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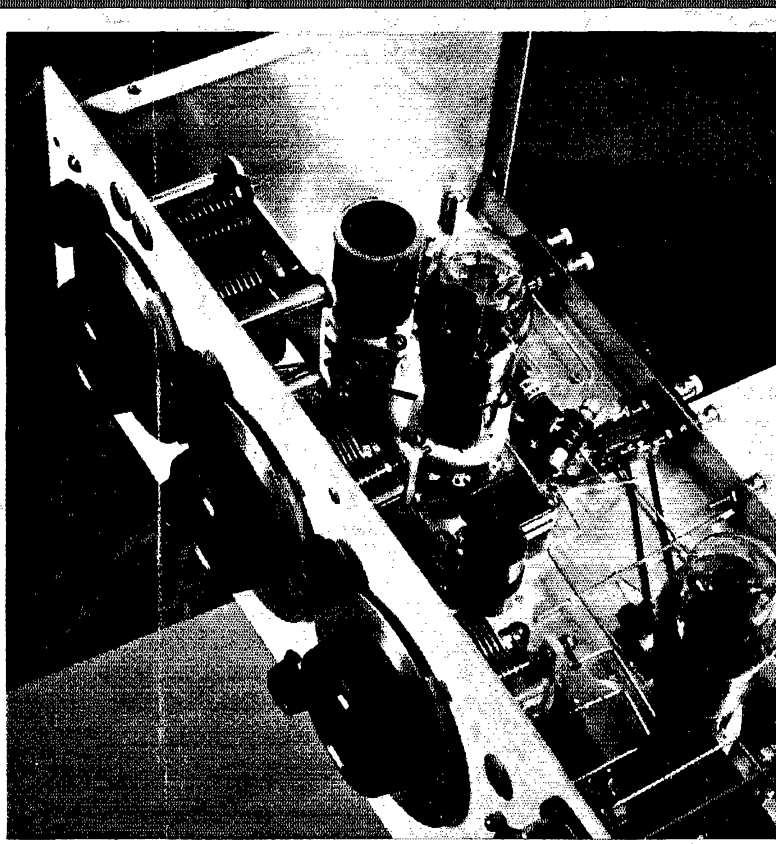
amateur radio

Crystal Control With Fewer Tubes

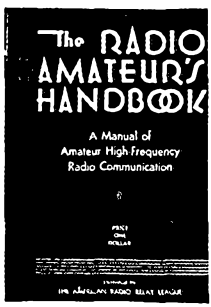
— In this Issue



The Radio Amateur's HANDBOOK

By the Headquarters Staff of
the American Radio Relay League

The Guide Book to Amateur Radio



Chapter I outlines the story of Amateur Radio — its start, its difficulties, its accomplishments; of the formation of the League to protect and preserve the rights of amateurs. Chapter II explains in detail how to get started in this finest of hobbies. Chapters III & IV, in simple language, explain electrical and radio fundamentals. Chapter V is devoted entirely to receivers. It contains circuits with complete constructional details and makes comparisons of the various circuits. It is full of constructional tips. Chapter VI recognizes monitors and frequency meters as essential parts of the equipment and tells how to make various types; how to calibrate them, and how to use them properly. Chapter VII covers transmitters, the most important part of a station. Self-excited and crystal-controlled; what ones to build, how to build them, how to tune them, and countless other helpful things, are all here. Chapter VIII, headed "Radiotelephony," covers the particular problems of 'phone transmitters and their operation, thoroughly and completely. Different types of modulators and amplifiers are shown and attention called to their various advantages. Chapter IX, written by pioneers in the Ultra-high Frequency field, points out the unusual circumstances to be found and gives the necessary information to build complete transmitters and receivers for use on frequencies of 30 megacycles and up. Chapter X treats of the vital subject of power supplies. Largely upon your power supply, depends the quality of your note. Here you will find power supplies designed especially to meet your particular needs. Chapter XI tells you how to prevent and cure various types of interference. It considers broadcast reception interference, and suggests the best keying methods. Chapter XII, on antennas, is packed with useful suggestions of how to best meet this frequently bothersome problem. The best of transmitters cannot make up for a poor antenna. The solution to your antenna difficulties will be found in these pages. Chapter XIII suggests various station arrangements both for the fellow who has plenty of room and the fellow whose space is limited. Chapter XIV explains the workings of the League's Communications Department. It tells of its aims and purposes; of its extensive field organization and how you may take part in all its activities. Chapter XV gives full instructions on the best operating procedure. From the calling of a station to the keeping of a log, it is all covered. Chapter XVI tells how messages should be handled, the correct form, and the restrictions governing message handling. In addition to these chapters there is an appendix full of useful data such as international prefixes, list of "Q" signals, commonly used abbreviations, and many useful charts and tables. In wealth of information (244 pages) and its 227 illustrations, the HANDBOOK is a big book. At almost any price, an amateur could ill afford to be without it.

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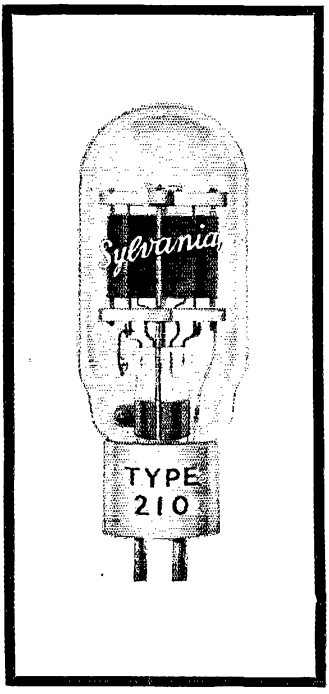

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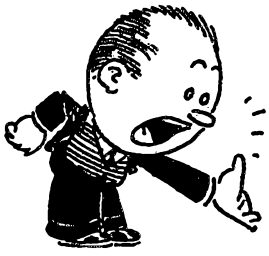

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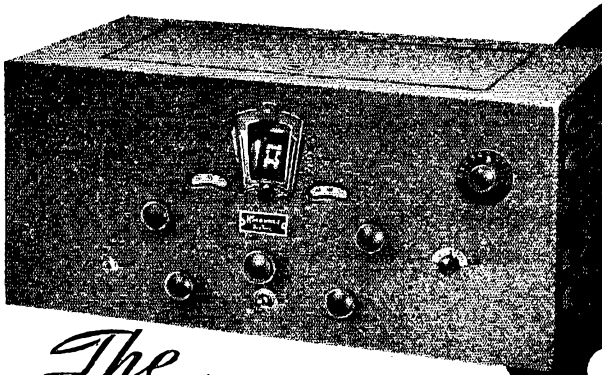

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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is 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 world 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.

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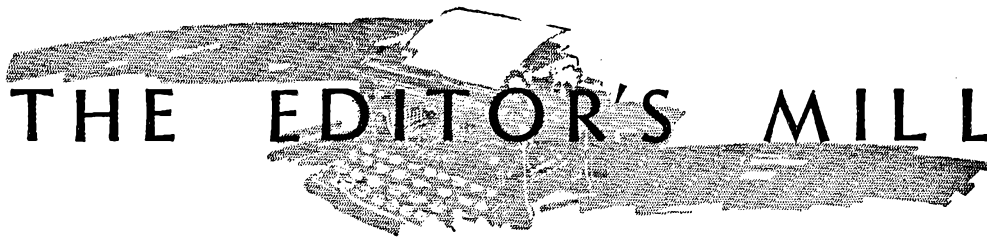


THE amateur outlook at future international radio conferences constitutes a subject of the highest importance to all of us. We realize that we have in this country a radio administration that believes in us and that has found it wise national policy to give us the maximum of amateur rights and privileges. But this maximum that a government can give its amateurs, particularly as concerns frequency assignments, is fixed by international treaty, which is a basic thing that underlies radio administration in practically every country and that affects every kind of radio service. The international telecommunications conference is the starting point of all our plans and aspirations. A government such as ours in the United States can be counted on to give us the widest liberty of action permitted anywhere in the world by the international treaty, as long as we continue to be a public asset, but for all its appreciation of us it cannot exceed the limits stipulated in the treaty. Thus, as a fundamental, the future of American amateur radio depends in the first instance on the decisions reached at these international conferences.

There is an element of risk involved here, for much of the world does not see eye to eye with the United States government on the amateur question. Of course the same thing is true of any other radio service one might name, such as mobile or broadcasting or fixed, but in the amateur case it is aggravated because in many countries amateur stations are the only ones not owned and controlled in every respect by the government. All the traditions of old-school European procedure instinctively oppose granting any such authority to the private citizen. Much as this traditional point of view has been leavened with liberality in recent years it is still a formidable thing to combat. Many of us wonder why under these circumstances any government (and particularly our own) is willing to join an international conference and put up with such a situation, inevitably involving compromises and the acceptance of a sort of least-common-denominator of international agreement, sometimes to the injury of an established service. The answer lies in the stark facts that communication ranges are international yet there is but one ether to use, so that without collaboration between nations there would be sheer chaos for all. Our country's radio services are more extensive than those of any other nation. To exist, they must be protected from destructive interference. Our government therefore simply must enter these conferences, as fully prepared as possible, and do the best possible job of selling its ideas to the rest of the world. Fortunately, American research and technique lead the world, as does our volume of international commercial communications, and these facts are of potent help in securing the adoption of American views. America must go in, then, whether she likes it or not, staking about everything on her ability to show the rest of the world the reasonableness and soundness of her views, but fore-armed with the knowledge that her leadership gives her tremendous advantage.

The first world-wide radio treaty was the London Convention of 1912, which of course antedated the development of high frequencies. It was then planned to revise the convention every five years but the War and its aftermath caused postponement until 1927, when the Washington Convention was negotiated and signed. In the intervening years amateur radio had grown up and the high frequencies had been developed. We find the first specific provisions for amateurs in the Washington Convention. Last year that convention yielded to the Madrid Convention, to be effective the first of next year. In it the amateur provisions are practically identical to those of Washington. The next conference is to be held in Cairo, Egypt, in 1937. If we examine our position at the moment, then, we find that two conferences five years apart have given us the same allocations and that in the second one we greatly solidified our general recognition and position. The situation has the appearance of reassuring stability. Indeed we unhesitatingly declare that we have achieved for ourselves the position of an international service for which adequate provision must always be made, and that the whole world now recognizes that. We have only two points on our curve but they are there in indelible ink and there are volumes to the story behind them.

Our American Radio Relay League now has a long experience in representing amateurs at these conferences. We have been represented at every high-frequency conference at which the participation of private interests has been permitted. Through this experience we know how to gauge things, we know what it is possible to do,

and how to go about doing it. Our plans for the Madrid conference were laid with great care, requiring a couple of years of preparation. They were so complete that they included even the mechanism for protecting ourselves in the remote event that the United States was forced into sacrificing us and became party to a treaty impossible of acceptance from our standpoint. It is not pleasant even to talk about such a subject, and we emphasize that the very mention of it is academic in our case, but this is a democratic country and the A.R.R.L.'s job in it is the protection of the radio amateur and you are entitled to know that your League was ready for even the extreme case if it had come upon us.

Although at Madrid the number of nations willing enough to propose additional restrictions for amateurs was sufficient to precipitate several battles and one protracted struggle, the five years since Washington had produced a huge and very significant improvement in the general attitude towards us. We derive from that more than a sense of satisfaction; from it flows additional strength and courage for future plans. In these intervening years, after the first great struggle over high-frequency allocating at Washington, the administrations have come to a much more ready acceptance of the amateur; he has been forced upon their consciousness; they perceive that he has his merits. Amateur radio itself has grown in every country, in numbers but particularly in organized strength. There are more national societies of amateurs now than ever before and their strength was never greater. In most countries they have reached the place where they no longer tremble at the thought of conferring with their radio administrators and realize that these officials after all are just "people," who can be talked with and counted on to see the reasonableness of amateur demands. Many of our A.R.R.L. policies and activities have been embraced by these societies, modified to fit their own needs. We have in mind particularly the formation in Great Britain of a naval communications reserve, made up of amateurs and patterned largely on our own U.S.N.R. plan, which was an idea sold to the Royal Navy by the Radio Society of Great Britain; and we think also of emergency communication nets similar to our Army-Amateur Radio System which have been established by the South African Radio Relay League and by the New Zealand Amateur Radio Transmitters in coöperation with their respective governments. Things like this have resulted in the strongest possible support of amateur radio by those governments and we are glad to say that there is more and more of it going on every day. Meanwhile our International Amateur Radio Union similarly progresses, through the growing strength of the two dozen national ham societies which compose it. The individual amateur rarely hears of the I.A.R.U. because it exists chiefly as a medium for coöperation between the societies of different nations. It has another function and that is the common representation of all the societies at international conferences. While we of the A.R.R.L. do not intend ever to relax our own efforts, it is comforting to think that the I.A.R.U. is increasingly capable of effective protection of our rights.

And now what of the future? We have our next great test at Cairo in 1937, where there will be drafted a Cairo Convention to take effect in 1939. We can look forward confidently to the preservation of our assignments there. But we must do more than preserve what we have. As we said recently on this page, having stabilized and entrenched ourselves at Madrid it is now time to strike out and improve our position. Our congestion is intense and we desperately need more space, particularly in the 7-megacycle region. There is no good reason why we should not have it. True, all the commercial channels are "registered on" and there are not enough to supply the needs for registration, but certainly there are more than are actually needed for the world's communications. Moreover, the high-frequency gold rush is over, the days are gone forever when a channel was potentially worth a million dollars, and short-wave commercial operation has proved anything but an infallible route to easy riches. There is room that is not legitimately needed by anyone but ourselves — and how we need it! It is to that that we look forward at Cairo.

Our first job in that direction must be done right here at home in the United States. Because America dominates in radio communication, her commercial companies have great voice. Because the United States delegation to such a conference as the Cairo one will be the most powerful protagonist the amateur could have, we must have its backing. In the average foreign country the government itself owns all the communication facilities — except the amateur stations. The international radio attitude of such a country is simply the attitude taken by its radio officials. In the United States the attitude to be taken by our government is worked out at a lengthy series of preparatory conferences between the administration and all the American services. Right there is where our work must be done. Both the government and the manifold commercial radio activities of America, which have supported us valiantly in the past at our present allocations, must be prevailed upon to see that we now need more than that, that we now required their support and vigorous American backing for an increase in our territory. Of course no one can foretell the developments of the next few years but their trend as viewed to-day is one that promises success for this endeavor.

Succeed we must, for amateur radio is growing at a tremendous rate, a rate that makes one pause

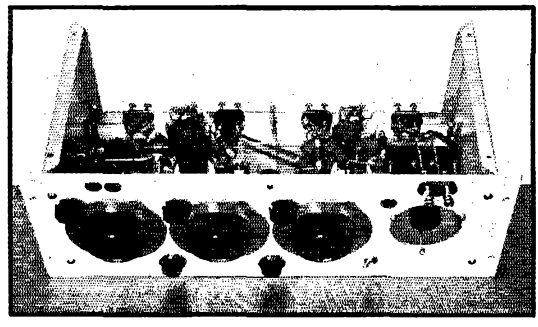
(*Continued on page 56*)

Tritet Multi-Band Crystal Control

A Universal Five-Band Transmitter Exciter Unit

By James J. Lamb, Technical Editor

NO DOUBT the ideal amateur transmitter should be something with one tube, a push-button for start-stop and a control to spin the output precisely to any spot frequency in any one of seven amateur bands, there to operate with the stability of WWV and with efficiency of not less than 100 percent. No doubt. But there is no such transmitter, and there will be none for some time to come. In dire contrast to this ideal, the usual adequately stable outfit capable of operation on any one of as many as five bands is something awesome to behold and woefully discouraging to manipulate. Really, none but the lovers of many stages and the congenital double-doublers should be permitted so much as to entertain the idea of such a mechanism. Certainly it is not for the fellow who is restricted to moderate power output and who likes his band coverage diversified, but convenient and simple.



PANEL VIEW OF THE UNIVERSAL EXCITER UNIT

By a system of switching and plug-in coils it provides transmitter excitation on four bands with tritet crystal control and on five bands with electron-coupled self control. It requires but two tubes and one crystal. The large dials, from left to right, are: oscillator grid-cathode tuning; oscillator plate tuning and amplifier plate tuning. The small knobs below are for oscillator switching (left) and plate coil selection (right). The toggle switch (right) is for shorting the key terminals. The r.f. output terminals are at the upper right, above the opening through which the amplifier plate coils plug in.

There can be little incentive, for instance, to build a 3.5-mc. to 28-mc. transmitter of usual line-up that starts with a 3.5-mc. crystal stage and winds up with a 10 or two in the output stage. Oscillator, doubler, doubler, doubler, neutralized final—all five for 10 watts or so of crystal-stabilized 28-mc. radiation. It's asking too much. But if equivalent performance could be had with no more than the basic three stages—crystal oscillator, buffer-doubler, final—then we could become interested. In fact, we have not merely become interested, we have succeeded in getting the answer.

The simple breadboard layout is the first evidence. By itself, it constitutes a little transmitter good for a few watts of crystal-controlled output, with the one crystal, on any one of four bands. Equipped as shown, it has been giving consistent service at W1SZ as the exciter for a neutralized push-pull 210 final stage putting out over 30 watts on 28.4 mc., controlled by the 3550-kc. crystal. With but two inexpensive tubes and three tuned circuits, it performs the multiplication by 8 of the crystal frequency in two jumps with better overall efficiency and less trouble than is accustomed in the more usual four-tube lineup of oscillator and three doubler stages. This drastic economy in stage lineup is not a development that was pulled from the hat full-blown, by any means, but is based on the "tritet" crystal oscillator circuit developed previously and described in the article, "A More Stable Crystal Oscillator of High Harmonic Output," June, 1933, *QST*. This versatile oscillator is the heart of the unit. Supplementing it is a circuit trick in the doubler stage which gives useful regeneration and improved doubler efficiency at the higher frequencies, where it is most needed.

