, photo QSL's are neither expensive nor difficult to make. Since Our Hero's camera is a small one, we shall dispense with it and prepare a positive pattern of the desired QSL and make a master negative from it. A roll of Eastman V122 fill is required for the negative. First, make a sketch of the desired letters and line sketches on white paper. Then, take the roll film into a dark room and cut off two sections about six inches long each, returning the remainder of the film to a light-proof container for future use. Place the two pieces of film in a fixing bath until the emulsion is removed and we have two pieces of clear celluloid. After the film has been washed and dried, the QSL pattern

Where to buy it

A directory of suppliers who carry in stock the products of these dependable manufacturers.

super skyrider hallicrafters ultra skyrider

ALBANY, N. Y.	Uncle Dave's Radio Shack	356 Broadway
ATLANTA, GEORGIA	Radio Wire Television, Inc.	265 Peachtree Street
BOSTON, MASS.	Radio Shack	46 Brattle Street
BOSTON, MASS.	Radio Wire Television, Inc.	110 Federal Street
BRONX, N. Y.	Radio Wire Television, Inc.	542 East Fordham Rd.
BUTLER, MISSOURI	Henry Radio Shop	211–215 N. Main Street
CHICAGO, ILL.	Allied Radio Corp.	833 W. Jackson Blvd.
CHICAGO, ILL.	Radio Wire Television, Inc.	901–911 W. Jackson Blvd.
CINCINNATI, OHIO	United Radio, Inc.	1103 Vine Street
DETROIT, MICH.	Radio Specialties Co.	325 E. Jefferson Ave.
DETROIT, MICHIGAN	Radio Specialties Co.	11800 Woodward Ave.
HARTFORD, CONNECTICUT	Radio Inspection Service Company	227 Asylum Street
HOUSTON, TEXAS	R. C. Hall & L. F. Hall	4021 Huey Street
JAMAICA, L. I.	Radio Wire Television, Inc.	90–08 166th Street
KANSAS CITY, MO.	Burstein-Applebee Company	1012 McGee Street
NEW YORK, N. Y.	Harrison Radio Co.	12 West Broadway
NEW YORK, N. Y.	Radio Wire Television, Inc.	100 Sixth Ave.
NEWARK, N. J.	Radio Wire Television, Inc.	24 Central Ave.
READING, PENN.	George D. Barbey Company	404 Walnut St.
SPRINGFIELD, MASS.	T. F. Cushing	349 Worthington St.
WASHINGTON, D. C.	Sun Radio & Service Supply Co.	938 F Street, N. W.

TRIPLETT INSTRUMENTS

ALBANY, N. Y.	Uncle Dave's Radio Shack	356 Broadway
ATLANTA, GEORGIA	Radio Wire Television, Inc.	265 Peachtree Street
BOSTON, MASS.	Radio Shack	46 Brattle Street
BOSTON, MASS.	Radio Wire Television, Inc.	110 Federal Street
BRONX, N. Y.	Radio Wire Television, Inc.	542 East Fordham Rd.
BUTLER, MISSOURI	Henry Radio Shop	211–215 N. Main Street
CHICAGO, ILLINOIS	Allied Radio Corp.	833 W. Jackson Blvd.
CHICAGO, ILLINOIS	Electric & Radio Supply Co., Inc.	25 North Franklin Street
CHICAGO, ILL.	Radio Wire Television, Inc.	901–911 W. Jackson Blvd.
CINCINNATI, OHIO	United Radio, Inc.	1103 Vine Street
JAMAICA, L. I.	Radio Wire Television, Inc.	90–08 166th Street
LITTLE ROCK, ARKANSAS	Beem Radio Company	409 W. 3rd St.
MINNEAPOLIS, MINNESOTA	Lew Bonn Company	1124–26 Harmon Place
MONTREAL, CANADA	Canadian Electrical Supply Co., Ltd.	285 Craig Street, West
MUSKOGEE, OKLAHOMA	Home Radio Mart	204 No. Twelfth Street
NEW YORK, N. Y.	Radio Wire Television, Inc.	100 Sixth Avenue
NEWARK, N. J.	Radio Wire Television, Inc.	24 Central Ave.
READING, PENN.	George D. Barbey Co.	404 Walnut Street
WASHINGTON, D. C.	Sun Radio & Service Supply Co.	938 F Street, N. W.

Listings on this page do not necessarily imply endorsement by QST of the dealers or of other equipment sold by them.

is traced on to one of the pieces of clear film with black india ink. If photographic inserts are desired, cut out pieces of black paper slightly smaller than the inserts and glue them in place on the film we are preparing.