THE OSCILLATOR CIRCUIT

The oscillator (called "tritet" because of its approximate equivalence to a combined low-mu triode oscillator and high-mu tetrode amplifier), uses a standard Type 59 multi-grid power tube. This application of the 59 is a practicable compromise, since the ideal would be a true screen-grid tube. However, the partial screening provided by combined grids No. 2 and 3, between output plate and control (No. 1) grid, suffices for operation with the output tuned to a harmonic of the crystal frequency. Output at the crystal's fundamental frequency is obtained quite conveniently either by shorting the cathode to ground and moving the fundamental coil to the plate circuit (thus converting the circuit to the well-known straight pentode oscillator), or by putting in a non-resonant r.f. choke to replace the tuned plate circuit of the oscillator and then tuning the output of the following r.f. stage to the fundamental. The latter scheme is especially

advantageous because it eliminates necessity of neutralizing the amplifier stage, which does not self-oscillate with its grid circuit untuned, and at the same time provides excellent buffer action between the frequency-control and output circuits.

To satisfy conditions for optimum operation, the oscillator cathode circuit, L_1C_1 of Fig. 1, should be tunable to a frequency much higher than that of the crystal. The inductance is much smaller than might be expected for the fundamental frequency of the circuit. As a specific example, the cathode coil for a 3500-kc. band crystal is about what would be used in a low-C 7000-kc. tank, and for best harmonic output and stability the cathode tank is tuned to resonate at around 6000 kc. While a high-L tank—such as is usual with other types of crystal-controlled oscillators—will give nearly as great output, with it there may be considerable crystal heating and, consequently, serious frequency drift or creep. The operation of the crystal is favored further by using shunt bias feed through a r.f. choke, as shown in Fig. 1, instead of the leak-across-crystal connection previously given. The reactive circuit obtained with the choke arrangement reduces damping of the crystal.

Except for these features, the oscillator circuit is substantially identical with the original described in the June *QST* article, to which reference should be made for further details. The plate output circuit is low-C, as it would be for any r.f. amplifier, and is designed for the particular harmonic frequency that is to be selected. In the 28-mc. exciter unit pictured, this circuit tunes to 14 mc., the fourth harmonic of the fundamental crystal frequency. Thus the one tube serves simultaneously as oscillator and frequency quadrupler—with enough 20-meter pep in the tank to light a "pick-up" flashlamp bulb to satisfying brilliancy or to drive and control the 59 regenerative doubler.

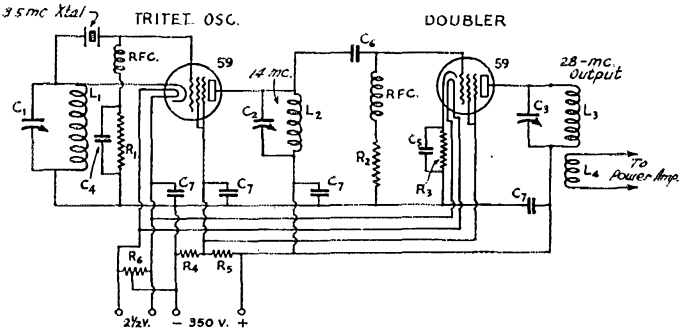


FIG. 1 — CIRCUIT OF THE 28-MC. BREADBOARD EXCITER UNIT

L_1 — 15 turns No. 14 enameled wire, 1½ inches long, 1⅝-inch diameter.
L_2 — 8 turns No. 14 enameled, 1⅜ inches long, 1⅝-inch diameter.
L_3 — 5 turns No. 14 enameled, 1¼ inches long, 1⅝-inch diameter.
(Each coil supported on small stand-off insulators spaced 1¾ inches between centers.)
L_4 — See text.
C_1 — 250- or 300-μμfd. midget variable condenser.
C_2 and C_3 — 25- or 50-μμfd. midget variables.
C_4 — 250-μμfd. fixed mica.
C_5 and C_6 — 100 μμfd. fixed mica.
C_7 — 0.002-μfd. or larger.
R_1 — 50,000-ohm or 100,000-ohm 1-watt oscillator grid leak.
R_2 — 50,000-ohm 1-watt amplifier grid leak.
R_3 — 1000-ohm 5-watt amplifier cathode resistor.
R_4 and R_5 — 10,000-ohm 10-watt divider resistors.
R_6 — 50-ohm filament center-tap resistor.
RFC — 2.5-millihenry r.f. chokes (National No. 100R).
Grid No. 1 (pin opposite heater terminals) used as control grid; grids No. 2 and 3 (pins either side of No. 1) connected together as screen grid. For complete socket connections see page 30, March, 1933, QST.

THE ULTRAUDION DOUBLER

Although the circuit of the doubler stage might appear to be that of a conventional non-regenerative amplifier with a cathode resistor for furnishing grid bias, there is more to it than meets the eye. The amplifier is regenerative, especially so at 28 mc. This regeneration, particularly desirable for improving doubler efficiency and output at the higher frequencies where efficiency and output are usually prone to fall off badly, is obtained by proper choice of the cathode resistance and its by-pass capacitance.

The discovery of this came partly through accident, one of those fortuitous happenings that pop up when something entirely different is the objective. With the purpose of limiting the maximum plate current drawn by the 59 and thereby protecting it against its own habit of running afoul of grid emission (the one fault of these tubes when they are used for r.f. work at plate voltages approaching 400), a cathode resistor was put in. As it happened, the handiest by-pass at the moment was a small one, 100 μμfd. The expectation was, of course, that this would reduce the output. When the unit was put into operation again, however, the 28-mc. output had not decreased *but had increased several fold.* In hunting for the explanation, it was found that the double stage still oscillated weakly *at its plate tank frequency* with the excitation shut off. Grounding the grid would not stop this feeble and unstable oscillation, indicating that ordinary stray feedback or the like was not accountable. But increasing the capacitance of the cathode by-pass to 250 μμfd. or so would stop it, as would reducing this by-pass to less than 50 μμfd. or so. These observations and further investigation led to the conclusion that the regeneration was the result of ultraudion action, the effective circuit being that

diagrammed in Fig. 2. The grid r.f. path is shown directly to ground (−B), since the 14-mc. plate tank of the oscillator has negligible impedance to the 28-mc. doubler tank frequency. As has been mentioned, the conditions as given favor regeneration at higher frequencies, particularly 28 mc., especially with the L/C in the doubler tank as large as it possibly can be made. The regeneration decreases for the lower-frequency bands (where it is unnecessary anyway), and becomes negligible. The self oscillation, being of an unstable type, is readily stabilized by the crystal-controlled excitation, remaining in complete control even when the doubler tank is tuned through its full range.

The effective regenerative circuit, as shown in Fig. 2, is recognizable as a form of the ultraudion type, in which a capacitive impedance is common to the grid-cathode and plate-cathode circuits. It is notable that this feature generally distinguishes the ultraudion, although there is neither an adequate analysis of its action nor a generalized theory of ultraudion circuit operation. Even Dr. Chafee's new *Theory of Thermonic Vacuum Tubes* dismisses the poor ultraudion with, "The theoretical treatment of this circuit is left to the reader." But we can say that with the common grid-cathode impedance capacitive, the circuit is regenerative; and that with this common impedance inductive, the circuit is degenerative. In the present instance, a 1000-ohm cathode resistor and a 100-$\mu\mu$fd. condenser in parallel provide capacitive impedance that is optimum for the 28-mc. band.

The neutralized push-pull 210 power amplifier used with the breadboard exciter unit at W1SZ by Clark Rodimon, who built up the model shown and with George Grammer uncovered the regenerative doubler feature, is the unit described in *The Radio Amateur's Handbook*, tenth edition,

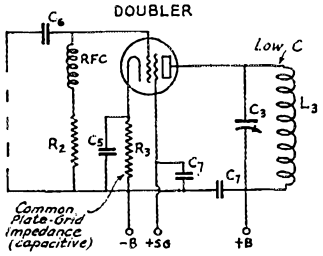
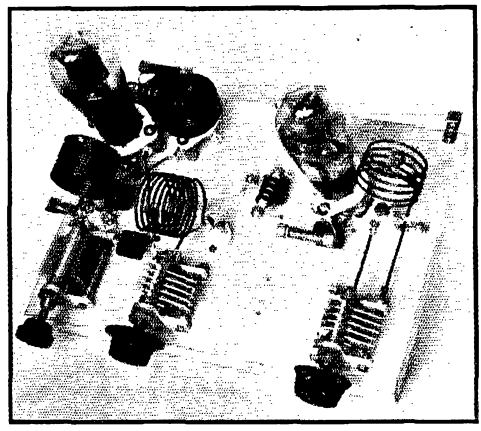


FIG. 2.—THE ULTRAUDION REGENERATIVE CIRCUIT EFFECTIVE WHEN DOUBLING AT HIGH FREQUENCY

The cathode resistor and its small bypass condenser provide capacitive impedance common to grid and plate circuits. Regeneration is at the frequency to which the plate is tuned, the half-frequency grid circuit offering negligible impedance.

pages 92 and 93. To couple this amplifier to the output of the exciter unit, the self-resonant coil L_4 (Fig. 1) was connected to the grid input terminals of the push-pull stage diagramed in Fig. 718 of the *Handbook*. The coupling to L_3 and the number of turns and spacing between turns of L_4, wound self-supporting with No. 14 enameled wire, were adjusted for maximum excitation of the amplifier as indicated by its grid current and r.f. output. A grid coil of 10 turns, 2½ inches in



THE SIMPLE BREADBOARD RIG USED FOR 28-MC. OPERATION WITH A 3.5-MC. CRYSTAL

It has given consistent service at W1SZ driving a neutralized push-pull Type 10 amplifier to over 30 watts output, getting QSA "pdc xtal" reports from midwestern stations on 10 meters, using a vertical half-wave antenna. The oscillator is at the left, amplifier at the right. Further details are given in the text.

diameter, may be used for a start, the final dimensions being so affected by individual circuit characteristics as to necessitate individual tailoring. Alternatively, a coil identical with L_3 might be used with a midget variable in parallel for tuning. The tuning and adjustment of the push-pull stage from this point on are identically as for operation in other transmitters and at lower frequencies, and are given in the *Handbook*.

The layout of the exciter unit for the experimental 28-mc. transmitter follows quite closely the schematic arrangement of Fig. 1, and is shown in sufficient detail by the illustration of the unit. The plate coil of the oscillator preferably should be at right angles to the other two tank coils, to minimize stray coupling, although this is not especially important with the circuits tuned to different frequencies. Additional plate coils for output on the 14-, 7- and 3.5-mc. bands would be in usual proportions to the coils described in Fig. 1. In fact, only one 7- and one 3.5-mc. coil would be required in addition to the three described. The same oscillator cathode coil serves for all bands. For 14-mc. output (doubling in the oscillator plate and doubling again in the amplifier), the present 14-mc. coil L_2 would become L_3, and would be replaced by a 7-mc. coil. For 7-mc. output (oscillator plate untuned, doubling in the amplifier), the coil for that frequency would go in

as L_3 and would be replaced at L_2 by a non-resonant choke. For 3.5-mc. output (straight amplification with choke coupling between oscillator plate and amplifier grid), the choke would remain in at L_2 and a 3.5-mc. coil would go in at L_3. Oddly enough, with this system of coil economy the greatest amplifier output is obtained on 14 mc., where there is double doubling with relatively high efficiency. The non-selective inter-stage coupling, using the r.f. choke, gives somewhat less output at 7 and 3.5 mc. But at these frequencies it is usual that less output is demanded from the exciter; the common difficulty is to get enough at 14 mc. Peak performance on "20" is therefore welcome.

A UNIVERSAL FIVE-BAND EXCITER UNIT

From the breadboard version of the crystal-controlled exciter unit for four-band operation, it was a logical step to a permanently constructed single piece of equipment, but also the widely desired elimination of the restriction to one spot per band that is imposed by ownership of but one crystal.

The basic circuit for crystal control is essentially that of the breadboard rig, the principal modifications being in the switching for alternative crystal control or electron-coupled self control, and for coil selection in the oscillator output. The tritet crystal oscillator circuit lends itself readily to conversion to the Hartley-type electron-coupled circuit in the manner shown in Fig. 3, the diagram of the universal unit. With the d.p.d.t. switch in the "Xtal" position, the oscillator circuit is the same as in Fig. 1. In the "E.C." position, the switch shorts the crystal, connects the grid to the upper end of the coil and the cathode to the proper tap near the bottom of the coil. Shorting of the crystal is necessary to prevent its resonating at certain oscillator

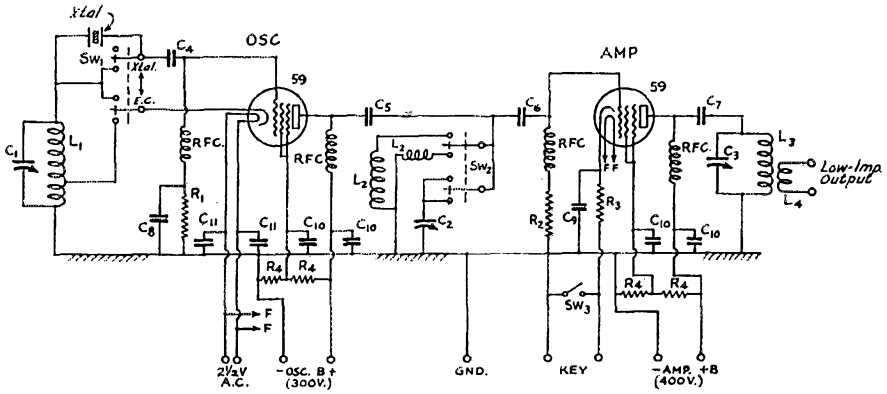
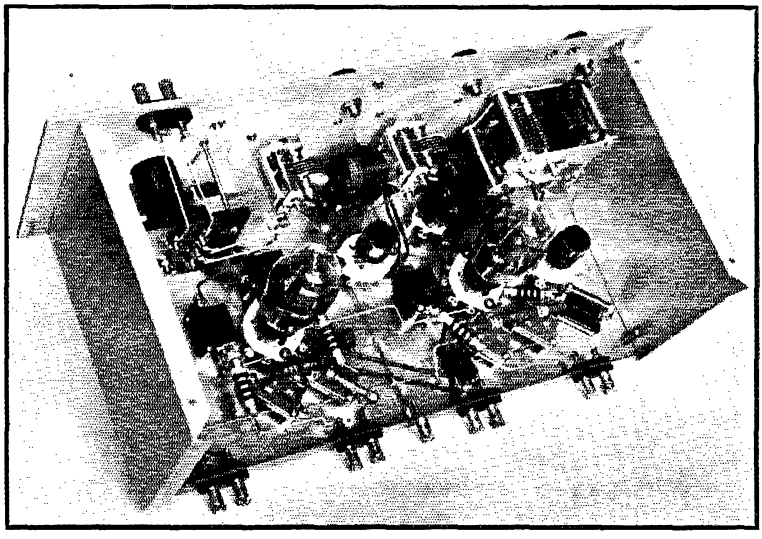


FIG. 3 — CIRCUIT OF THE DIVERSIFIED UNIVERSAL EXCITER UNIT

Because of mechanical considerations, certain components are specified by type numbers. Different components o the same ratings may be adapted by suitable modifications in the layout.
L_1 — Oscillator grid-cathode coil. See tables.
L_2 — Oscillator plate coils. See tables.
L_3 — Amplifier plate coils. See tables.
L_4 — Output coupling coil. See tables.
C_1 — 350-μμfd. variable (General Radio Type 334-N).
C_2 and C_3 — 50-μμfd. midget variables (National Type ST 50).
C_4 — 250-μμfd. fixed mica.
C_5 — 500-μμfd. fixed mica.
C_6, C_7 and C_8 — 100-μμfd. fixed mica.
C_9 — 100-μμfd. fixed mica.
C_{10} — 0.01-μfd. fixed mica.
(Above fixed condensers all Dubilier Type 4 transmitting).
C_{11} — 0.005-μfd. fixed mica (Dubilier Type 3 receiving).
R_1 and R_2 — 50,000-ohm 1-watt resistors.
R_3 — 1000-ohm 5-watt resistor (wire-wound).
R_4 — 10,000-ohm 10-watt resistors (wire-wound).
RFC — 2.5-millihenry section-wound r.f. chokes (National Type 100R).
SW_1 and SW_2 — Double-pole double-throw low-capacitance worm-type switches (General Radio Type 339-B).
SW_3 — Single-pole single-throw toggle switch.
Panel and plug-in coil descriptions are given elsewhere in the article.

"standardized" unit that would supply five-band excitation with choice of either crystal-control for spot frequencies in four bands or electron-coupled self-control for choice of frequency in any one of five bands. Thus, in a single sweep, is accomplished not only a long step towards convenient and economical diversification in band coverage with a frequencies. In the "neutral" position, the switch opens the oscillator cathode circuit, completely stopping operation. The plate coil switch is also d.p.d.t., selecting either one of two coils in the closed positions, or disconnecting the tuned circuits and giving non-selective choke coupling in the open position. By simply manipulating

these switches, adjusting the tuning condensers and interchanging only the doubler output coils, quick choice of either crystal or self-control over a range of four bands is at one's finger tips. For instance, with a 1.75-mc. crystal and proper cathode coil, the tuning of this unit for output at 1.75, 3.5, 7 or 14 mc. with crystal control, or for any frequency in any of these four bands with self-control, can be completed as speedily as the average amateur-band receiver can be shifted to follow it; faster than a band per minute. For coverage of the additional band of 28 mc. with self-control only, a 3.5-mc. range coil would replace the 1.75-mc. coil at L_1 and the 14-mc. coil would go into the plug-in position at L_2. Best output for 28-mc. electron-coupled operation is obtained with the oscillator working at, say, 4700 kc., tripling to 14.1 mc. in the plate and then doubling to 28.2 mc. in the amplifier. A number of combinations are possible, using 1.75- or 3.5-mc. crystals, the specifications and suggested operating combinations for five output frequencies being given in the tables on the following pages.



INSIDE THE UNIVERSAL EXCITER UNIT

Viewed from the rear, the oscillator is at the right, the amplifier at the left. The crystal is between the oscillator tube and the oscillator switch on the front panel, plugged into a tube-socket mounting. The plug-in position for one oscillator plate coil is to the left of the oscillator tube, the other coil (tuning to 7 mc.) being permanently mounted on its tuning condenser frame. The fixed condensers in line along the back are the bypasses, except for the oscillator grid condenser at the extreme right. The pairs of binding posts (left to right) are for key, amplifier plate supply, filament and oscillator plate supply. The center post is for ground connection. The G. R. bakelite coil mounting at the left is supported from the panel by three tapped rods with cap nuts on the front.

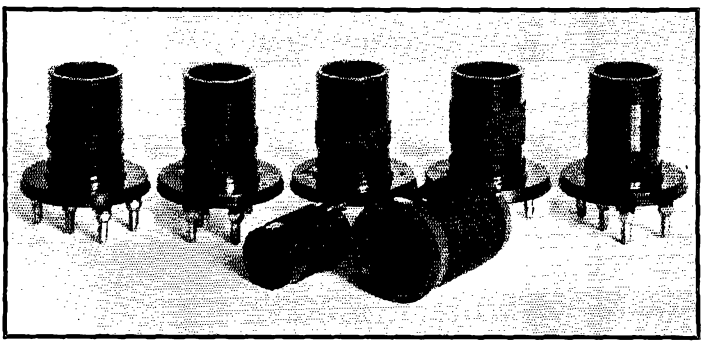
STANDARDIZED CONSTRUCTION

The building of this unit has been considerably simplified by using a type of standard panel unit newly developed by General Radio. These units are of the 19-inch rack-mounting type, with the various panel holes already made. In the unit shown, there are four large holes of size to accommodate standard 3-inch type meters. When not used for this purpose, they are covered by plates drilled to take variable condensers, rheostats, etc., or by blanks or by adapters for 2-inch meters. These holes also accommodate the panel-type plug-in coil assembly used for the output amplifier, as shown at the right of the panel. Conveniently distributed smaller holes are provided for toggle switches, binding posts, jacks, etc. These are blanked by push-in buttons when not used for mounting apparatus. In constructing this unit the only drilling necessary was the No. 35 holes in the base plate, which are tapped for the 6-32 brass machine screws used to fasten the sockets and other parts in place. Although the appearance might give the impression that the panel was designed particularly for this one job, in reality the assembly was adapted readily to the standard panel layout.

The arrangement of apparatus is planned to give no immoderately long leads in r.f. circuits and to space r.f. coupling condensers and coils sufficiently from the base, according to ordinary good practice. The coil sockets are mounted on spacing bushings, as are the moulded bakelite coupling and by-pass fixed condensers. Shunt bias and plate feed through chokes is used, allowing the tuning condensers to be mounted in contact with the panel by keeping d.c. from the tuned circuits. Comparative checks of series and parallel plate feed show the parallel chokes to be effective over the entire frequency range. The oscillator circuit connections, including those to the G.R. cam switch, are made with solid No. 18 push-back wire, which is semi-flexible and less likely to resonant vibration than the square No. 14 bus wire used for the other circuits. The large tuning condenser is used in the oscillator for mechanical stability and wide capacitance range, midget type condensers of low capacitance being satisfactory for the other tuned circuits.

Provision is made for keying the amplifier in

its cathode circuit, this being similar to center-tap keying with directly heated tubes. A panel switch shorts the key terminals for continuous operation, as would be necessary in a 'phone transmitter. Since there is some r.f. coupling through the amplifier tube even with its cathode circuit open, it would be advisable to connect the cathode circuit (or filament center-tap) of the following stage through the keying circuit so that both would be opened at once. This should be necessary only when the amplifier is operating "straight," or with its input choke-coupled to the oscillator plate.



PLUG-IN COILS FOR THE UNIVERSAL EXCITER

Back row, amplifier plate coils for the 28-, 14-, 7-, 3.5- and 1.75-mc. bands. In front, the 3.5- and 1.75-mc. band (high-C) oscillator coils. The output coil forms are G. R., equipped with 5 plugs (one blank). The smaller oscillator coil form is a National midget (1-inch) 4-prong and the larger a National standard (1¼-inch) 4-prong.

The output coupling is the low-impedance type so that efficient coupling by a r.f. line can be used between the unit and the tuned grid circuit of the following stage. This system is becoming increasingly popular and is recommended. The other end of the line should terminate across a few turns of the tuned grid circuit of the next amplifier, the proper number being found by adjustment for maximum excitation. For further information on this method of coupling, see W2AOE's description of the "Five and Ten" transmitter in August, *QST*, and the "Experimenters' Section," May and June, *QST*.

OSCILLATOR COIL DATA

Except for the permanently-mounted 7-mc. oscillator plate coil, both the oscillator plate and the grid-cathode coils are plug-in and interchangeable, and are tapped for cathode connection in the electron-coupled oscillator circuit. Note that coil design for high-*C* operation in grid-cathode circuit on one band is identical with design for low-*C* operation in the plate circuit on the next higher-frequency band. Data on the basic set of coils are as follows:

(Coil A.) High-*C* for 1500 to 4000 kc., low-*C* for 3500-kc. band. One coil required. Standard National R39 form, 1½-inch diameter. Length of winding, 1⅝ inches. Number of turns, 33½. Turns per inch, 20 (No. 24 d.s.c. spaced diameter of wire). Approximate inductance, 25 μh. Cathode tap, 11¼ turns from ground end.

(Coil B.) High-*C* for 3000 to 7500 kc., low-*C* for 7000-kc. band. Two coils required. National midget 4-prong form 1-inch diameter for grid cathode coil. National midget plugless form 1-inch diameter for permanent oscillator plate coil. Length of winding, ¾ inch. Number of turns, 18½. Turns per inch, 24 (No. 26 d.s.c. wire spaced diameter of wire). Approximate inductance, 7 μh. Cathode tap on plug-in coil, 5½ turns from ground end.

(Coil C.) High-*C* for 7-mc. band, low-*C* for 14-mc. band. Plate coil only required. National midget plug-in form, 1-inch diameter. Length of winding, ½ inch. Number of turns, 7½. Turns per inch, 16 (No. 24 or No. 22 d.s.c. spaced to fit). Approximate inductance, 1.7 μh. Cathode tap, 2¼ turns from ground end.

All coils doped with clear Duco.

OPERATING SUGGESTIONS

A single power supply delivering the indicated voltages can be used or, preferably, separate plate power supplies can be used for the oscillator and amplifier stages, a separate oscillator plate supply eliminating slight changes in oscillator frequency with keying of the amplifier. The total plate current taken by the unit runs around 100 ma., including the drain of the two voltage dividers. In preliminary testing and adjustment, 0–100 d.c. milliammeters can be connected in the oscillator and amplifier plate supply leads. As an r.f. indicator, a 6-volt flash-lamp connected across the low-impedance output terminals serves nicely. A neon tube or loop-and-lamp is also handy for checking up the oscillator and intermediate circuits in the familiar fashion.

The oscillator operation should first be checked, a drop in plate current indicating start of oscillation. A similar drop in this current should occur when the oscillator plate circuit is tuned to a harmonic. When these indications show that the oscillator is operating, the amplifier should be put into operation and tested. Its plate current should increase with excitation, when the oscillator plate circuit is resonated to a harmonic of the oscillator, and should then show a dip when its own plate circuit is tuned to resonance.

The next step is to verify the output frequency for each coil and tuning combination. This is extremely important because the nearly equal

output obtainable on consecutive harmonics is likely to mislead one into mistaking their identity — say a third for a second — unless the frequency is actually checked. The most reliable instrument for doing this is a simple absorption frequency meter or "wave meter." Its calibration need be only approximate, since it serves but to distinguish between harmonics of the oscillator frequency. Precise frequency checks and calibration of the oscillator for electron-coupled operation should be made with an accurate heterodyne frequency meter. As the harmonic checks and vibration and with variations in oscillator load circuit conditions.

In planning a complete transmitter with the universal exciter unit as the basis, it is recommended that its output be fed to a single Type 10 or similar tube (say one of the newer between-size tubes now on the market), operated at full rating as a straight amplifier (neutralized or screen-grid). This can then be used as the final stage for moderate power output, either c.w. or modulated for 'phone, or can be used to drive a high-power final stage. This plan insures adequate

AMPLIFIER PLATE COIL DATA

The forms for these coils are General Radio, moulded black Bakelite, diameter 1¼ inches. They are equipped with G. R. plugs that fit into G. R. jacks in a behind-panel base. Winding specifications are as follows:

Band Kc.	No. Turns L_3	Length Winding	Turns Per In.	Size Wire	Turns Spacing	Approx. Ind. μh	Turns[1] L_4
1750	60	27/32"	72	28 enam.	None	100	6
3500	30	¾"	40	24 d.s.c.	None	28	4
7000	15	⅜"	40	24 d.s.c.	None	10	2¼
14,000	6¾	9/32"	25	24 d.s.c.	To fit	2.5	2¼
28,000	3¼	⅛"	9.6	24 d.s.c.	To fit[2]	.....	2¼

[1] *Wound at bottom of form, top end of L_4 spaced ¼-inch from lower end of L_3.*
[2] *Suggested that L_3 turns be adjusted to tune to 28 mc. with least possible tuning capacitance, subject to individual conditions.*

frequency calibrations are made, the dial settings for the various combinations should be logged to facilitate rapid shifting in later operation.

Little trouble in getting satisfactory operation is likely provided that the specifications are as given, that there are no defective parts and that no mistakes have been made in connections. There is some possibility of trouble with some Type 59 tubes, although those of reliable manufacture have been found generally satisfactory. Since these tubes are relatively inexpensive, it is a good plan to have a spare or two on hand for selection.

When operating with crystal control, it is important that the oscillator cathode circuit be adjusted for maximum harmonic output and minimum crystal heating. As has been mentioned previously, this adjustment is reached with the tank capacitance reduced considerably from the more usual setting, where oscillation starts suddenly with tuning from maximum capacitance down. The best setting will be the least capacitance at which oscillation will start reliably when the oscillator is switched on. With a good crystal it should be found that the oscillation will persist weakly even with the condenser at minimum capacitance. Any good crystal is a ready oscillator in this circuit, some that refuse to oscillate in other circuits giving fair performance. But a good crystal in a good mounting is necessary for realizing the full capabilities of the tritet. Although the frequency stability with the oscillator operating electron-coupled is generally comparable with the crystal-controlled stability, crystal operation is noticeably better, especially with mechanical excitation and maximum economy in the stage-by-stage development of the transmitter. Subsequent articles will describe further adaptations of the tritet oscillator and universal-type exciter to transmitters of different tube combinations.

OPERATING COMBINATIONS FOR FIVE BANDS

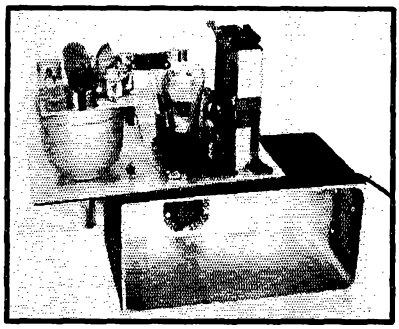
Output Band L_3	Osc. Operation	Coil At L_1	Coil At L_2	Frequency Sequence
1750-kc.	1.75-mc., xtal or e.c.	A	Open	Osc. plate untuned, straight amp.
3500-kc.	3.5-mc., xtal or e.c.	B	Open	Osc. plate untuned, straight amp.
	1.75-mc., xtal or e.c.	A	Open	Osc. plate untuned, doubling in amp.
7000-kc.	3.5-mc., xtal or e.c.	B	Open	Osc. plate untuned, doubling in amp.
	3.5-mc., xtal	Shorted[1]	A	Pentode osc., doubling in amp.
	1.75-mc., xtal or e.c.	A	A	Doubling in osc., doubling in amp.
14-mc.	3.5-mc., xtal or e.c.	B	B	Doubling in osc., doubling in amp.
	1.75-mc., xtal or e.c.	A	B	Quadrupling in osc., doubling in amp.
	2.35-mc., e.c.	A	B	Tripling in osc., doubling in amp.
28-mc.	3.5-mc., xtal or e.c.	B	C	Quadrupling in osc., doubling in amp.
	4.7-mc., e.c.	B	C	Tripling in osc., doubling in amp.
	7-mc., e.c.	C	C	Doubling in osc., doubling in amp.

[1] *End stator plate of C_1 bent to short to rotor with condenser at maximum.*

Automatic Temperature Compensation for the Frequency Meter

By G. F. Lampkin, W8ALK*

DURING the development work on the micrometer frequency meter[1] which extended over a period of some four months, most of the time was actually taken up with thermal considerations. In addition to the electrical stabilization previously described the final design incorporates an automatic compensating condenser whose capacity varies with temperature to produce frequency changes of opposite sense to those of the oscillator itself. This type of correction operates on the one factor most detrimental to frequency stability in electron-coupled oscillators. Through its use the oscillator may be kept within plus or minus 150 cycles of 3500 kc. over an ambient temperature range of 20° *C*. The design which was finally adopted for the m.f.m., and the reasons therefor, will be gone into in detail, with but brief references to other pertinent angles of the investigation.



INTERNAL CONSTRUCTION OF THE MICROMETER FREQUENCY METER, SHOWING THE COMPENSATING CONDENSER TO THE LEFT AND THE TANK CONDENSER TO THE RIGHT OF THE INDUCTANCE ON THE MICROMETER CONDENSER

Between this assembly and the power-pack equipment at the right are the oscillator and rectifier tubes. The circuit and further constructional details of the frequency meter were given in July QST.

The starting point is the curve of Fig. A, showing frequency versus time for the oscillator tube warming up in open air. This would not be such a bad characteristic, flattening out as it does in about fifteen minutes, were it not, unfortunately, that the tube and oscillating circuit must be shielded; and rather completely so in the case of a frequency meter. As soon as the apparatus is put in a box the heat from the tubes and transformer is confined and, finding its way to other parts of the layout, must bring them to some higher temperature. The heat flow continues in the m.f.m. for two or three hours before equilibrium is attained and the frequency flattens out as shown in Fig. 1B.

In Fig. 1C the conditions of Fig. 1B were duplicated, with the exception of the MC-100-M tank condenser, which was replaced by a 50-$\mu\mu$fd. moulded mica condenser. The equilibrium time is slightly less, but the point of interest is the positive temperature coefficient. The tube warming up contributes the section "*OX*" of the curve, then, as the heat reaches the mica condenser, it creates the section "*YX*." This is indicative of the performance not only of one make of condenser, but also of the gamut of moulded mica condensers available. Positive temperature coefficients of frequency for different condensers were observed from plus 200 to plus 2500 cycles-per-degree Centigrade, at 3500 kc. However, an even graver indictment against the use of mica condensers as frequency-determining elements is aging. Factors of this sort were found ranging from 10 to 400 cycles-per-hour, negative.

It might be thought that thermal shielding, such as heat baffles or balsa-wood boxes, could be used to prevent the heat of tubes and transformer from warming up the coil or condenser, but any design that attempts to do this and still retains reasonable electrical shielding of the tube will transfer some heat to the box and parts; and the time required to reach equilib-

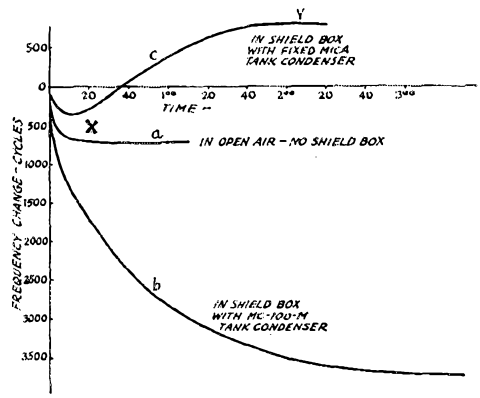


FIG. 1 — FREQUENCY-TIME CHARACTERISTIC OF THE FREQUENCY METER WITHOUT TEMPERATURE COMPENSATION

*146 W. McMillan St., Cincinnati, Ohio.

[1] Lampkin, "The Micrometer Frequency Meter", *QST*, July, 1933.

rium will be as long or longer. Since automatic temperature compensation is to be used anyway, the simplest scheme is merely to vent the box so that the transformer and filter condensers will not overheat, and let a compensating circuit ele-

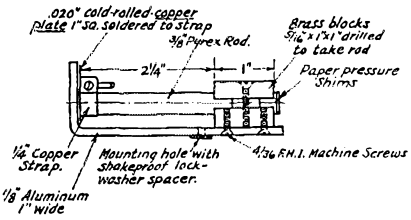


FIG. 2 — DETAIL OF THE COMPENSATING CONDENSER

ment take care of both internal and external temperature variations.

There are a number of forms which the automatic temperature compensator might take. It might operate on the tuned circuit inductance coil by having an expansion element rotate or translate an inductor with reference to the coil. Again, a compensating condenser could be made from a thermometer by placing a conducting surface over the stem for one electrode and using the mercury for the other. Or an expansion element could be used to vary the area or the gap of a plate condenser. The latter is the form used in the m.f.m., the details being given in the sketch of Fig. 2.

The thermal expansion coefficient of aluminum is $.225\times10^{-4}$ per degree Centigrade, and that of Pyrex, $.032\times10^{-4}$ per degree Centigrade. As the temperature goes up the aluminum electrode moves away from the copper plate, decreases the capacity, and so increases the frequency to offset the change of the m.f.m. The capacity increase or decrease per degree Centigrade for this type of condenser is inversely proportional to the square of the gap between the plates, under practical conditions. The effect of the adjustment of the gap is shown in Fig. 3, for three values of gap.

The humps or oscillations in the curves, particularly noticeable when the compensation is near the best value, result because the various parts (coil, tube, condenser) have different rates of temperature rise and different terminal temperatures. The tube, of course, starts heating first and drives the frequency down; then the compensating condenser begins to receive heat and returns the frequency in the other direction; and the final frequency is a balance of all factors. In the design shown the compensating condenser is mounted on the micrometer condenser, which in turn is mounted on the panel, but spaced therefrom with fibre washers. Without the fibre-washer spacing rapid changes in ambient tempera-

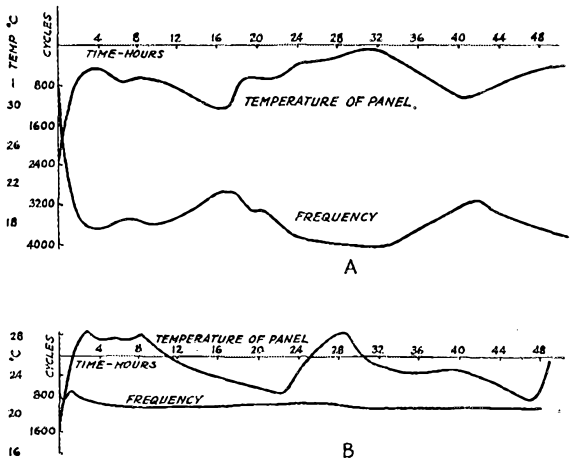


FIG. 4 — LONG-TIME PERFORMANCE OF THE FREQUENCY METER WITH AVERAGE VARIATIONS IN ROOM TEMPERATURE

A — Without temperature compensation; B — With temperature compensating condenser.