In the dark room, place the prepared film over a section of unexposed film and give a rather short exposure to the printing light and develop the exposed film. After the new negative has been processed, and dried in the usual manner, the sections of photo negatives, if used, are cemented in place on the new negative with transparent cement and the final negative is complete. Paper or post-card prints are made from this negative in the usual manner. Fig. 3 shows paper reproductions of the final negative and the finished print.

— *Thos. J. Kelly, W4CNY*

The cards of W8JTT and W8MSL were made by a similar process. (See Fig. 2.)

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W6PCI avoids the use of film in producing a positive print by painting in the background instead of the actual pattern of the QSL on a sheet of glass. Letters for the call and any design work desired may be cut out of paper and fastened in position temporarily before the glass is coated. Spaces may be left for photo negative inserts, if desired. The job should not be particularly difficult since mistakes can be wiped off the glass before the coating dries, or afterward eliminated by scraping the coating with a knife. After the coating is dry, the paper mask or pattern may be removed and we have a negative which will make a positive print without reversal by photographic means. The photo negative inserts are cemented in place on the glass before the printing of cards is started. W6PCI recommends black lacquer as the coating material.

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If a typewriter is used to make text copy on a tracing-paper negative, a piece of carbon paper at the back of the tracing paper with the carbon side toward the back of the tracing paper will help to produce an opaque pattern. — *W2LLZ.*

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Several of the gang suggested making a large pattern of the QSL on white cardboard or Bristol board and photographing with a camera. If the camera is too small to produce a card-size negative, the negative may be enlarged by a commercial finisher or, as an alternative, the card may be divided into panelled sections and a separate photograph made for each section. The negatives may be properly masked in printing the cards to produce the panelled effect. Photo montage effects may also be used as well as straight lettering.

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First Prize — F. Eugene Young, W2EBK.
Second Prize — John Doremus, W3EDA/1.

We wish also to thank the following for their contributions: W1KIE, W1LIG, W2LLZ, W3GZW, W4AJY, W4CNY, W5GNV, W6PCI, W7FXI, W8JRQ, W8JTT, W8MSL, W9ASF, W9MZK, VE4DB, VE5TX, YR5VV, Kenneth Dressler, Henry E. Hill, Paul H. Hultquist, C. R. McGinnis, F. H. Mochino, E. G. Witting.

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.
(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.
(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.
(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.
(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.
(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. 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, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising by him takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

Having made no investigation of the advertisers in the classified columns, the publishers of *QST* are unable to vouch for their integrity or for the grade or character of the products advertised.

QUARTZ — direct importers from Brazil of best quality pure quartz suitable for making piezo-electric crystals. Diamond Drill Carbon Co., 719 World Bldg., New York City.

USED receivers. Bargains. Cash only. No trades. Price list 3¢ W3DQ., Wilmington, Del.

QSL'S. Free samples. Printer, Corwith, Iowa.

CALLBOOKS — Fall edition now on sale containing complete up-to-date list of radio hams throughout entire world. Also world prefix map, press schedules and new time conversion chart. Single copies $1.25. Canada and foreign $1.35. Radio Amateur Call Book, 610 S. Dearborn, Chicago.

CRYSTALS, mounted, 80–160, $1.25, V-cut 40, $2.25. R9 Crystals 338 Murray Ave., Arnold, Pa.

QSL'S. SWL's. 100 — 3 color — 75¢. Lapco, 344 W. 39th, Indianapolis, Ind.

MACAUTO code machines: low monthly rental 50,000 words practice tapes. Write N. C. Ayers, 711 Boylston St., Boston, Mass.

QSL'S — samples. Brownie, W3CJI, 523 No. Tenth St., Allentown, Pa.

WHY not get better deal? Used receiver list free. W9RA, ChiRad, 415 So. Dearborn St., Chicago.

QSL'S. Maps. Cartoons. Free samples. Theodore Porcher, 7708 Navajo, Philadelphia, Pa.

1000 watt G.E. transformers 1100–2200–4400 volts each side c.t. Guaranteed. $13.50. Dawson, 5740 Woodrow, Detroit, Mich.

QSL'S, all colors, cartoons, snappy service. Write for free samples today. W1BEF, 78 Warrenton, Springfield, Mass.

WANTED: Amrad S tubes. W9WTD.

QSL'S. Fritz, 455 Mason, Joliet, Ill.

ANY radio diagram, 25¢. Specify manufacturer, model. Radio magazine free. Television Cyclopedia, 25¢. Supreme Publications, 3727 W. 13th, Chicago.