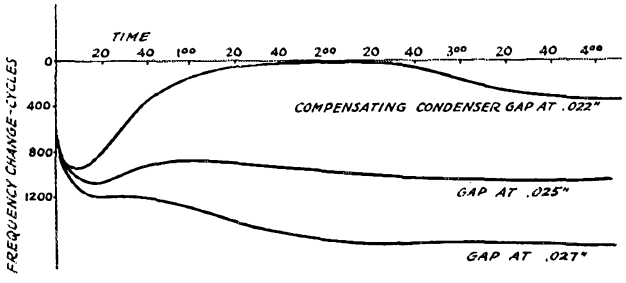


FIG. 3 — PERFORMANCE OF THE TEMPERATURE COMPENSATING CONDENSER FOR DIFFERENT SETTINGS OF THE GAP, COMPENSATING CONDENSER MOUNTED ON THE MICROMETER CONDENSER WITH THE LATTER IN CLOSE CONTACT WITH THE PANEL

ture reach the compensating condenser before reaching the tube, and can cause a positive or negative hump of 200 or so cycles in the frequency/time curve.

In setting the compensating condenser, a source of frequency that will stay constant for three or four hours is necessary. The m.f.m. is turned on and after five minutes tuned to zero beat with this standard, then, after three hours, it is again tuned to zero beat. If the later frequency reading is higher, the compensating condenser gap must be set closer, and *vice versa*. For measuring and setting the gap,

built-up paper shims may be used, figuring newspaper at about 3 mils thickness, *QST* pages at 2.4 mils, *QST* covers at 4.2 mils, calling cards at 10 to 12 mils, etc. The compensation will be comparatively the same for different tubes of the same make, or of different makes. The saturation value, or frequency at which the curve flattens out, will vary, however, from tube to tube.

At one stage of the development a compensating condenser was used having hard rubber (coefficient approximately $.7\times10^{-4}$) and aluminum as the expansion elements. This was discarded in favor of the aluminum-Pyrex combination because the hard rubber was not sufficiently permanent in its dimensions. At another time a cedar-wood box was constructed to enclose completely all the elements of the tuned circuit — the coil, the micrometer condenser, the compensating, midget and 0.01-μfd. fixed condensers. The idea was to make the heat reach all parts of the tuned circuit at a slow and uniform rate. The first hour of the frequency-time characteristic, even with the compensating condenser in the circuit, was like that of Fig. 1B, indicating that the oscillator tube is the major contributor to the temperature coefficient of frequency.

In Fig. 4B is given the long-time performance of the m.f.m. over a period of two days, with average variations in room temperature. Variations in frequency from five minutes after turning on to 48 hours were plus or minus 150 cycles. After 4 hours they were not more than plus or minus 50 cycles. Total shift due to intentional line voltage change from 120 to 105 volts was plus 55 cycles.

L. F. Osc. Harmonic				*Corresponding Amateur Freq., Kc.*	*M. F. M. Scale Reading*
49	50	51	52		
X				3367.3	
	X			3400.0	
		X		3431.4	
			X	3461.5	
X				3469.4	
	X			3500.0	
		X		3529.4	
			X	3557.7	
X				3571.4	
	X			3600.0	
		X		3627.4	
			X	3653.8	
X				3673.5	
	X			3700.0	
		X		3725.5	
			X	3750.0	
X				3775.5	
	X			3800.0	
		X		3823.5	
			X	3846.2	
X				3877.6	
	X			3900.0	
		X		3921.6	
			X	3942.3	
X				3979.6	
	X			4000.0	
		X		4019.6	
			X	4038.5	

FIG. 6 — HARMONIC TABLE FOR CALIBRATING THE FREQUENCY METER FROM 100-KC. OSCILLATOR AND WWV 5000-KC. TRANSMISSION

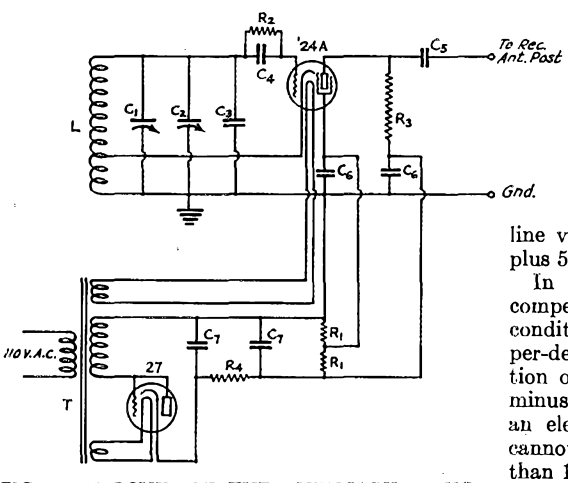


FIG. 5 — CIRCUIT OF THE AUXILIARY 100-KC. OSCILLATOR USED FOR ACCURATE CALIBRATION OF THE FREQUENCY METER FROM WWV 5000-KC. TRANSMISSIONS

C_1 — 350-μμfd. variable condenser.
C_2 — 50-μμfd. midget variable condenser.
C_3 — 0.002-μfd. moulded mica condenser.
C_4 — 500-μμfd. moulded mica condenser.
C_5 — Twisted hookup wire 6 inches long.
C_6 — 0.25-μfd. non-inductive by-pass condenser.
C_7 — 1-μfd. 400-volt filter condenser.
L — 360 turns No. 34 d.s.c., on tube 1¼-inch diameter and 4½-inch length, tapped 120 turns from ground end.
R_1 — 25,000-ohm 1-watt resistor.
R_2 — 50,000-ohm 1-watt resistor.
R_3 — 250,000-ohm 1-watt resistor.
R_4 — 10,000-ohm 1-watt resistor.
T — Transformer, 110-v. 60-cycle to 220/2.5/2.5 volt.

In Fig. 4A is plotted the curve of the uncompensated frequency meter under similar conditions. The frequency varies some 190 cycles-per-degree Centigrade which, for a total variation of 20°, would be possible error of plus or minus 1.9 kc. Without temperature compensation an electron-coupled frequency meter therefore cannot be dependably accurate to much better than 1/10 per cent.

CALIBRATION

To calibrate the m.f.m. accurately an auxiliary electron-coupled oscillator should be put together (from available parts) to work on a fundamental frequency of 100 kc. The inductance may be calculated, as the one diagramed in Fig. 5, or the inductance in Fig. 5 may be duplicated. Using the *L-C* values given, the oscillator hit 100 kc. within the range of the variable condenser on the first try. To check that the oscillator is on 100 kc., a broadcast receiver may be used to tune in the even 100-kc. stations, such as WLW (700-kc.),

WFAA (800-kc.), WOC (1000-kc.) etc., on each of which a beat will be had. An alternative method is to use a receiver calibration (or old frequency-meter calibration) and set the dial of the 100-kc. oscillator so that a harmonic is heard on 3500 kc. The other harmonics should then be heard on the even 3600-, 3700-, 3800-kc., etc., points. If spaced closer than this, the condenser capacity must be decreased, or *vice versa*. If the oscillator is not on

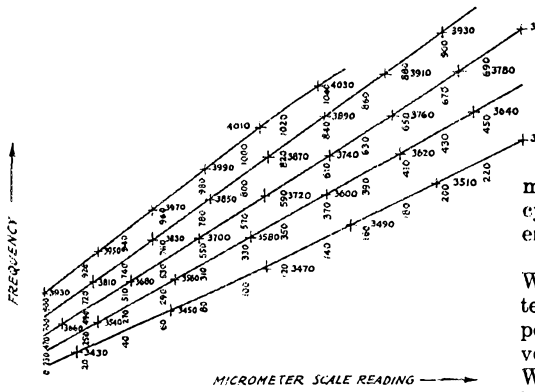


FIG. 7 — THE TYPE OF CALIBRATION CHART RECOMMENDED FOR ACCURATE PLOTTING AND READING OF CALIBRATION FREQUENCIES
Crosses are shown indicating only 20-kc. steps in the 3500-kc. band, since it is impracticable to reproduce the lines of the plotting paper in the cut.

100 kc. the errors will be so glaring that there is negligible chance of error. It is desirable that the 100-kc. point be spotted somewhere between 30 and 50 on the dial of the 350-$\mu\mu$fd. condenser, since this will give the best distribution of calibration points.

In the accurate calibration process the 100-kc. oscillator is to be used in conjunction with the 5000-kc. standard frequency transmissions of WWV, the schedules of which are given elsewhere in this issue. This transmission is the final authority for frequency measurements in the United States — for accuracy there is none better. The 50th harmonic of the 100-kc. oscillator as shown, even when operated on a.c., will hold within 10 or 15 cycles of WWV over short periods. Thus all harmonics of the oscillator will be marked to about 3 parts in a million, or 0.0003 per cent. The harmonic strength on the 3500-kc. band is R8 to R9 with the coupling wire tied to the receiver antenna post and there is little likelihood of QRM in the band making readings inaccurate or impossible. The readings for a complete calibration may be carried out one after the other without waiting for the next schedule.

A precise method for setting to zero beat should be mentioned here. It has appeared in the literature before, but apparently is still not very well known. If two beating carriers are strong enough, zero beat may be detected on a non-oscillating receiver by a "flutter" in background noise or slight amplitude modulation. If the signal carrier be weak, however, zero beat may seem several hundred cycles wide. In this case the beating carrier had best be made of the same order of weakness. With the receiver non-oscillating, tune the beating carrier from audibility to audibility on either side of zero beat, and try to spot the middle. Then make the receiver oscillate, and if the middle was spotted within 20 or 30 cycles there will be a 20 or 30 cycle flutter in the thousand-cycle or so beat note caused by the receiver. The beating carrier may then be tuned to bring the flutter down to one cycle or less. Although such diligence may seem to be carrying things too far, nevertheless it is a case of the old maxim — a number of small errors (or losses, or cycles) can add up to create an intolerably large error or frequency difference.

The procedure of calibration is simple. Pick up WWV on the receiver tuned to 5000 kc. (60 meters), set the oscillator to approximately the 100-kc. point as previously determined, and then use the vernier to tune it exactly to zero beat with WWV. Next tune the receiver back to the 3500-kc. band, where the standard frequencies of 3500, 3600, 3700, 3800, 3900, and 4000 kc. will be marked by the respective harmonics of the 100-kc. oscillator. Pick each frequency up on the receiver, tune the m.f.m. to zero beat, and record each m.f.m. reading in a table like that of Fig. 6, opposite the corresponding frequency.

Then go back to WWV with the receiver, *increase* the capacity on the 100-kc. oscillator until the next harmonic is heard on WWV, and set to zero beat. The frequencies then falling in the 3500-kc. band are those listed under the 51st harmonic. Beat these with the m.f.m. and record the settings, taking note of either the receiver setting or the value of the m.f.m. reading to get it in the proper bracket. The m.f.m. readings should increase successively down the table. Go back to WWV, again increase the 100-kc. oscillator capacity to set the 52nd harmonic on WWV, and read the corresponding points in the 3500-kc. band. Finally, *decrease* the capacity of the oscillator from the 100-kc. point to hit the 49th harmonic beating with WWV. This procedure gives points roughly every 25 kc. throughout the band, to within 20 or 30 cycles.

The calibration curve is plotted on one-inch cross-section paper, ten divisions per inch, 20 inches high and 24 inches long. This is a Dietzgen paper which comes in rolls, and was mentioned in a Stray in *QST* some time ago. The curve is plotted in five sections with individual scales for each section, as pictured in Fig. 7. The method puts the entire calibration on one sheet, and allows accuracy of plotting and reading commensurate with the stability and precision of the frequency

(Continued on page 58)

The Ultra-High-Frequency World

Some Tales of Activity on 56 Mc.

FIFTY-SIX-mc. news of the month comes from G5BY and his associates who have been doing sterling work in England. Their most recent test was from the top of Mount Snowden, Wales, which is, at 3570 feet, the highest point in both England and Wales. From this mere hillock, G5BY pushed his 'phone signals 200 miles, to produce word-perfect copy at the other end. If any U. S. amateur has done comparable DX from such an altitude, we have yet to hear about it. Even our honest-to-goodness *mountains* have yet to notice such things happening around them.

* * *

Then, from Italy, comes the story of how Mr. F. Pugliese, I1FP, and Frederico Strada, I1AU, climbed to the top of the Monte Rosa, 13,680 feet above sea level, to establish the practicability of amateur 56-mc. apparatus for communication between Europe's highest observatory, the Regina Margherita, and the rest of the world. The observatory, a very important one as observatories go, was once connected by land-line. Not until moving glaciers and storms had wrecked the lines many times did the observatory people give up. They tried medium and ordinary short-wave radio then, but without much success because, as I1FP explains, the large antennas necessary "were soon dismantled by winds and lightning that constantly fall around the building." 56 mc. solved the problem.

The apparatus, mostly built according to *QST* designs, was first taken by mule to the Institute C. Mosso at Col d'Olen, a large building 9000 feet above the sea. From this point, the second station was carried by shoulder on the 8-hour climb to the observatory. Duplex contact was immediately established with the Institute station. The link has been operated continuously since then and has proved of immense value to the scientists and alpine climbers of those parts. Signals from the stations, incidentally, are received strongly in Milan — about 80 miles away.

* * *

Back home again, we find the South Jersey Radio Association pepping up the game with a "Hidden Station Hunt." It happened like this: Dr. C. D. Haigis, W3XAF, and C. H. Jenkins, W3XV, after much poring over topographical maps to select a hot spot, drove out with their portable 56-mc. gear and hid themselves in the wilds of the Southern New Jersey Pine Belt. Then, some twenty odd Association members, armed with directive and non-directive receivers, transmitters and what-not started out to find them. Alternate periods of transmission had been arranged so that data on bearings and locations might be transmitted by transmitter-equipped hunters for the benefit of the others. After four and a half hours of strenuous hunting, Edward Braddock, W3BAY, and E. D. Blodgett, W3CES, located the hidden station with the aid of a directive receiver. The winning hunters, what with being marooned in a gravel pit and burning out two sets of tubes, were able to take only four bearings with their loop. Four proved to be enough, however.

Everyone agreed that the stunt was a thorough success.

* * *

Casting aside all thoughts of DX, traffic handling, or stunting, the members of the Lawn Manor Radio Club and the Illinois Ham Club did a splendid job of routine communication at the American Air Races in Chicago. Mr. Earle Russell, W9HBX, president of the I. H. C., came to the rescue of W9PA and W9VT (who cooked up the idea of the communication net) and, with the help of about thirty club members, put the job across in fine style. Chief work, of course, was the maintenance of communication between the judge's stand and the pylons. It would have been fairly easy if a ripping storm had not strewn the judge's stand, pylons, radio shacks, typewriters, and radio gear over the surrounding countryside during the night of the first race-day. In characteristic fashion, the radio crew provided emergency stations, rebuilt their gear and, in no time at all, had the net running as if nothing had happened. And so it went on for the five days of races with one set of thrills and one bunch of problems after the other.

The net was in charge of Jack Threlkeld, W9PA; Louis E. Potter, W9VT; George Dammann, W9JO, and Earle Russell, W9HBX. Credit for solid work on a big job well done goes to W9KF, W9FPP, W9JKH, W9JO, W9NIP, W9HBX, W9ILF, W9HPX, W9CSB, W9CF, W9LEP, W9HQQ, W9FQU, W9GG, W9LBP, W9KE, W9CYT, W9IMG, W9NKP, W9DSX, W9NLP, W9EFQ, W9IBC, W9VT and W9PA.

* * *

Then we have the Frederick Amateur Radio Association of Frederick, Md., putting on a fine field day in the vicinity of Braddock Heights. Roy Corderman, W3ZD, ran the key station on a lookout tower 1200 feet above sea level. A second station, under the call W3CPF, contained gear owned by W3BJA and was operated on

(Continued on page 82)

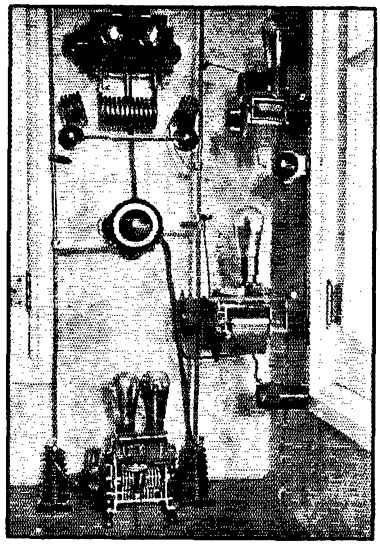
Inexpensive Individual-Band Transmitters

An Effective Combination for Convenient Four-Band Operation

By Clyde C. Anderson, W6FFP*

DESCRIPTION of low-power transmitters for the 1.75- and 3.5-mc. bands can be found in many issues of *QST*, but most of them stop at the antenna system and say nothing about the work that can be done. And the information about the antenna coupling and tuning with these sets leaves something to be desired — an unavoidable condition, of course, since antenna systems are as numerous as the hams using them, especially on the lower frequencies. That is one reason why this article is written: to describe a four-band antenna system that is easy to handle —and works. The second reason is to do some rooting for low-power work and to show how conveniently several bands can be worked if simple and inexpensive transmitters are used.

Because of QRM in the 3.5-mc. band, our Naval Reserve section went up to 1.8 mc. Most of us tried to put our p.p. TNT's there, but when a quick QSY to 3.5 mc. was needed lots of time was lost in changing coils and retuning. So our back issues of *QST* were gone over and all but one circuit tried — "A Low-Power 1715-kc. C.W. Transmitter," page 8, March, 1932, was passed over because the "low-power" scared us off. Most of us remembered our experiences in the old days, when it took at least a badly overloaded 203 to work across the state. Finally, after a 210 went west in my p.p. rig, the low-power circuit was hooked up. The 210 with the high voltage worked very nicely until it decided it was lonesome for its mate and departed for the happy hunting ground during drill one night. The only other tubes available at the time were some 45's in the receiver; one of these was pulled out, a filament rheostat hurriedly put in, the plate voltage dropped and we were back in the net, expecting to raise only a station in the city. But the control station came back asking, "what was the idea of tuning up with high power?" Visions of having a nice little 1.8-mc. rig stuck over in the corner out of the way popped up, for up till then it had nothing else to do but be on for weekly drills.