FBXA complete with preselector, heavy duty National power supply, tubes, speaker, 10 to 160 Bandspread and F coils, $55. RCA-ACR136 complete, $35. W4ELA.

6th annual Boston Hamfest — Hotel Bradford, Boston, Mass. October 21st.

WANTED: genemotor suitable for mobile transmitter. State condition, manufacturer, and complete ratings. W2ACW, 270 Fairmount Ave., Newark, N. J.

SELL 250 watt CW xmtr. W3SW.

SELL Master Teleplex, good condition, complete with key, tapes, and ink — $15. Peter Dublanica, 111 Willard St., Garfield, N. J.

QSL'S. QSL's. Free samples. W8DED. Holland, Mich.

SELL or swap: 1000 volt one k.w. G.E dynamotor. Make offer. W9FHU, Dancy, Wisc.

TRADE: Graflex, series B, revolving back, 3¼ x 4¼ and accessories value $100., for A-1 modern receiver. W8PN, Cleveland, Ohio.

FOR sale — one HQ-120X. Perfect condition — speaker — $95. W2AQV.

DOUGLAS Universal modulation transformers match all tubes. No obsolescence. One year guarantee. Free advice. Douglas leads in quality and price. 50 watts audio, $4.95 pair; 100 watts audio, $7.75 pair. Postpaid in U. S. For details write W91XR, Rice Lake, Wisc.

QSL'S — SWL's, colorful, neat, economical. Samples. Meade, 819 Wyandotte, Kansas City, Mo.

TELEPLEXES, Instructographs, omnigraphs, vibroplexes, receivers, bought, sold, traded. Ryan's, Hannibal, Mo.

175 watt CW rig, 6L6-814, coils, xtal. and meter — only $50. RME-69 with speaker, excellent condition, $90. W3FXR, 2633 So. 16 St., Philadelphia.

HANDBOOK high-performance Super, power supply, speaker, metal cabinet, ten coils, individual trimmers, National parts. Forty dollars. W9EMB.

QSL'S. Finest. Lowest prices. Samples. Maleco, 1805 St. Johns Place, Brooklyn, N. Y.

WANTED: Master Teleplex; UTC-VM4, PA59AX, PA113, PA118 PA108, PA109; Variac; HRO. Complete details — W8KXK.

HAMMARLUND Standard Pro, $19. 5' Bud relay rack, $10. Parts bargains — stamp — list. W9VGS, Hutchinson, Kansas.

COMPLETE stock ham supplies. New and used communication receivers. Amarillo Electric, W5WX, Amarillo, Texas.

SELL: ACR136 and Peak preselector, $35. CW transmitter — 20, 40 meter; 6L6, RK20A, 4 power supplies, all in steel cabinet, $35. Dr. Grant, W8NXT.

SELL — trade: Weston milliammeters, 5, 50, 100; Voltmeters, d.c., 150/7.5, 7, 20; thermo-galvanometer; thermo-ammeter; four Pyrex strain insulators; Samson interstage audio; two AmerTran #854 chokes; three AmerTran DeLuxe audios; Thordarson T-6363; T-6594, T-5753; PF-52; UTC PA-15, PA-132; General Radio #358 Wavemeter; Baldwin phones; Kolster 12" Dynamic cone. Sell separately, (best offer) or trade for Rolleicord II, lenses, Graflex, movie, other photographic equipment. Stuart, 711 Greeley, Webster Groves, Mo.

CRYSTALS in plug-in heat dissipating holders. Guaranteed good oscillators. 160–80, $1.25; (no Y cuts) 40X, $1.65; 80M vari-frequency, complete, $2.95. State frequency desired. C.O.D.'s accepted. Pacific Crystals, 1042 So. Hicks, Los Angeles.

SELL 150 watt fone transmitter. W8QXU.

SELL: one new 1939 National 101X complete in factory carton, $95. W1FFG.

BAKELITE strips, panels, tubing, rod. Send dimensions for price. Hackbush Bakelite Supplies, 297 Schenk, No. Tonawanda, N. Y.

CRYSTALS: unconditionally guaranteed, X cut, 1750–2000; 3500–4000; ±five kilocycles, $1.50; spot frequency, $2.50, Three X cut, 80 meter blanks including carborundum, $1.45. Holders, $1. William Threm, W8FN, 3071 Moosewood St., Cincinnati, Ohio.

SELLING out: SX-16, $65. 500 watt 10 meter phone, 100TH's PP. 203Z's, UTC Class B and Thordarson power transformers, B&W Swinging Link, Lafayette speech, American Crystal mike, 3 element General Rotary beam, 7 large and 2 small Triplett meters, two 20 meter Bliley crystals. Tubes: 6F6 — 807 — PP T20's — PP 100TH's. 4 power supplies, 6-866's, Johnson & Cardwell condensers. First $200 takes it as is or knocked down. Now on air at W4FBB. J. H. Cumby, 1308-41st St., Belview Heights. Birmingham, Ala.

SELL: complete station W8LHP; deceased: ACR-155, 50 w. transmitter; reasonable. Aaron Goodhines, W8RXA, Boonville, N. Y.

CRYSTALS commercial and amateur. C-W Mfg. Co., 1170 Esperanza, Los Angeles.

SELL surplus transformers, chokes, crystals, tubes, including 803, 211's, 150T's, alternator, dynamotor, tuning condensers W9ERU.

BEST place to get amateur receivers is from W9ARA. Best trades, best terms (financed by myself), ten-day trial of all receivers. Prompt shipment from world's most complete stock of amateur receivers. Shipment from factory if you prefer. Write me fully about your wishes and I will help you get the best receiver for your use. Also distributor for all transmitters, antennas, kits parts. W9ARA, Butler, Mo.

RECONDITIONED guaranteed amateur receivers and transmitters. Ten days free trial. Nearly all models cheap. Terms. List free. Write W9ARA, Butler, Mo.

CRYSTAL blanks, all sizes, cuts, and prices. Crystal Shop, Barre, Vt.

METER repair service — lowest prices — best service. Milliammeters, $1.75. Thermocouples, $2.25. Braden Engineering Co., 1809 Fifth Ave., Dayton, Ohio.

HE man's beam to fit a poor man's purse. Not $59.50. Not $84. But only $39. for steel frame, quiet motored, hollow shaft, husky rotator with built-in Selsynchronous indicator, tip-down head. Tapered telescoping alumalloy elements. Quarter brings Bassett handbook, our bulletins, photos. Rotary Array Service, W8ML.

COLLINS 200 watt 10 to 160 transmitter, complete. Write J. D. Avery, 1046 Garfield, Topeka, Kansas.

CRYSTALS: Start the season off right by using Eidson T9 high activity 40 and 80 meter crystals. They are guaranteed to give utmost satisfaction on any band from 10 to 80 inclusive. 40 and 80 meter bands, $1.60 postpaid. T9 ceramic holders, $1. C.O.D.'s accepted. Fine commercial crystals to order. Sold by: O'Laughlins Radio Supply, Salt Lake City, Utah; Frank Anzalone, 375 W. 46th St., N. Y. C.; Henry Radio Shop, Butler, Mo.; Radio Doc, 721 So. Main, Los Angeles, Calif.; Hieronymus Radio, 88-34 209th St., Queens Village, N. Y.; Florida Distributors, Inc., Tampa, Fla.; Casa Edison, Havana, Cuba; Hamrad Wholesale, Ltd., London, Eng., or Eidson's, Temple, Texas.

SELL: QST 1925 to date; also Radio, R9. W9NPI.

WANTED: used code machine, $6; used receiver, $15. W. J. Roby, 2524 Morgan Ave., N. Y. C.

SWAP movie camera and projector, Colt 45 revolver — want Eimac's or modulator or ?. W9HPM.

CRYSTALS: police, marine, aircraft, and amateur frequencies. Descriptive catalog. Ham Crystals, 1104 Lincoln Place, Brooklyn, N. Y.

ANALYZER wanted, cash, subject to examination. W5GUY, Rio Hondo, Texas.

WE build Stancor, Thordarson, and all kits at lowest prices at terms to suit yourself. Special aluminum tubing for beams; world clocks, $3.95; modulation transformers 100 watts, $1.95; other bargains. Write for catalog. W9GFQ.

RECONDITIONED receivers and transmitters at lowest prices. Easy terms. Write for list. 80 meter blanks, 65¢. Wholesale Radio Labs., Council Bluffs, Iowa.

CRYSTALS: famous P.R., mounted in latest Alsimag 35 holders — 40, 80 meter PR-X, 160 meter PR-Z, $3.; 40, 80 meter PR-Z (low drift), $3.50; 20-meter PR-20, $4.50; unconditionally guaranteed. Immediate shipment. Wholesale Radio Labs., Council Bluffs, Iowa., W9GFQ.

QSL'S of quality. W2AEY, 338 Elmora, Elizabeth, N. J.