THE COMPLETE INSTALLATION FOR FOUR-BAND OPERATION

The 14-mc. push-pull t.p.t.g. transmitter with a pair of 10's is on the table between the two stand-off insulators at which the feeders terminate. Higher up on the wall between the feeders is the 7-mc. transmitter, also using a pair of 10's in the same circuit. The low-power 1.75-mc. Hartley is mounted on the right-hand wall just above the 14-mc. set. The 3.5-mc. Hartley is at the top right; its antenna condenser is fastened to the window frame just below it. Any band can be worked simply by clipping the antenna leads on the right places, and plugging the key in an appropriate jack.

The layout of the rig as described in *QST* was rather too bulky to hide in the corner, but it did look as if the thing could be put into smaller space, so a piece of pressed wood was mounted on the condenser and the tube and Sangamos mounted above, with the result that the set looked more like a wavemeter than a transmitter — and it was small enough to hang in the corner.

All this narrative seems necessary for it is an explanation of how skepticism was overcome. I'm the same as any other ham, always trying it out "exactly" like *QST* says — only not having this or that piece of apparatus and thinking a different one will work just as well. When it doesn't — aw, *QST*'s no good! I did happen to have the 0.005 condensers necessary or I'd still be struggling along trying to find a good little rig.

The oscillator circuit is identical with the one in *QST*. The antenna tuning arrangement is different, in that it uses a counterpoise and there is no antenna tuning condenser. A visit to one of the local emporiums brought a hundred-foot roll of stranded antenna wire; this was bent into a "V," hung up over the clothes-line, and connected as shown in Fig. 1. Two methods of checking antenna current were tried out with equal results. In the first a two-foot length of the antenna lead was shunted by a flashlight bulb; the second method was to leave a looped bulb in fixed position on the antenna coil. Fixed antenna coupling is used.

Now for the tuning. The oscillator is first set on the desired frequency. The antenna and coun-

* 931 Orange Ave., Fresno, Calif.

terpoise are then hooked on and the oscillator frequency readjusted. If the light is at maximum brilliancy at that frequency, fine and dandy; but if it turns out to be like mine it won't, so something must be done. Here's how: Turn the tank condenser until the lamp is at peak brilliancy and note the oscillator frequency. Probably the frequency will be high, so add antenna turns. If your tubing is long enough, FB; if not, wind a loading coil and hook it in series in the counterpoise lead. Then tune for maximum brilliancy again. The resonance point will be found to have changed quite a bit. Keep on with this process until the antenna is resonant at the desired frequency. The only precaution to be observed is, upon reaching the desired frequency, to key the rig and if it chirps or is unsteady add one or two more turns to the antenna and work it just off the high frequency edge of the peak. The set is then ready for operation and should bring in some gratifying reports. Almost all mine have been crystal-like and *loud*.

Profiting by this experience, I had visions of a 3.5-mc. rig for local drills. But since there was no dope in *QST* this time, it was decided to adapt the low-power circuit to 3.5-mc. Fourteen turns of No. 14 enameled wire, spaced with smaller wire and tapped 6 for grid and 8 for plate, were wound on a piece of tubing 1½ inches in diameter. The turns were tightened, the spacing wire taken out, and the coil lacquered. This left room on the tubing for about twelve antenna turns wound close together. Sangamo 0.002-μfd. condensers were substituted for the 0.005's in the 1.8-mc. circuit. The antenna tuning was different this time because it was desirable to be able to work almost any place in the band; a midget 100-μμfd. variable was shunted therefore across the antenna coil. Tuning is the same as with the 1.8-mc. rig — for maximum lamp brilliancy. By this time you will have burned out several globes, so profit by my experience and try to get a small 24-volt carbon lamp, such as the 2G or 2F lamps used for signalling by the telephone company. At peak brilliancy these just get slightly more than bright red, and on either side of this peak they barely light, so the peak is more easily reached than with a bright tungsten flashlight globe. But once the set is tuned up, don't leave the lamp on the coil; if you do about five watts of your power stays in the shack.

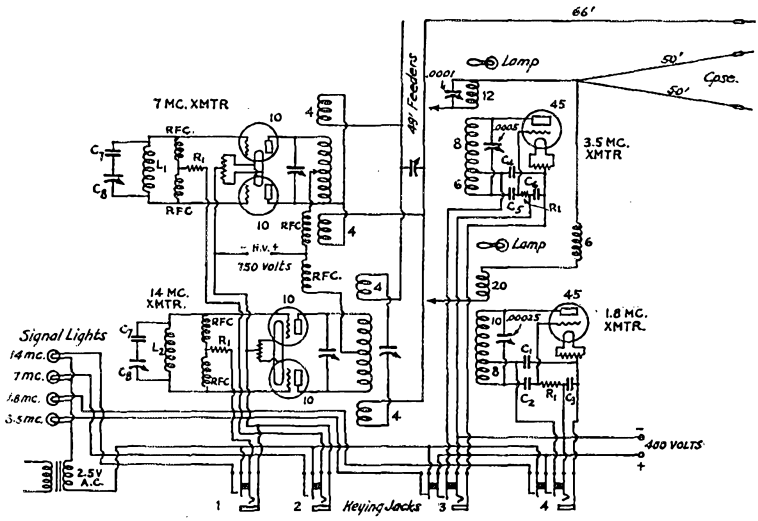


FIG. 1 — THIS DIAGRAM SHOWS HOW THE FOUR TRANSMITTERS ARE CONNECTED TO THE ANTENNA AND POWER SUPPLIES

The "high-power" 7- and 14-mc. sets each use a pair of 10's in push-pull; the circuit is a modified TNT. The tank coils for these two transmitters have 12 and 8 turns of ¼-inch copper tubing respectfully; the tank tuning condensers are 250 μμfd. each. The numbers beside the other coils refer to the turns on each; diameters and methods of winding are given in the text. Other circuit constants follow:

C_1, C_2 — 0.005 *μfd.*
C_3, C_5 — 250 *μμfd.*
C_4, C_6 — 0.002 *μfd.*
C_7 — 100 *μμfd.*
C_8 — 50 *μμfd. variable.*
L_1 — 35 *turns No. 16 on ½-inch form.*
L_2 — 20 *turns No. 16 on ½-inch form.*
R_1 — 50,000 *ohms.*
RFC — 150 *turns No. 30 on ½-inch form.*

The main antenna is a half-wave 7-mc. Zepp. The antenna leads from the little sets clip on the feeder that is hooked to the flat-top. The "dead" feeder is still in the circuit because it is coupled by means of the 7-mc. antenna coil and tuning condenser. The 1.8- and 3.5-mc. rigs are hooked permanently to the counterpoise. Fig. 1 shows all the details.

One more thing concerning the 7-mc. and 14-mc. rigs should be mentioned. These are modified push-pull p.p. TNT's, having tuned grid coils, with the bias fed to the tubes through r.f. chokes. The grid coils have no center tap,

(Continued on page 24)

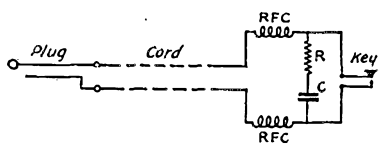


FIG. 2 — KEY-THUMP FILTER CIRCUIT

C — 2 *μfd., 100-volt rating.*
R — 600 *ohms.*
RFC — 130 *turns No. 30 on ½-inch form.*

World's Fair Amateur Radio Convention

IF IT were ten years ago — when the era of superlatives began — and we were telling the tale of the World's Fair convention held in Chicago August 3rd–4th–5th, we would probably scour the dictionary for adjectives and lavish them freely in columns of print. Even in sober, moderate 1933 we can say that the convention staged by the World's Fair Radio Amateur Council was a splendid job — entertaining, instructive, satisfying.

Activity was the keynote from the moment of the opening address by Bill Schweitzer, Thursday morning, until the final dispersal of the delegates after 250 prizes had been distributed, at nearly 3 o'clock Sunday morning. Following the opening session and a buffet lunch in the foyer of the convention hall on the 7th floor of the Medinah Michigan Avenue Club, the entire group of delegates adjourned upon a free trip to A Century of Progress, viewing selected points of interest in the gigantic World's Fair. Assembling for dinner at Hollywood, a concession on the Fair grounds, a buffet dinner was served in the large open air casino and a variety of excellent entertainment presented. Straggling groups of hams filtered back to the club from this festive party until the wee hours of the morning.

WINNERS IN THE WORLD'S CHAMPIONSHIP CODE SPEED CONTESTS HELD AT CHICAGO, AUGUST 4TH AND 5TH

Class A 57.3 w.p.m. (world's record) Joseph W. Chaplin, Press Wireless, Little Neck, Long Island, New York
Class B 35 w.p.m. H. R. Reiss, W9ERS, Appleton, Wis.
Class C 30 w.p.m. L. A. Morrow, W8DKE, Springfield, Ohio
Class D 25 w.p.m. Kenneth L. Stecker, W8SS, Detroit, Mich.
Class E 20 w.p.m. Jean Elizabeth Hudson, W3BAK, Laurel, Del.
Class F 15 w.p.m. M. C. Bartlett, W9JHY, Indianapolis, Ind.
Class G 12 w.p.m. Edward Moory, W5BRD, De Witt, Ark.
Class H 8 w.p.m. Armin H. Meyer, W9ACE, Lincoln, Ill.
We hope to present a complete story of the contests next month, written by I. S. Coggeshall, contest judge.

They were up in plenty of time, however, to get in on the swimming in the club natatorium beginning at 7, Friday morning. The preliminaries of the code speed contests began at 9 with Art Agazin, organizer of the contests, in charge, and judges Coggeshall of Western Union, Schnell and Hebert on the job. More than 300 amateurs of the 714 registered appeared for the preliminaries, but not all turned in papers, their object being simply eligibility for the drawing of prizes later at the banquet. Little Jean Elizabeth Hudson, W3BAK, just a day or two past her ninth birthday, copied her way into the 20 w.p.m. classification with the assurance of an old timer — afterward she proved her ability to do creditable copying at speeds up to 30 w.p.m. — and later was interviewed by the press like the charming little lady she is.

The technical sessions which occupied the floor from the middle of Friday morning until late Saturday afternoon covered the cream of amateur and professional radio developmental work during recent months, in addition to the discussions of general amateur activities. Boyd Phelps, W2BP-W9BP — who at the banquet was presented by President Maxim with a gold medal in recognition of his work in developing the short waves — discussed transmitting antennas, while Don Wallace, W6AM-W6ZZA, told of his experiences with receiving antennas encountered through the operation of his portable station in many locations. R. H. Freeman, radio engineer of United Airlines, described aircraft communication development. John Reinartz talked first on the adaptation of small power tubes to short-wave work and a super-sensitive bridge voltmeter, later describing a new receiving circuit employing a variety of super-regeneration. F. Dawson Bliley spoke on quartz crystal oscillators; A. J. McMaster of the G-M Laboratories on photo-electric cells; W. J. Leidy of the Chicago Transformer Company on power supplies; H. P. Wareing, who is radio engineer of the Milwaukee Police Department, talked about frequency stability in general and e.c. oscillators in particular; Fred Schnell described his new monitor; Robert S. Kruse read a paper on transmitter ailments and their cures.

The old timers' get-together dinner on Friday, at which only those licensed during 1925 or before were eligible, was a great success — this writer, at least, will remember it and the reunions preceding and following it that night for a long, long while. During the evening B. C. Burden of the Lincoln (Neb.) Tel. and Tel. Co. demonstrated a large variety of apparatus in highly interesting exhibition of electronic magic. John Reinartz, W1QP, told the tale of his trip to the Far North with MacMillan in 1925.

Capt. G. Everett Hill of the Signal Corps discussed army-amateur activities as the opener on Saturday morning, followed by a technical radiophone session in which Loy E. Barton, Kendall Clough, Arthur Collins, Robert S. Kruse, and Ralph Batcher were heard. A. A. Hebert of A.R.R.L. Hq. led the traffic meeting, at which SCM's Hinds of Illinois and Eubank of Virginia were introduced, along with Wathen, RM for Virginia, and other RM's present. DeSoto of Hq. discussed international amateur

activities. Saturday afternoon featured talks by Prof. J. Barton Hoag on the ionosphere, and the opening by Bob Kruse and Ralph Batcher of their "bag of tricks." Running concurrently with these discussions were the finals of the code speed contests, the results of which were announced at the banquet, and which are tabulated elsewhere.

With Fred Schnell as toastmaster, the speech-making at the banquet Saturday night was fascinating, fluent and ample. President Maxim made the principal address of the evening, gazing reminiscently into the past at previous world's fairs and previous amateur conventions and the trend of amateur history, and into the future at the possibility of intergalactic communication by amateurs, primarily with Mars, and the future of amateur radio. Rufus C. Dawes, president of A Century of Progress, had accepted his sole dinner invitation outside the Fair grounds this season to address the amateurs, and did so, magnificently. Harold D. Hayes, federal inspector-in-charge of the Chicago district; Admiral Wat T. Cluverius, commandant of the 9th naval district; Captain G. Everett Hill, Jr., of the Signal Corps; Paul H. Davis, W9GES-BT-LK, formerly president of the Chicago Stock Exchange, A. A. Hebert, A.R.R.L. treasurer-fieldman, and a dozen or more distinguished amateurs also spoke. Mr. Dawes presented the world's championship code speed cup to Joseph W. Chaplin, the winner, while the cups in the other seven classes were presented by Mr. Hayes. Following the speeches, the drawing for 250 prizes, many of them very valuable and all desirable, held the attention of the 411 amateurs attending the banquet until nearly 3 o'clock in the morning.

NINE-YEAR-OLD JEAN HUDSON, WINNER OF THE 20 W.P.M. CHAMPIONSHIP AT THE CHICAGO CONVENTION

The daughter of E. L. Hudson, W3BAK, SCM for Maryland-Delaware-D.C., Jean secured her ham ticket April 26th and is on the air consistently.

—*C. B. D.*

Inexpensive Individual-Band Transmitters

(*Continued from page 22*)

hence the grid impedances for each tube take care of themselves and the note is bettered. The 7-mc. grid coil is wound of No. 16 enamel wire, 35 turns on half-inch tubing; the 14-mc. coil 20 turns of the same wire and tubing. These must be wound tight and then lacquered. They are tuned by 50-$\mu\mu$fd. midget condensers in series with a fixed 0.0001. There is quite an r.f. voltage across the grid circuit, and the fixed condenser increases the voltage break-down.

Now as to the results from the low-powered Hartley rigs. While ZL1CD was being worked on 7mc. he asked me to listen for him on 3.5mc. While listening there I thought it would be a good chance to try the 3.5-mc. Hartley out on a W6 who was rather weak and I thought wouldn't hear me anyway, so I called him — and raised him. This caused me to wake up, but when he gave me R9 I nearly cracked the roof. It was almost time for me to listen for ZL1CD so I signed off. At the appointed hour 1CD came through R5 and I called him, but he wasn't expecting me to call him so I didn't raise him. Later I heard ZL1GV CQ and gave him a call. I got him, though he had quite a lot of difficulty in reading me — a QSA2 R3 signal isn't so hot to copy solid.

Although this ZL QSO was considered to be a freak, 3.5 mc. was used quite steadily with the following results: all W, VE3, 4, and 5, K6 and K7 have been worked; a steady schedule is maintained with K7AHK and a lot of traffic is handled; and the rig is used on Naval Reserve drills continuously as Section Control Station. And while keeping an ear open for ZL's, ZL1AR was worked. Since then ZL1AR and I have been carrying out tests and have been QSO on 3.5 mc. many times. Other ZL's worked include 3FJ, 4AO and 2CP.

On 1.8 mc. the results are just as gratifying, and would no doubt be better if more stations were up there. Nine states have been worked — in fact, all that have been heard. And there was just as much thrill in working W9EKK as in working big DX.

The power input on 1.8 mc. and 3.5 mc. is only 16 watts. No meters are used at all. I took one meter off the shelf just to see what plate current the rigs drew, and then put it back. All the tuning is done with the lamp.

I'm all for the little Hartleys!

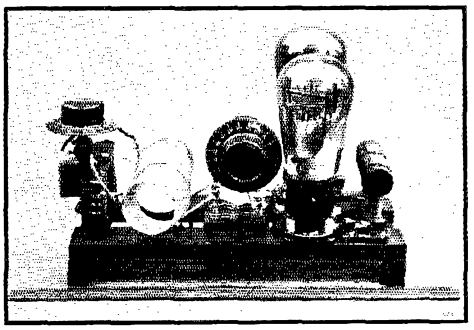
Strays

With blissful disregard of the truth, a certain radio supply house advertising the Wallace *Short Wave Manual* insists, despite our protests, in asserting that the Hoover Cup was awarded Don Wallace for devising a short-wave receiver which in competitive tests received signals inaudible on other receivers. Because these cups were awarded under A.R.R.L. auspices, it seems incumbent upon us to say a word, in no wise in derogation of Wallace's proven accomplishments but just to set the facts straight. Former president Hoover,

(*Continued on page 87*)

Midget Transmitters

THE trend of the times being towards things miniature, what with broadcast receivers resembling trick cigar humidors; and five-meter ham outfits getting down to lunch-box proportions, it is logical that there should be compression in size for transmitters built to give full-size performance on the regular amateur bands. As illustrations of what can be done, two



VK6FT'S "ATOM" TAKES AN INPUT OF 75 WATTS WITHOUT DISTRESS AND WORKS DX IN PROPORTION

excellent examples are shown, one the conception of Fred Tredrea, VK6FT, and the other the idea of Frank Orcutt, W4JO-W4PAZ. The first uses a push-pull TNT circuit, the second a Hartley. Here's what VK6FT tells us about his little TNT:

"After purchasing the components including two 100-$\mu\mu$fd. midget variable condensers for tuning the plate and aerial circuits, the whole outfit was laid out and it was discovered that the set could be quite comfortably rigged up on a baseboard 9¼ inches long by 3¾ inches wide. Accordingly, the transmitter was duly built to these specifications. The grid coil was made resonant at a frequency slightly lower than the 7000-kc. band and wound of 26-gauge enamelled wire on 1-inch diameter bakelite former. The miniature stand-off insulators supporting the split aerial coils are made of the same material of ½-inch diameter. The grid leak and radio-frequency chokes were wound on matched formers 2¼ inches long by ¾-inch diameter. Eight miniature terminals are provided, the cap of each being of polished black bakelite and the shanks of No. 6 brass rod. Two of these terminals surmount the stand-off insulators and besides supporting the aerial coils also accommodate the feeders; the remaining terminals are for the key, high- and low-tension supplies. The ten-turn tank coil (7000 kc.) and the two seven-turn aerial coils are wound 1½-inch diameter of 12-gauge aluminum wire. Aluminum was used because it happened to be handy and its lightness was an advantage; besides it adds a little 'flashiness' (remembering that the transmitter was designed especially for exhibition purposes).

"To increase the capacity of the tank circuit, a 100-$\mu\mu$fd. fixed air-spaced condenser is shunted across the midget variable tank tuning condenser. This is an advantage, inasmuch as it spreads the band over the condenser dial a bit more and its terminals are very handy for mounting the coil and tuning condenser.

"The aerial tuning condenser is mounted vertically and occupies only about 1½ square inches at the extreme end of the baseboard between the two midget stand-off insulators. The aerial tuning condenser is fitted with flexible leads and small clips, to enable it to tune either series or parallel.

"The tank coil is immediately behind this, then the tuning condenser (halfway along the baseboard), then the two valve sockets, and finally three sockets in a line an inch apart to take the center-tapped grid coil. The grid leak and radio-frequency choke are accommodated underneath the baseboard.

"Having built the set, the question was, 'How much power input?' It was considered that the high tension voltage would be limited by the spacing of the midget variable condensers and the rating of the valves. Thereupon two valves of the 210 type were installed and 600 volts applied to their plates. With some trepidation the key was pressed and luckily the transmitter oscillated; otherwise 'bang' would have gone the milliammeter fuse. Adjusting the frequency and bringing

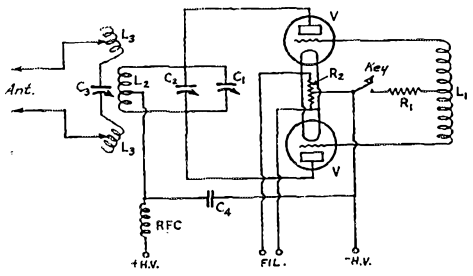
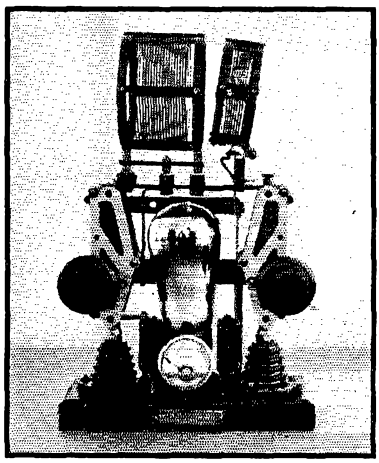


FIG. 1 — THE CIRCUIT OF VK6FT'S TNT "ATOM"

L_1 — Grid coil, 60 turns center-tapped.
L_2 — Plate coil, 10 turns.
L_3 — Split aerial coils, each 7 turns.
C_1 — 100-$\mu\mu$fd. fixed air condenser.
C_2, C_3 — 100-$\mu\mu$fd. midget variables.
C_4 — 0.001-μfd. mica by-pass condenser (may be omitted but reduces possibility of radiating harmonics).
R_1 — Wire-wound grid leak, 12,500- to 20,000-ohm.
R_2 — Filament center-tap resistor, 60-ohm.
RFC — Radio-frequency choke.
V — Type 10 tubes.
Note: Coils are for 7000-kc. band, further details being given in text.

the aerial into tune, brought the M/amps up to 110, an input of 66 watts. The key was left down to see what part would give up the ghost first, but nothing happened until I put the absorption



W4JO-W4PAZ'S "BABY MIGHT" HARTLEY TAKES 600 VOLTS ON ITS TYPE 10 AND DOES BUSINESS ON THE 1750-KC. BAND

frequency meter near the feeders and promptly blew the indicating lamp; all else remained intact. Switching off, all components were inspected and the weakest part was found to be the tank coil which was fairly warm. For obvious reasons this could not be made of the conventional ¼-inch copper tubing. After all, this was only a minor detail and it was considered that the transmitter could easily handle an input of 75 watts.

"Reducing power (??), a CQ was sent out, and ZL2GO came back (approximately 5000 miles away), but he was not very QSA and his report was spoiled by QRM. Later reports from stations in the Eastern States (approximately 3000 miles away) gave the tone as 'near d.c.' It is considered that this can be improved by reducing the tank coil to eight turns, which will probably bring the 7000-kc. band just within the limit of the tuning condenser, the total capacity then being approximately 200 $\mu\mu$fd.

"The weight of the transmitter without valves is 1¾ lbs. which makes it ideal for a portable outfit.

"There is nothing more to add, except that 'The Mighty Atom' secured first prize at the Exhibition as the best midget transmitter."

And now for W4JO's "Baby Might." It was designed particularly for use at the All-American Air Meet at Miami in 1931 and was used under the call W4PAZ at the far pylon of the course, from which it reported a cabin cruiser crash in which three were killed and one was injured. It uses the conventional Hartley circuit adapted to the compact symmetrical arrangement illustrated. Although small in size, it delivers full power performance with its Type 10 tube operated at a plate voltage of 600. The outside dimensions are 7 by 11 by 3 inches and the weight "as is," is 2½ pounds.

More midgets?

—*G. G.*

Annual Navy Day Receiving Competition

NAA and NPG will Transmit Special Messages October 27th. All Operators Invited to Copy and Mail to A.R.R.L. for QST Honor Roll— Secretary of Navy Will Commend 25.

Station—Frequency	*Time of Transmission*
NAA, *Washington D. C., simultaneously on 4205, 8410 and 12,615 kcs. (71.3 35.7 and 23.7 meters).*	*9 p.m. E.S.T.; 8 p.m. C.S.T; 7 p.m. M.S.T.; 6 p.m. P.S.T.*
NPG, *San Francisco, Calif., simultaneously on 4385 and 8770 kcs. (68.4 and 34.2 meters).*	*10.05 p.m. E.S.T.; 9.05 p.m. C.S.T. 8.05 p.m. M.S.T.; 7.05 p.m. P.S.T.*

NAVY DAY, 1933, is October 27. This year there will be two telegraphic messages to amateurs from the Secretary of the Navy, one from San Francisco (NPG), the other from Washington (NAA). The thought will be similar, but wording will vary to preclude advantage to operators turning in copies of both transmissions.

The broadcasts will be sent at approximately 15 words per minute and preceded by a 5-minute continuous CQ call. Twenty-five letters of commendation signed by the Secretary of the Navy will be sent to the amateurs submitting the best copies of the messages. ACCURACY counts first in importance in determining the merit attained in the receiving competition. Legibility and neatness will be considered to decide relative standing where copies compared are of equal accuracy. Letters of appreciation will be divided between

(*Continued on page 88*)

Fifth International Relay Competition Results

VIVE LA DX"! And a thousand-odd radio amateurs joined in the chorus as the Fifth International Relay Competition came to a close March 19th, 1933, after nine days "open season on DX."

Competition? ". . . it was the biggest, the grandest, and the hardest fought battle ever staged by the A.R.R.L. Man, oh man! Talk about your gangsters and your highwaymen; why those birds are small timers compared to the way we fellows lay in wait for foreigners. One small peep out of a foreign station and up jumps the devil in about 'steen U. S.ers."—Thus does W3APJ describe the competition.

From every standpoint the 1933 DX "Tests" surpassed all previous DX competitions: Close to 1000 scores submitted; hundreds more participating but submitting no scores; at least 300 foreign stations on the air; conditions almost universally favorable throughout the greater part of the contest period; a generally acknowledged run of better operating and better signals. It was a QSA5 contest with QSA5 fun.

The World-High scorer and winner of the gold charm award for participants outside the U. S. and Canada is EAR185 with 18,382 points a real accomplishment in the face of real competition. Hearty congratulations, OM! Well-earned glory for placing second goes to Miss Judy Leon operating HC1FG. This YL showed the OMs how to do it with a score of 15,834!!

The Highest-U.S.-Canada score, 14,976, which is also the third highest "world score," brings W3ZD the gold award for "W-VE" contestants. Well done, ZD. "How did he do it?" asks the gang. He answers, "If I have accomplished anything special in the score obtained, I can credit it to *patience*."

Worthy of special mention are the results of several of the other highest scorers: Outside the U. S. and Canada—K4AAN 14,036, EAR96 13,563, ON4AU 12,579, VK3ML 11,232, Opr. O'Heffernan G5BY 10,860, CT1AZ 9262. Within the U. S. and Canada—W4AJX 12,600, W8CCW 12,360, W6CUH 10,900, W4ZH 10,816, W2BHZ 10,664, W6BYB 10,179, W8CRA 9912, W7BB 9325. Many other notable scores attained by individual operators will be found in the score list.

A single operator at the following stations contacted amateurs in 30 or more different countries (prefixes): W8CRA 42, W4AJX W8CCW 40, W3ZD W4SI 36, W9IJ 33, W2BSR W2ALK W4ZH 32, W1GF W2BHZ W3AJD W3ZJ 31, W2TP W8BKP 30. These amateurs contacted 12 or more W-VE districts: X9A 14, EAR185 F8PZ ON4AU CM2JM VK3ML HC1FG 13, G2NH G6QB G5BY K6BAZ PY2BN F3MTA VK2JZ ZL2CI ZL4AO ZL2BZ 12.

Reminiscences: W8CRA "Worked All Continents" the long way around . . . W9IJ and opr. "FD" at W4AAQ "WACed," and W1DHE was made eligible for the coveted certificate . . . W6CIQ made all QSOs by answering foreign CQs . . . The OM and YF divided time at VK4JU . . . K7ATF and K7BMC, in the same town, took turns on the air, K7ATF nosing out BMC for Alaskan leadership by four points . . . That parting cry, "Oh for an s.s. super!" . . . Comparatively short calls were found best by W9BRX . . . The clearest impression the tests left with the O'Dwyer brothers at EI8B was the smell of three burning grid bias transformers . . . Coincidences noticed by G2II: W1DHE and W2TP both using "222" for serial number, and W2BHZ and W9CWU using "999" . . . ZL1AR was at ZL1CE's shack listening in and discussing the loudest station in the test. ZL1AR voted for W7BB, while ZL1CE remarked "Did you hear EAR96 the other night, R8?." "Yes," checked ZL1AR. Within a minute of mentioning these stations they heard EAR96 calling W7BB on 7 mc.!! . . . A Wisconsin sleet storm brought down W9OT's sky wire and grounded W9RH's on the 8th day of the tests . . . W9ICL claims the "World's Worst Location" . . . Those broad, rough notes!!! . . . And Power Leaks! &%$# . . . W9ASV snagged the two continents necessary for his WAC . . . W9AOG's r.f. got tangled up in BCL antennas . . . CM8UF, well known DXer, was working in this contest as W7CFC, Keyport, Washington . . . G2DZ found more U. S. A. stations using XPDC than in previous years . . . VK3RJ seconds, with, "There is a marked improvement in the quality of the signals emanating from W stations, both in regards to tone and to width" . . . From D4AAR: "On 7 mc. I noticed a great increase in c.c. Yankee stations. On 14 mc. it was possible to copy a W QSA5 if he was R2 or 3, but if the signal was r.a.c. the readability of an R2-3 signal was QSA0." —another argument in favor of d.c., gang! . . . W9DQD never worked so much DX before in the same length of time in all his eight years in ham radio . . . The following name EAR96 as the best European heard: W7LD, W8AYU, W8DQN, W9FLH, W6CUH, W6ACL, W4AAQ . . . VK3ML was best Australian heard at W1CU, W2WC, W4AAQ, W6ACL, W6CUH, W8DQN . . . W9BVI nomination for the outstanding station of the tests: X1AA . . . W9BHT used 14 mc. 'phone only . . . At W8NV 30.1% of stations called were worked, 255 foreign stations were heard in 33 countries and 6 continents . . . EAR96 received many nominations as "most

outstanding station" . . . Other stations voted to be "outstanding," "consistent," or "best:" K6BAZ, VK3ML, TI2TAO, CE1AI, ZL2GN, G5YH, X9A, F8EX, LU3FA, ZL2CI, VK5HG, ON4AU, PY2BN, VP4TB, CM2NA, HC1FG, FM8IH, K4AAN, EAR225, VK3HK-ES-RJ, ZL4AO, G5BY, EI8B, J1EC, XU1U . . . Most consistent W's heard at VK2JZ: W7BB, W3CXL, W6CUH . . . VK2OU votes W6CUH best, followed by W2CIN, W5MS, W6EW . . . On 7 mc. W7BB and W6CUH were most prominent stations heard at ZL1AR . . . Outstandingly strong stations at ZL2JE were W3CXL and W8CCW . . . OM1TB, Guam, boosts d.c. signals when he says, "I have heard all W districts on both 'phone and c.w., but being so far from the states only the best stations with p.d.c. crystal notes get through!" . . . Famous last words: "My score isn't impressive but I had a lot of fun." —*E. L. B.*

SCORES

[Operator of station first-listed in each Section and Country is winner for that territory, unless otherwise indicated. . . . Number countries-prefixes (in case of W/VE participants) and number W/VE Districts contacted (in case of non-W/VE participants) shown in parentheses after call. . . . Asterisks denote stations not entered in contest, reporting to assure that stations they worked get credit. . . .]

E. Mass.

W1GF	(31)	5766
W1ZI	(27)	4617
W1FH	(24)	4176
W1AF	(24)	3816
W1WV	(19)	3002
W1ME	(18)	2538
W1CU	(19)	2356
W1AZY	(17)	2329
W1CMX	(22)	2134
W1SI	(12)	1224
W1HE	(14)	980
W1DQH	(15)	975
W1IA	(11)	737
W1FS	(15)	735
W1LH	(11)	627
W1CUO	(10)	610
W1EBR	(11)	605
W1HX	(11)	462
W1FIY	(8)	176
W1CRV	(7)	168
W1DYW	(7)	168
W1BFK	(5)	140
W1BIU	(4)	132
W1CFU	(5)	105
W1MX*	(5)	105
W1ALG*	(4)	84
W1CGB	(4)	76
W1FJN	(5)	75
W1BRI	(4)	72
W1AJK	(4)	60
W1CTG	(4)	48
W1DQ*	(3)	18
W1CUF*	(2)	12
W1BNT*	(2)	10
W1NA	(1)	6
W1DZG	(1)	3

Connecticut

W1QV	(28)	5320‡
W1SZ	(33)	9735[1]
W1MK	(35)	9380[2]
W1CJD	(24)	4680
W1BHM	(23)	4117
W1HQ	(16)	1600
W1RA	(17)	1275
W1YU	(15)	1005[3]
W1FDM	(14)	770[4]
W1BNP	(10)	540
W1DGG	(10)	440
W1AVV	(8)	336
W1DCI	(5)	225
W1BEI	(6)	144
W1UZ	(6)	144
W1CLH	(5)	75
W1AGT	(3)	54
W1DBU	(4)	52
W1DXL	(4)	48
W1DMK	(3)	36
W1BGJ	(3)	21
W1FTR	(2)	12
W1BAX	(1)	3
W1DGC	(1)	3
W1FCM	(1)	3

W. Mass.

W1CLX	(24)	5208
W1CC	(25)	3375
W1ZB	(22)	2310
W1BVG	(15)	1170
W1AFU	(13)	1144
W1BKF	(9)	405
W1DCH	(8)	344
W1ETU	(6)	234
W1MI	(4)	72
W1ZD	(4)	60
W1BDW	(3)	39
W1CCH	(3)	36
W1AUQ	(2)	12
W1DCS	(2)	12
W1CQR*	(2)	8

New Hampshire

W1AVJ	(25)	4275
W1CBJ	(14)	1848
W1DUK	(14)	1302
W1BMM	(9)	603
W1CGJ	(6)	198

Rhode Island

W1BUX	(22)	3212
W1AFO	(20)	3120
W1CAB	(17)	2941
W1BES	(16)	1776
W1DJX	(5)	210

Maine

W1TE	(20)	3180
W1DHE	(25)	3050
W1CPT	(22)	2530
W1EF	(18)	1764
W1OG	(15)	1095
W1BPX	(11)	847
W1CPA	(10)	730[5]
W1CPS	(7)	329
W1DVN	(6)	156
W6ZZAM	(4)	32
W1CFO	(2)	24

Vermont

W1FN	(5)	125
W1ZZG	(4)	44
W1AXN	(1)	3

N. Y. C.-L. I.

W2BHZ	(31)	10664
W2BSR	(32)	8448
W2UK	(29)	5568
W2AIS	(18)	3330
W2JD	(22)	2750
W2AQC	(19)	2413
W2DJO	(14)	1274
W2BJ	(14)	1232
W2DRJ	(13)	975
W2CJM	(14)	854
W2AEN	(12)	708
W2BEM	(12)	600
W2DYK	(7)	392
W2BHD	(8)	352
W2EMJ	(9)	351
W2DKF	(8)	312
W2DOG	(9)	279
W2CZF*	(9)	279
W2DJM	(7)	273
W2BKV*	(8)	264
W2DT	(8)	216
W2CJR	(6)	180
W2ECU	(6)	180
W2DHH	(6)	162
W2CK	(7)	154
W2CTO	(7)	133
W2AQN	(5)	120
W2RY	(6)	108
W2AOP	(4)	84
W2AXZ	(4)	72
W2DVO*	(5)	70
W2DMI	(3)	27
W2UX*	(3)	27
W2AAK	(3)	21
W2BZK	(2)	12
W2BCE	(2)	8
W2CBB*	(1)	3

No. New Jersey

W2TP	(30)	8250
W2ALK	(32)	7328
W2WC	(24)	3528
W2ABT	(21)	3192
W2CIM	(15)	1635
W2CWC	(17)	1511
W2AIF	(17)	1428
W2GW	(18)	1314
W2GT*	(19)	1216
W2FL	(13)	1053
W2DZA	(12)	684
W2AIO	(13)	676
W2AGX	(10)	390
W2AIW	(8)	288
W2AFB	(6)	198
W2DPB	(6)	180
W2CHB	(5)	140
W2WY*	(5)	105
W2BPG	(4)	64
W2BZJ	(4)	56
W2CDP*	(4)	48
W2ESF*	(4)	48
W2BPY	(3)	27
W2CFW	(3)	27
W2DQR	(3)	27
W2CH*	(1)	6
W2ZZBV*	(1)	4

E. New York

W2BYP	(29)	6931
W2DC	(27)	6210
W2CNH	(23)	4163
W2BWP	(18)	2592
W2BKW	(18)	2268
W2BMU	(19)	1368
W2CL	(13)	1092
W2SZ	(15)	1080
W2CFU	(10)	570
W2UL	(11)	462
W2CGT	(7)	259
W2DEJ	(6)	96
W2DEG	(5)	90
W2ACY	(5)	75
W2AEQ	(5)	75
W2DSB	(3)	45
W2AUT	(2)	18
W2DRC	(2)	8

Md.-Del.-D. C.