CATHODE modulation saves $$$$$$. Complete plan book, $1. Frank Jones, 577 Monadnock Bldg., San Francisco.

WANTED complete amateur phone transmitter, 100 watt. Write full details and price. VE4AL, Mossbank, Sask., Canada.

HAMMARLUND Super Pro: includes 10 ma. 12" Jensen ED. Model SP110 Type S #2913. Std. P. S. #2948. Best offer gets. Satterthwaite, 544 Colonial Ct., Toledo, Ohio.

BEST cash offer takes new Hallicrafter SX-23 with speaker. Edwin Little, 14 E. Oakwood Place, Buffalo, N. Y.

NEW National NC80X, speaker and cabinet, excellent condition, $67 cash. John Grasse, W9QFO, Platteville, Wisc.

STANDS for all types of microphones. Tri-ped, Jr. desk model, chrome or wrinkle, $1.50. Ellis Lab., 189-Q W. Madison St., Chicago.

MICROPHONES — The best carbon microphones at anywhere near the price. Hand model $5.75; stand model $5.; suspension model $3.60; repairs. Ellis Lab., 189-T W. Madison St., Chicago.

HERE'S just what you wanted. A 2.5 m.h. choke, 4 pi, 100 mil with ceramic dowel threaded for panel or base mounting. Send 30 cents and your jobber's name to DX Radio Products Co., 1575-D Milwaukee Ave., Chicago.

BARGAINS: 200 watt transmitter with 1250 volt supply, $40.; 150 watt phone, $80.; 400 watt transmitter complete, $115. Frampton Radio, Blackwell, Okla.

Your Nearby Dealer Is Your Best Friend

Your nearby dealer is entitled to your patronage. He is equipped with a knowledge and understanding of amateur radio. He is your logical source of advice and counsel on what equipment you should buy. His stock is complete. He can supply your needs without delay. His prices are fair and consistent with the high quality of the goods he carries. He is responsible to you and interested in you.

One of these dealers is probably in your city — Patronize him!

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Radio Wire Television, Inc.
265 Peachtree Street
"The World's Largest Radio Supply House"

BALTIMORE, MARYLAND
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3 N. Howard St.
Everything for the amateur

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Radio Wire Television, Inc.
542 East Fordham Road
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BUFFALO, NEW YORK
Radio Equipment Corp.
326 Elm Street
W8PMC and W8NEL — Ham, service and sound equipment

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285 Craig St., W.
Quality parts and equipment for discriminating buyers

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NEW YORK, N. Y.
Radio Wire Television, Inc.
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RICHMOND, VIRGINIA
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W3EQQ — "The Virginia Ham Headquarters" — W3FBL

TORONTO, CANADA
A & A Radio Service Supply
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Canada's Foremost Radio Supply House

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Electrical Supplies, Ltd.
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YOU CAN BE SURE WHEN YOU BUY FROM QST ADVERTISERS

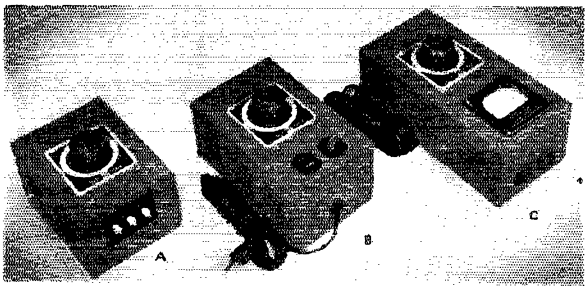
"Advertising for *QST* is accepted only from firms who, in the publisher's opinion, are of established integrity and whose products secure the approval of the technical staff of the American Radio Relay League."

Quoted from QST's *advertising rate card.*

Every conceivable need of a radio amateur can be supplied by the advertisers in QST. *And you will know the product has the approval of the League's technical staff*

Index to Advertisers

New UTC VARITRAN CONTROLS



A B C

★ New roller contact . . . practically eliminates contact wear.

★ New glass-insulated wire . . . for positive dependability.

★ New large, copper, heat radiating disc . . . for cooler operation.

★ New copper alloy collector ring . . . eliminates pigtails and loose connections.

★ Gore type lamination . . . for maximum ruggedness and minimum space.

★ New top and bottom mounting . . . for panel, chassis, or bench service.