W3ZD	(36)	14976
W3AJD	(31)	3618
W3CXL	(17)	3825
W3APJ	(24)	2424
W3VJ	(13)	572
W3CIC	(11)	374
W3NR	(8)	352
W3BOY	(5)	75
W3IL*	(4)	56
W3BWT	(2)	24
W3BFX*	(2)	18
W3ZE	(2)	12
W3AHT*	(1)	3
W3BKZ*	(1)	3

So. New Jersey

W3PC	(29)	5597
W3APN	(21)	3969
W3AIU	(23)	3749
W3CGU	(21)	2856
W3ARN	(19)	2546
W3CKT	(16)	976
W3NK	(9)	405
W3AWT*	(8)	376
W3CDO	(8)	256
W3BDO	(8)	216
W3CEU	(5)	200
W3ATJ	(8)	178
W3ADL	(6)	162
W3CBR	(6)	108
W3FO	(5)	105
W3BGP	(3)	36

E. Penna.

W3HF	(25)	4125
W3ZJ	(31)	3782
W3AOJ	(21)	3066
W3CPX	(20)	3010
W3AQI	(21)	2331
W3BET	(21)	2205
W3ANS	(17)	1615
W3ZG	(14)	1372
W8GHR	(14)	1006
W3BLQ	(12)	720
W3BPY	(12)	600
W3ANA	(9)	279
W3BWP	(7)	210
W3BHY	(6)	162
W3BVX	(5)	95
W8FLA	(5)	75
W3AOR	(4)	60
W3CKD*	(3)	54
W3ANZ	(4)	48
W3BBZ	(3)	45
W3FU	(3)	45
W8FNE	(3)	33
W3AWK	(3)	30
W3CGN	(2)	24
W3WG	(2)	20
W3CLI	(2)	12
W3CZO	(2)	12
W3AGV*	(1)	3

Virginia

W3BWA	(21)	2457
W3BZA	(17)	1275
W3FJ	(9)	513
W3CHE	(7)	357
W3AG	(3)	27
W3BZE	(1)	3
W3BAN*	(1)	3

No. Carolina

W4ZH	(32)	10816
W4FT	(27)	6858
W4MR	(20)	2900
W4AT8	(23)	2783
W4NC	(22)	2706
W4AFE	(18)	1376

[1] Station Score. Opr. "R" 5796, "W" 1162, "8" 10. [2] Station Score. Opr. "CD" 5800, "RP" 952. [3] Station Score. Opr. Wilson 915, Beers 3, Williams 3. [4] Station Score. Opr. "HHD" 728, "JAK" 3. [5] Station Score. Opr. "CPA" 288, "DKJ" 246. [6] Station Score. Opr. "JB" 1717, "FD" 1584. [7] Station Score. Opr. "BM" 72, "CD" 4, "WM" 3, "JG" 3. [8] Station Score. Opr. "JFB" 682, "HJB" 44. [9] Station Score. Opr. "HY" 2601, "Sam" 135. [10] Station Score. Opr. "RH" 304, "RN" 3. [11] Station Score. Opr. "NH" 900, "WCM" 650. [12] Station Score. Two oprs. [13] Station Score. Opr. "JR" 132, "DM" 18. [14] Station Score. Two oprs. Score of each individual opr. is being awaited before making award in Japan. [15] Station Score. Opr. O'Hefferman 10860, Morgan 300. [16] Station Score. Two oprs. Highest one-opr. score 2046. [17] Attention is called by HAF8B to the fact that only those Hungarian stations with "one number and one initial" are licensed by the Ministery for Commerce and Industry, Postmaster General, and the Board of Trade in Hungary. We also observe that several of the German stations listed in the scores are "unlicensed." [18] Station Score. Opr. Molnar 6390, Killian 216, Matheson 3. [19] Station Score. Opr. Prescott 3942, Magner 12. [20] Station Score. Opr. "FN" 2695, "VEN" 1980.

‡‡ Points have been deducted from this score for contacts made while the station was operating "off frequency." In no case were points deducted unless the off-frequency work was substantiated by two or more reliable reports.

‡ Although a single operator at both W1SZ and W1MK made a higher score than W1QV, the Conn. award goes to W1QV since A. R. R. L. HQ members and stations are not eligible for awards.

W4TO (18).... 1368
W4EG (12).... 1056
W4AL (9).... 540
W4ABW (10).... 430
W4RE (8).... 352
W4AGX (9).... 324
W4EC (7).... 210
W4DW (2).... 24
W4BKS (3).... 21

Ga.-S. C.-etc.

W4SI (36).... 8388
W4BZ (25).... 3200
W4BPD (16).... 1104
W4EF (11).... 495
W4NT (2).... 12

E. Florida

W4AJX (40).... 12600
W4TZ (27).... 4509
W4ACV (19).... 2337
W4AGT (14).... 980
W4QN (15).... 900
W4BRY (11).... 572
W4BGG* (8).... 312
W4BIF* (9).... 243
W4NN (9).... 243
W4BTO (7).... 189
W4ANH (6).... 126
W4ABG (5).... 90
W4BGR (3).... 27
W4AKJ* (2).... 12
W4BT (1).... 3

Alabama

W4AAQ (26).... 5278[6]
W4BGO (8).... 240

Tennessee

W4FR (15).... 1305
W4SW (10).... 310
W4ZP (4).... 40

W. Florida

W4BGA (2).... 36
W4MS (1).... 9

Oklahoma

W5QL (23).... 3795
W5CAI (11).... 594
W5ESD (10).... 540
W5YE (4).... 1287
W5AMT* (1).... 3
W5CXU (1).... 2

So. Texas

W5MS (19).... 3116
W5AUX (11).... 396
W5AFV (8).... 280
W5PF (3).... 39
W5ADZ (3).... 36
W5AUI* (2).... 18

No. Texas

W5ATF (23).... 2714
W5PJ (13).... 1131
W5VU (4).... 36

Louisiana

W5WF (18).... 1854
W5CEN (18).... 1548
W5KC (9).... 648
W5AOO (10).... 420

Arkansas

W5ZF (11).... 803[8]
W5ABL (3).... 27
W5BDW (1).... 6

New Mexico

W5AAX (4).... 88

Los Angeles

W6CUH (25).... 10900
W6FYT (28).... 7140
W6AHP (23).... 5221
W6BC (22).... 4400
W6EXQ (20).... 3720
W6ACL (19).... 3420
W6CXW (18).... 3240[9]
W6ADP (18).... 2412
W6GRX (21).... 2163
W6EAK (17).... 1870

W6ERM (17).... 1819
W6QD (11).... 1815
W6CVZ (15).... 1380
W6FAL (13).... 1027
W6PJ (14).... 812
W6ELU (12).... 732
W6DE (11).... 693
W6FFF (11).... 660
W6ERL (9).... 576
W6FDF (8).... 456
W6CVV (6).... 180
W6AM (7).... 168
W6BUK (5).... 150
W6FMP (5).... 150
W6FVN (6).... 138
W6RO (6).... 126
W6HG (5).... 105
W6GNZ (5).... 105
W6FFW (5).... 105
WGGT* (5).... 90
W6BWA (4).... 60
W6BYU* (2).... 18
W6POQ (2).... 12
W6GOK (1).... 3
W6WQ (1).... 3

Sac. Valley

W6BYB (27).... 10179
W6EJC (23).... 4531
W6EMK (17).... 2499

Santa Clara V.

W6DSZ (25).... 6150
W6AOD (11).... 726
W6DJP (7).... 462
W6CBP (10).... 420
W6CUZ (6).... 180
W6DNY (4).... 60
W6GUJ* (1).... 3
W6HM* (1).... 2

San Francisco

W6AWA (24).... 6072
W6WB (28).... 3556
W6TA (16).... 1616
W6CIS (14).... 1358
W6DZZ (13).... 1339
W6ZS (11).... 1012
W6AZK* (10).... 530
W6FPU* (9).... 459
W6MZ (8).... 408
W6CAL (5).... 135
W6ABM (4).... 96
W6AZX (1).... 3

San Diego

W6AMO (21).... 3549
W6BBR (12).... 840
W6BAM (8).... 320
W6CTP (7).... 196
W6AKY (3).... 21
W6BHV (2).... 18
W6AXN* (2).... 12
W6GTM (1).... 3

San Joaquin

W6CLP (17).... 3332
W6BHQ (15).... 2010
W6FFP (14).... 1904
W6ASV (12).... 1812
W6FSQ (9).... 594
W6FZA (5).... 150
W6ECU (5).... 115
W6CYY (5).... 110
W6CLU* (3).... 24
W6EML* (2).... 16
W6KB (1).... 3

Utah-Wyoming

W6DPJ (17).... 2482
W6DTB (9).... 612
W7ADF* (3).... 27

East Bay

W6QW (18).... 2196
W6ATR (10).... 1170
W6ZAE (11).... 858
W6TT (10).... 640
W6CIQ (8).... 600
W6FYC (9).... 486
W6BAP (8).... 480
W6JN* (9).... 342
W6TI (6).... 216
W6VX (3).... 27

Arizona

W6CDU (5).... 75
W6DHR (2).... 18
W6FZQ (2).... 8

Washington

W7BB (25).... 9325
W7DF (16).... 2880
W7CFC (18).... 1980
W7EK (12).... 1500
W7CCF (10).... 1210
W7ALZ (10).... 770
W7BGH (10).... 640
W7JZ* (7).... 322
W7TS (7).... 252
W7JB* (6).... 180
W7JF (5).... 120
W7LD (3).... 114
W7JD (3).... 81
W7UX (4).... 80
W7BBY (4).... 72
W7BTX (2).... 30
W7AGE (2).... 12
W7AHT (2).... 12
W7TZ (1).... 3

Oregon

W7HM (16).... 2688
W7FH (7).... 322
W7WL (7).... 168
W7BOH (5).... 75
W7BUB (4).... 68
W7UJ (3).... 54
W7AXO* (3).... 54
W7HD (3).... 84

Montana

W7AOD (8).... 328[10]
W7EC (1).... 4

Idaho

W7AT (3).... 90
W7CHT (4).... 84

W. Penna.

W8CCW (40).... 12360
W8CRA (42).... 9912
W8CTE (27).... 5265
W8DWV (22).... 2750
W8CFR (20).... 1920
W8ALO (18).... 1782
W8DQN (16).... 1152
W8AAT (13).... 910
W8HET (12).... 504
W8FAP (7).... 238
W8DHR (7).... 224
W8DLV (7).... 196
W8DVZ (7).... 175
W8CJF (5).... 150
W8BSF (6).... 114
W8FSZ (3).... 81
W8FAD (3).... 27
W8ECH (3).... 12
W8CMK (2).... 12
W8FAK (1).... 3
W8ZZBC (1).... 3
W8DUT* (1).... 3

Ohio

W8SI (24).... 5472
W8BKP (30).... 4950
W8NV (23).... 3381
W8ANO (22).... 3190
W8BCT (17).... 2142
W8EYE (17).... 2040
W8SG (18).... 1980[11]
W8FJP (18).... 1962
W8BTI (20).... 1580
W8DGP (16).... 1200
W8BSR (14).... 924
W8APY (15).... 900
W8BOS (13).... 663
W8KC (12).... 648
W8CFP (13).... 624
W8FPL (12).... 564
W8DFR (9).... 297
W8OQ (7).... 252
W8NL (8).... 216
W8FIV (6).... 108
W8GDH (5).... 105
W8CBC (4).... 96
W8AZU (4).... 80
W8FQT (4).... 72
W8BJX (4).... 72

W8CXC (4).... 72
W8ANZ (4).... 60
W8GER (4).... 48
W8CZR (4).... 36
W8DJJ (2).... 26
W8CBF* (4).... 24
W8FGV (2).... 18
W8ERJ (2).... 12
W8HFE (2).... 12
W8AAJ (2).... 12
W8DIO (2).... 12
W8BXC (1).... 3
W8FJE (1).... 3
W8FRL (1).... 3

W. New York

W8BLP (21).... 3297
W8PE (17).... 2312
W8EUY (19).... 2204
W8CZB (19).... 1919
W8FWH (16).... 1296
W8AYU (15).... 1155
W8BFG (14).... 1022
W8CPC (12).... 828
W8BCN (11).... 649
W8ACY (10).... 620
W8AON (10).... 580
W8CJJ (8).... 344
W8AAU (8).... 336
W8DME (7).... 259
W8FNZ (6).... 168
W8HJN (6).... 168
W8JV (6).... 162
W8FHO* (6).... 126
W8HQW (4).... 48
W8AXE (3).... 45
W8CLP (4).... 40
W8BDC (3).... 36
W8AKX (3).... 27
W8APD (3).... 15
W8GWB* (1).... 6
W8EMW (1).... 3
W8ANQ* (1).... 3
W8EOA* (1).... 3

Michigan

W8DYK (24).... 4224
W8DED (19).... 2128
W8DHC (18).... 1512
W8AYO (16).... 1344
W8EPC (15).... 1035
W8CPH (10).... 360
W8BWB (7).... 168
W8BTK (7).... 147
W8DXV (6).... 126
W8GSZ (6).... 126
W8MI (7).... 126
W8GRN (5).... 100
W8HSH (5).... 75
W8CVU (5).... 70
W8FJK (5).... 65[12]
W8CHH (2).... 32
W8BNK (2).... 12
W8CHJ (1).... 9
W9CE* (1).... 6
W8GQB (1).... 3
W9FSK* (1).... 3
W8KE (1).... 1

W. Va.

W8DFO (16).... 1392
W8TI (14).... 1288
W8BDA (7).... 273
W8GRJ (5).... 150

Illinois

W9DKU (28).... 8148
W9IJ (33).... 7293
W9ICL (21).... 3003
W9CIA (22).... 2794
W9ARN (20).... 2700
W9LF (22).... 2618
W9CES (20).... 2340
W9FUR (23).... 2093
W9BRX (19).... 1881
W9EGD (17).... 1717
W9CYT (16).... 1241
W9DO (10).... 1200
W9AFN (28).... 1092
W9AOE (15).... 750
W9KA (13).... 676
W9RO (13).... 598
W9DRN (11).... 561
W9BUK (12).... 504

W9ETP (10).... 490
W9PK (12).... 444
W9ADG (10).... 440
W9ECZ (10).... 370
W9ERU (8).... 288
W9FXE (7).... 245
W9FFQ (8).... 200
W9IJA (7).... 182
W9BON (5).... 160
W9FID (7).... 147
W9GRV (7).... 147
W9KSB (7).... 133
W9FLH (6).... 132
W9SJ (6).... 108
W9LW (5).... 105
W9SH (4).... 60
W9FXZ (4).... 48
W9ACU (3).... 27
W9GY (3).... 27
W9BHT (3).... 27
W9GFZ (3).... 27
W9ALI (3).... 27
W9FF (2).... 18
W9ICO (2).... 18
W9GDM (2).... 14
W9GIZ (2).... 8
W9AMN (1).... 3
W9FDT (1).... 3
W9DGK* (1).... 3
W9JQS* (1).... 3
W9LOJ* (1).... 3

Indiana

W9UM (26).... 7228
W9EF (24).... 3600
W9DHM (13).... 715
W9DZX (10).... 370
W9EGE (8).... 288
W9DSC (6).... 180
W9QF (7).... 133
W9CUX (6).... 126
W9JKK (5).... 75
W9HKH (4).... 68
W9DJJ (2).... 12
W9MM* (2).... 12

Kentucky

W9ELL (27).... 5346
W9BWJ (1).... 6

No. Minn.