● *FOR CONTROLLING: Line Voltage, Rectifier Output, Motors, Lights, Heaters, etc.*

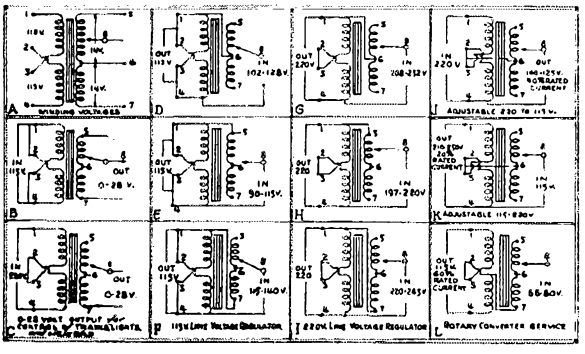
● Variable voltage transformers for smooth voltage control. Varitran units employ a special non-fusing *roller* contact to contact the exposed turns of an autotransformer winding. Rugged construction is employed, with *glass* insulation to assure dependability. Output of 115 volt unit variable from 0–130 volts (230 volt unit; 0–260 V.) smoothly without interrupting circuit. Output voltage independent of load.

● Maximum Amp. rating applies from 0 to 20 and 95 to 130 volts. Between 20 and 95 volts current rating tapers off to 50% of rated current at 65 V. point.

● Top and bottom mounting for laboratory bench or panel mounting. All units supplied mounted, with terminal strips as in Fig. A except V-1 (Fig. B) and V-1M (Fig. C).

Type	*Input Voltage*	*Output Voltage*	*Watts*	*Maximum Amps.*	*Approx. Wt. Lbs.*	*Net Price*
V-0	115 volts	0–130	230	2	8	**$7.50**
V-0-B	230 volts	0–260	230	1	10	**9.50**
V-1	115 volts	0–130	570	5	11	**10.00**
V-1-M	115 volts	0–130	570	5	12	**15.00**
V-2	115 volts	0–130	570	5	11	**9.00**
V-2-B	230 volts	0–260	570	2.5	14	**11.50**
V-3	115 volts	0–130	850	7.5	14	**14.00**
V-3-B	230 volts	0–260	850	3.75	18	**18.00**
V-4	115 volts	0–130	1250	11	32	**20.00**
V-4-B	230 volts	0–260	1250	5.5	38	**25.00**
V-5	115 volts	0–130	1950	17	45	**32.00**
V-5-B	230 volts	0–260	1950	8.5	56	**37.00**
V-6	115 volts	0–130	3500	30	90	**60.00**
V-6-B	230 volts	0–260	3500	15	90	**70.00**
V-7	115 volts	0–130	5000	44	120	**87.00**
V-7-B	230 volts	0–260	5000	22	120	**95.00**

Type	*Max. Amps. Output*	*Approx. Dimensions*	*Approx. Weight, Lbs.*	*Net Price*
VL-0	1.5	3⅜ x 4½ x 3⅛	5	**$5.50**
VL-1	3.5	4⅜ x 6 x 4⅝	7	**6.50**
VL-2	6	4⅜ x 6 x 5⅛	10	**8.00**
VL-3	11	4⅜ x 6 x 6⅛	15	**13.00**



UNIVERSAL VARITRANS

These varitrans have a 115/230 V. primary winding and a smoothly variable secondary from 0–28 volts. Line voltage control can be effected for 102/140 V. or 197/243 volts to 115 V. or 220 volts respectively. The 28 volt secondary can also be used for low voltage lights, cauteries, trains, rectifiers, etc. The primary and secondary windings can be arranged to effect variable 220/115 or 115/220 volt arrangements. Appearance as in Fig. A above.

UNITED TRANSFORMER CORP.

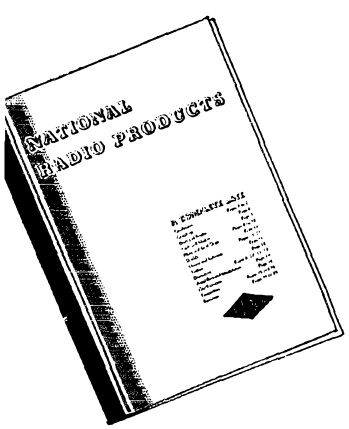
Write: COMMUNICATIONS DIV. ★ 150 VARICK ST. ★ NEW YORK, N. Y.

EXPORT DIVISION: 100 VARICK STREET NEW YORK, N. Y. CABLES: "ARLAB"

RUMFORD PRESS
CONCORD, N. H.

A NEW AC MODEL NC-44A

Three models of the NC-44 are now available. The newest is the NC-44A, an AC model employing a transformer-type power supply. The transformer has been specially designed to insure effective shielding. The NC-44B is a new model for 6-volt battery operation.



The two newer models retain the fine performance characteristics of the original AC-DC NC-44. All have outstanding ability throughout their range from 550 KC to 30 MC. All have the same price $49.50 net, complete with speaker and tubes. They are described in detail in the new 25th Anniversary Catalogue No. 300L which has just been issued.

NATIONAL COMPANY, INC., MALDEN, MASS.

GUESSWORK Cut...

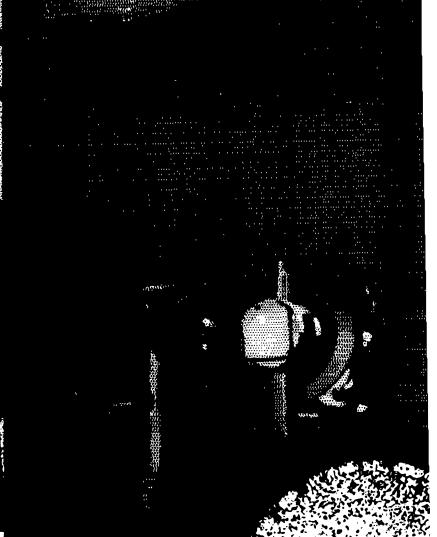


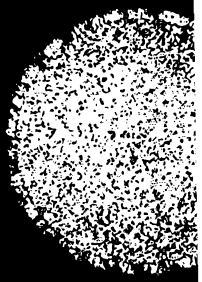
PHOTO-MICROGRAPHS SHOW WHY RCA TRANSMITTING TUBE FILAMENTS LAST LONGER

Longer filament life in RCA Transmitting Tubes is neither an idle boast nor an accident. It is the direct result of long and careful RCA research of the kind so essential in producing the preferred tubes for Radio's most exacting applications. Here's the story:

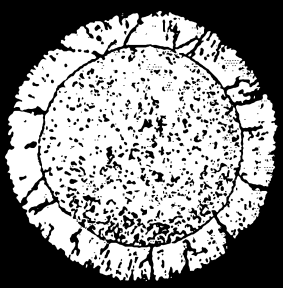
Long filament life in a thoriated tungsten filament tube depends on maintaining a *complete* layer of thorium on the surface. Carburization of the tungsten wire is essential in maintaining this layer as it reduces the rate of evaporation of the thorium and increases its rate of production.

A filament such as used in the RCA-809 is about the thickness of a human hair, its thin carbide layer indistinguishable to the eye—yet even a slight deviation from uniformity in this layer may rob the tube of many hours of life.

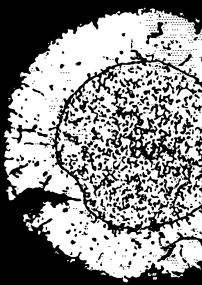
To facilitate accurate control of the carburizing process RCA has developed a mechanical device by which the layer is applied very uniformly. However, even the "foolproof" accuracy of this entirely automatic operation is periodically checked and double-checked by means of photo-micrographs. Tremendously enlarged filament cross-sections eliminate all guesswork. Nothing is left to chance. The aim, as always, is to supply you with tubes of unquestioned dependability in *every* mechanical and electrical characteristic.



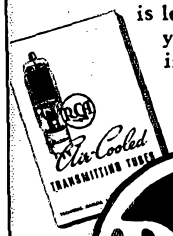
TOO LITTLE TUNGSTEN CARBIDE—
Short filament life.



CORRECT A
OF TUNG
CARBI
This RCA s
assures op
strength a



TOO MUCH TUNGSTEN CARBIDE—
Filament excessively brittle.



ALL TUBE TYPES for AMATEUR NEEDS

Use RCA Technical Manual TT-3 as your guide to Transmitting Tubes. 25c at RCA jobbers. Smaller folder TT-100 free upon request.

RCA

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CAMDEN, N. J.
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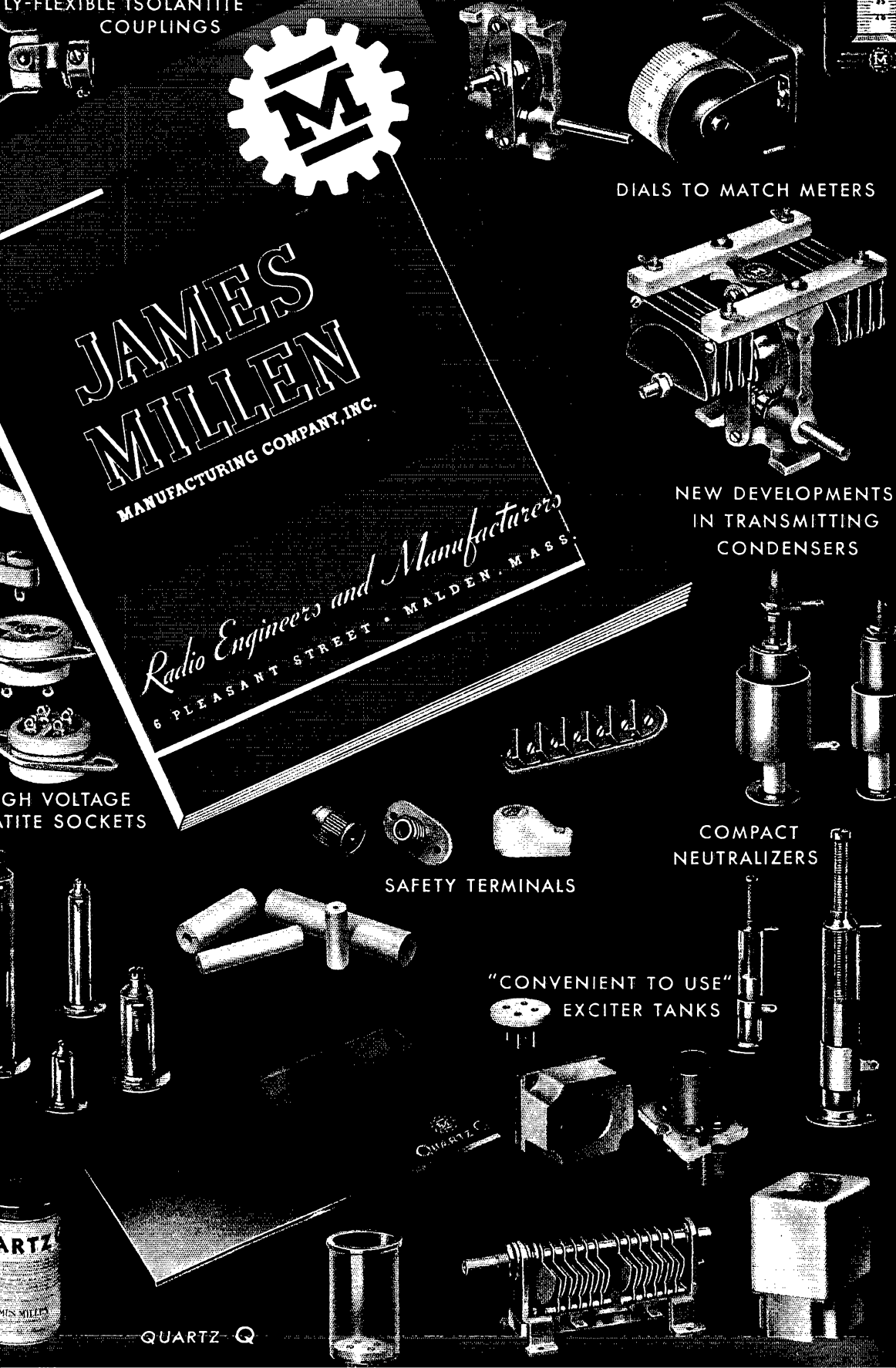
Radio Tubes

FIRST IN METAL—FOREMOST IN GLASS—FINEST IN PERFORM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"CONVENIENT TO USE"
EXCITER TANKS
QUARTZ-Q

THE HETROFIL*

▶ The HETROFIL is a device which provides means directly in the audio output of a communications receiver to reject or suppress an interfering signal or audio beat note. Thus, if two CW stations are being received simultaneously the HETROFIL may be adjusted so as to reject either of the signals and accept the other. Or, if two phone signals are being received at the same point on the dial cause a heterodyne beat note the HETROFIL may be adjusted so as to eliminate the audible beat note. The unit operates directly in the audio output of the receiver without the use of tubes. It may be used externally as a separate unit or built into a complete receiver. When used with a receiver without the modern type crystal filter it has all of the advantages of the phasing control of the crystal circuit and at the same time is much easier and quicker to operate. When an interfering signal is heard, the knob is rotated until the objectionable audio signal is removed. The HETROFIL may be used with any type of receiver and provides a means of selective control for TRF receivers comparable to the crystal filter used in superheterodynes and at a much lower cost. It may also be used in super-regenerative receivers to remove the interruption frequency from the output. A technical paper fully describing this new device appeared in the September 1939 issue of *QST*. Manufactured under license from the inventor, Dr. R. W. Woodward.

90721.....HETROFIL.....Net Price $3.50

*Reg. Trademark