W9BVI (19).... 4864
W9BHH (3).... 27
W9BBL (2).... 24
W9KKO (1).... 3

Iowa

W9AZZ (27).... 3429
W9AJI (13).... 897
W9IO (3).... 45
W9JSO (2).... 12
W9FTG* (1).... 3

Missouri

W9EL (23).... 3335
W9ASV (11).... 979
W9DUM (7).... 217[13]
W9GBJ (5).... 110
W9BHG (6).... 96
W9DCB (3).... 27
W9AOG (3).... 27
W9FUM (1).... 6

Wisconsin

W9IH (18).... 1836
W9RH (14).... 1176
W9FDI (15).... 960
W9OT (14).... 770
W9BQM (14).... 588
W9GIL (9).... 567
W9ARE (9).... 279
W9BIB (6).... 174
W9OCI (5).... 75
W9ASL (2).... 18
W9GHN* (2).... 18

Colorado

W9HRI (15).... 1515
W9DQD (7).... 273
W9BYC (8).... 192
W9LCW (7).... 189
W9YL (6).... 108
W9HIR (2).... 18

Kansas
W9GCX (14).... 1274
W9ARL (11).... 1232
W9CFN (12).... 660
W9JDY (9).... 495
W9IPD (1).... 1

So. Minn.
W9DMA (14).... 658
W9CYA (8).... 328
W9FNK (6).... 138
W9BLG (5).... 75
W9DRG (3).... 33
W9BTW (2).... 30
W9IJD (3).... 21
W9EGG (3).... 21
W9GFA (1).... 3

No. Dakota
W9EGI (4).... 60
W9EMY (2).... 54

So. Dakota
W9IDW (6).... 240
W9HJU (3).... 36

Nebraska
W9DGL (1).... 3
W9EEW* (1).... 3

Maritime
VE1DQ (17).... 2040
VE1DC (10).... 360
VE1ED (5).... 150
VE1EA (4).... 144
VE1DW (6).... 132
VE1AN (5).... 120
VE1AS (2).... 12

Quebec
VE2EE (20).... 2640
VE2CX (17).... 1054
VE2CA* (10).... 420
VE2AX (8).... 312
VE2AP (7).... 273
VE2CO* (4).... 60
VE2DQ (3).... 45
VE2AA (2).... 18

Ontario
VE3WA (19).... 1520
VE3GT (17).... 1497
VE3JZ (11).... 671
VE3BK (10).... 420
VE3EL (8).... 248
VE3DD (6).... 144
VE3JF (5).... 65
VE3IJ (3).... 27
VE9SJ* (1).... 2

Alberta
VE4GD (3).... 90
VE4BJ (5).... 75
VE4EA (4).... 68

Saskatchewan
VE4BF (3).... 57
VE4CV (3).... 27
VE4AT (2).... 12
VE4KA (2).... 12

Manitoba
VE4FT (4).... 48
VE4DK (1).... 3

Brit. Columbia
VE5BI (7).... 357
VE5FE (4).... 124
VE5FG (3).... 36
VE5HQ (3).... 36
VE5JC (2).... 18

ASIA

Japan — J
J1GA (9).... 5292[14]
J1EC (8).... 2072
J1DM (7).... 1792
J1EG (6).... 1218
J1EE (4).... 984
J2CE (4).... 700
J1ET (3).... 462
J2CB (3).... 360
J7CF (3).... 315
J5CE (2).... 192
J1EA (2).... 174
J3DP (3).... 153
J2CL (2).... 146
J3DT (3).... 144
J3DU (2).... 128
J3CG (2).... 122
J7CJ (3).... 114
J3CS (2).... 108
J3CX (2).... 102
J3DE (1).... 69
J6CG (2).... 48
J2CI (2).... 24
J1EQ (1).... 24
J4CH (1).... 12
J3DZ (1).... 6

China — AC/XU
XU1U (7).... 3318
AC8J8 (2).... 110
AC2RT (1).... 24

Hong Kong — VS
VS6AH (5).... 1575
VS6AE (3).... 591
VS6AG (2).... 143

AFRICA

Algeria — FM8
FM8IH (9).... 3537

Tunis — FM4
FM4AB (8).... 1096

Morocco — CN8
CN8YBQ (7).... 812

U. of So. Afr. — ZS/ZT/ZU
ZS6B (5).... 70
ZS2F (2).... 24
ZS1H* (2).... 14
ZS2Z (1).... 3
ZT5R (1).... 3

Nigeria — ZD
ZD2A (4).... 36

EUROPE

Spain — EAR
EAR185 (13).... 18382
EAR96 (11).... 13563
EAR46 (9).... 5184‡‡
EAR227 (8).... 4568‡‡
EAR225 (10).... 4100
EAR121 (8).... 2176
EAR116 (5).... 515
EAR18 (6).... 498
EAR37 (5).... 270

Belgium — ON
ON4AU (13).... 12597
ON4ZA (9).... 3078
ON4RUP (9).... 2691
ON4FE (10).... 2090
ON4DJ (8).... 1200
ON4BC* (4).... 184
ON4RO (3).... 36

Great Britain — G
G5BY (12).... 11580[16]
G5YH (11).... 7898
G2NH (12).... 5820
G5NL (10).... 4720
G6QB (12).... 4152
G6RB (9).... 3942
G2ZQ (8).... 2832
G2BM (9).... 2574
G5LA (8).... 2464
G5FV (9).... 1845
G2AK (9).... 1431
G6WY (9).... 1359
G6GZ (7).... 1155
G5VL (8).... 1064
G2DZ (8).... 1008
G2LZ (8).... 984
G2II (8).... 816
G2IO (8).... 600
G6XN (6).... 576
G2OA (6).... 468
G6GS (7).... 441
G2HP (7).... 399
G5YK (6).... 360
G5JU (5).... 350
G2DW (6).... 348
G8SG (6).... 294
G5XV (7).... 266
G5IS (5).... 245
G6WQ (6).... 216
G5OJ (5).... 160
G5NF (5).... 115
G5DP (4).... 96
G2UX (4).... 88
G6LK (5).... 85
G6QX* (2).... 16
G6BB (1).... 3
G6GV (1).... 3

Portugal — CT1
CT1AZ (11).... 9262
CT1JS (7).... 2121

France — F
F8PZ (13).... 8697
F8EX (10).... 4860
F8GG (8).... 2952
F8WV (10).... 2160
F8KJ (8).... 1128
F8FE (7).... 1022
F8RQ (9).... 837
F8TQ (8).... 808
F8DS (6).... 630
F8WK (7).... 532
F8EB (7).... 511
F8JI (7).... 315
F8OK (6).... 282
F8ZF (5).... 250
F8CS (5).... 150
F8DT (4).... 144

Germany — V
D4AAR (8).... 3064
D4BIT (9).... 2349
D4UAN (8).... 2208
D4UAO (5).... 605
D4NGQ (6).... 348
D4NLQ (4).... 324
D4OSA (5).... 250
D4LGH (4).... 48

Azores — CT2
CT2AW (9).... 2025
CT2AA (5).... 225

Netherlands — PAO
PAOGH (8).... 1976
PAOQQ* (8).... 2728
PAOXF (9).... 1296
PAOGO (6).... 1236
PAOIM (9).... 1107
PAOZK (7).... 581
PAOXG (6).... 540
PAOFE (7).... 497
PAOCH (6).... 438
PAOAP (5).... 220
PAOFLX (5).... 200
PAOXD (4).... 148
PAORP (4).... 100
PAODC (4).... 60
PAOQL (4).... 48
PAOWG (3).... 39
PAOPF (1).... 6

Czecho Slovakia — OK
OK2VA (9).... 1926
OK2MA (9).... 1377
OK2RM (8).... 1016
OK1AW (6).... 792
OK1WF (6).... 276
OK1VP* (1).... 1

Norway — LA
LA1G (8).... 1176
LA3G (7).... 1013
LA3B (3).... 39

Irish Free State — EI
EI7C (7).... 742
EI8B* (11).... 4103[16]
EI4D (1).... 3

Hungary — HAF
HAF8B (8).... 728
HAF3BZ (9).... 648[17]
HAF3D (5).... 320
HAF1G (5).... 285
HAF2D (5).... 110
HAF1C (2).... 12

Finland OH —
OH5NG (8).... 720
OH2PP (3).... 45

North Ireland — GI
GI6YW (8).... 560
GI5HV (6).... 324
GI6VG (1).... 3

Sweden — SM
SM5RG (7).... 371
SM6WL (4).... 120
SM5UR (3).... 108
SM6ZK (2).... 6

Madeira — CT3
CT3AB (5).... 315

Poland — SP
SP3AR (6).... 224
SP1KX (3).... 48

Switzerland — HB
HB9AG (6).... 90

Italy — I
XI1ER (1).... 9

NORTH AMERICA

Virgin Islands — K4
K4AAN (11).... 14036

Mexico — X
X9A (14).... 8568
X1AA (11).... 3872
X1N (7).... 959
X29B (5).... 435
X23A (5).... 175

Cuba — CM
CM2JM (13).... 8163
CM2NA (10).... 3090
CM2MG (11).... 2486
CM2WW (7).... 378
CM8CK (1).... 3

Canal Zone — K5/NY
K5AA (10).... 6780[18]
NY2AB (11).... 2563
K5AB (8).... 552

Martinique — F3
F3MTA (12).... 5940

British Honduras and Trinidad — VP4
VP4TB (12).... 4656
VP4AA (9).... 2745

Costa Rica — TI
TI2TAO (10).... 4170‡‡
TI2WD (10).... 3110
TI8BD (5).... 175

Panama — RX
RX1AA (9).... 3996[19]

Newfoundland — VO
VO8AW (8).... 3080

Barbados — VP2
VP2MR (9).... 1377
VP2YB (4).... 84

Jamaica — VP5
VP5MK (8).... 480

Alaska — K7
K7ATF (4).... 384
K7BMC (4).... 380

OCEANIA

Australia — VK
VK3ML (13).... 11232
VK3RJ (11).... 3696
VK2JZ (12).... 3456
VK5PK (10).... 3440
VK5FM (10).... 2820
VK4JU (13).... 6015[20]
VK3ES (10).... 2390
VK3WL (9).... 2205
VK2GW (10).... 1800
VK2OU (9).... 1755
VK7CH* (10).... 1520
VK7BC (9).... 1278
VK5GR (9).... 1080
VK3BW (8).... 984
VK2PX (9).... 909
VK3HK (10).... 840
VK2ER (8).... 488
VK3KX (7).... 455
VK3CX (9).... 387
VK5WJ* (7).... 294
VK4GK* (6).... 258
VK2WD (7).... 210
VK3MX (6).... 162
VK3FM (6).... 156
VK2VG (5).... 135
VK6SA (5).... 135
VK3XF (6).... 126
VK2FQ* (5).... 120
VK2NR (3).... 72
VK3DC* (5).... 55
VK2YL (3).... 24
VK3AX (2).... 8
VK3YW (2).... 8
VK3LQ (1).... 3

New Zealand — ZL
ZL2CI (12).... 7728
ZL4AO (12).... 4632
ZL2GN (11).... 4268
ZL1FW (11).... 3322
ZL1AR (11).... 3003
ZL3CC (11).... 2915
ZL2JE (9).... 2844
ZL2GQ (10).... 2670
ZL2KI (9).... 1494
ZL2BZ (12).... 1476
ZL1GX (9).... 1170
ZL2CA (9).... 513
ZL2GW (5).... 225
ZL2LX* (5).... 135
ZL2BN (4).... 128
ZL4CM* (4).... 108
ZL3BS* (5).... 105
ZL1BA (3).... 51
ZL2BI (3).... 45
ZL2HR (3).... 42
ZL2FE (3).... 24
ZL4AL* (1).... 1

Hawaii — K6
K6BAZ (12).... 7092
K6DSF (8).... 1888
K6ELN (11).... 1419
K6DQQ (5).... 420
K6CQZ (6).... 414
K6BVP (2).... 82
K6CCS (1).... 6

Philippines — KA
KA1NA (5).... 1333
KA9WX (3).... 72

Guam — OM
OM1TB (6).... 1068

Dutch E. Indies — PK
PK1HG (3).... 261
PK4DA (2).... 242
PK1BO (3).... 84
PK3GW (1).... 5

SOUTH AMERICA

Ecuador — HC
HC1FG (13).... 15834

Brazil — PY
PY2BN (12).... 4464
PY2BK (7).... 322
PY2AG (4).... 72
PY2BR (3).... 45

Argentina — LU
LU3FA (10).... 2830
LU1CH (6).... 180
LU9AX (5).... 120
LU5AQ (1).... 9

Chile — CE
CE7AA (7).... 1344
CE1AI (8).... 1272
CE1AQ* (2).... 14

British Guiana — VR
VR1HR (8).... 408

Peru — OA
OA4U (6).... 294

Colombia — HJ
HJ5ABG (2).... 10

The Isochrometer

By George J. Maki, ex-K7HV—W7HV*

IN commercial power practice, the term "synchronism" is used to define that condition which exists when two or more alternating voltages are identical both in frequency and phase relationship. This condition of synchronism must be met when two or more alternators are used to feed a common load. For frequency *comparison*, or other purposes, the term "isochronism" is used defining the condition which exists when two or more alternating voltages are identical in frequency, but may or may not be in phase. The phase element is disregarded.

The usual method of adjusting two alternating voltages of high frequency to isochronism is by the "zero-beat" method with a headset in the output of a common detector. Because audio apparatus and the human ear will not respond to frequencies of a few cycles per second, a relatively wide region is present in which no beat note is heard — but at only *one* critical point are the two frequencies at absolute zero beat. For ordinary purposes, the aural method is sufficiently accurate, but to take full advantage of the various standard-frequency signals some electrical device must be substituted for the ear to obtain the same percentage of accuracy as the standard frequency. In other words, the high precision of the standard frequency transmissions is lost if the unknown frequency cannot be adjusted to absolute zero beat.

For the purpose of adjusting two frequencies to absolute zero beat, the outputs of two separate radio-frequency amplifiers are fed into a common detector, as shown in Fig. 1. The known frequency is coupled to one amplifier and the unknown source is coupled to the other amplifier. One or the other frequency, of course, must necessarily be variable. The potentiometers are provided so as not to overload the detector tube.

Fig. 1 shows the wiring diagram and constants of the various units. The input potentiometers are preferably of the carbonized-strip type. The coupling condensers are not critical in value and can be anything from 100 $\mu\mu$fd. to 0.005 μfd. The r.f. transformer constants depend upon the frequency band in which the apparatus is to be used. No tuning condensers are used; the windings should be of a value such that there is relatively-high inductive reactance at the operating frequency. Coupling should be very loose to the sources of radio-frequency voltage, such as through a small condenser, a few turns of a coil, or some such scheme. It is important that the coupling be as loose as possible, especially to a self-excited oscillator, so the frequency will not be affected. The detector is of the biased type. The meter can be permanently connected or, as in Fig. 1, a jack may be provided so that a meter need not be tied up in the apparatus. The meter need only be of such size as to determine the detector plate current conveniently, and can even be uncalibrated. The full-scale reading should be less than 5 milliamperes; a 0–1 milliammeter would be ideal. Construction should not offer any difficulties, and the isochrometer can be laid out to suit individual taste.

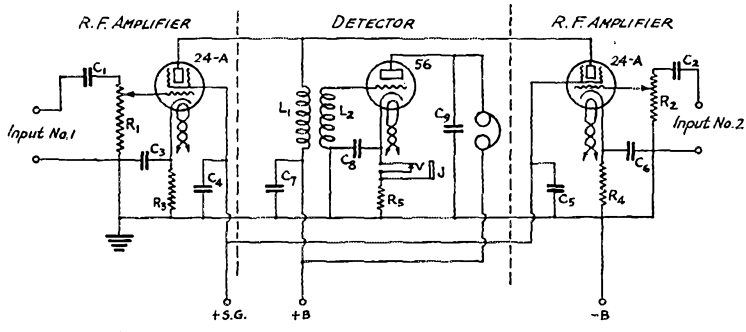


FIG. 1 — CIRCUIT DIAGRAM OF ISOCHROMETER OR ZERO-BEAT INDICATOR

C_1, C_2—0.002 μfd.
C_3, C_4, C_5, C_6—0.1 μfd.
C_7, C_8—1μfd.
C_9—0.001 μfd.
R_1, R_2—250,000-ohm carbon-strip potentiometer.
R_3, R_4—500 ohms.
R_5—5000 ohms.
L_1, L_2—Size depends upon frequency band in use. Use enough turns to be resonant around the operating frequency. Coils may be wound on same form and be plug-in if desired. Spare coils from receiver may also be used.

The instrument is used as follows: Each ampli-

*433 Charles Ave., S. E., Grand Rapids, Mich.

fier is loosely coupled to the different sources of radio-frequency voltage, and the potentiometers are adjusted for a convenient value of detector plate current. One or the other frequency is varied while listening in the 'phones for a beat note. The note is adjusted as closely as possible to zero beat while watching the needle on the meter. As the two frequencies approach isochronism, the needle will be seen to swing up and down at a rate equal to the difference frequency. The oscillator or other source is then very carefully adjusted until the meter needle settles down to a constant value. At this point, the importance of shielding and coupling will become very apparent, and the various factors affecting frequency can be investigated readily while watching the meter.

Many uses suggest themselves, such for instance as determining the effect of keying or modulation of a transmitter on the frequency of the master oscillator. The master oscillator is coupled to one input of the isochrometer and a dynatron or electron-coupled frequency meter coupled to the other input. By first adjusting the two frequencies without keying or modulation, their respective effects upon the master oscillator frequency will be apparent by movement of the meter needle. Other applications would be in comparing the frequency drift of two frequency meters for the probable purpose of determining relative advantages and disadvantages of different types; the effect of load on an oscillator; in fact, in numerous applications where the objective is a *comparison* the isochrometer will be found very useful.

Getting More Power from Type 50 Modulators

By George Ewing, W6GM*

The natural ambition of every amateur using low-power apparatus is to get more power output from his small equipment. This article deals with the method used at W6GM for getting more than three times the rated audio power output from two Type 50 power tubes, no special equipment being required.

The operating voltages used in this set-up are 575 volts *at the modulator plates*, 112 volts of negative bias and a plate current of about 60 ma. per tube. The tubes show no signs of distress and many amateurs are now using them under these conditions. At these plate and grid voltages and a load resistance of 7000 ohms, one Type 50 tube operated in the usual fashion as a Class A amplifier will deliver an audio power output of about 9 watts.

Now if the load impedance could be considerably increased, more power output could be obtained provided the grid swing could also be increased. This can not be done in ordinary set-ups, however, because the grid would have to be driven positive; in that case grid current would flow and cause distortion because of the voltage drop in the high-resistance audio transformer secondary, and in the plate resistance of the driver tube itself unless a power driver is used. To obtain greater power output it would therefore be necessary to raise the plate voltage and plate current so a larger bias voltage could be used.

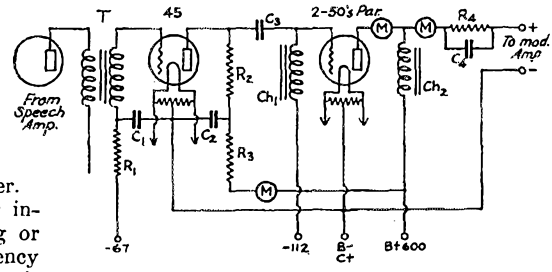


FIG. 2—THE MODULATOR AND DRIVING AMPLIFIER WIRING

R_1—50,000 ohms for grid filtering (may not be needed).
R_2—8000 ohms, 25 watts.
R_3—2000 ohms, 5 watts.
R_4—100 ohms.
C_1—1 μfd., 200-volt rating.
C_2—2 μfd., 600-volt rating.
C_3—1 μfd., 1000-volt rating.
C_4—4 μfd., 200-volt rating.
Ch_1—30 henrys; not over 300 ohms d.c. resistance.
Ch_2—30 henrys, 300-ma. rating.
T—Audio transformer (about 3:1 or 4:1 ratio).

Now if we have a driver stage with good audio regulation so that the grids can be driven positive without distortion, a higher load resistance can be used. With a load resistance of 11,000 ohms, for instance, it is possible to get 15 watts from a single Type 50 tube or 30 watts from 2 tubes, enough to modulate 60 watts input to the r.f. amplifier.

The grid swing necessary, as determined by inspection of Type 50 curves, is 159 peak volts. There were no data on hand to determine just what load the modulator grid circuit would present when it went positive; however, after some consideration of the question of what audio bleeder load could be used economically, the figure of 8000 ohms was chosen. In other words, there is a constant load of 8000 ohms in the plate circuit of the driver stage to afford some regulation of the audio input to the modulator grids. The idea is just the same as having a bleeder on a poorly-regulated power supply.

To develop 159 peak volts across 8000 ohms, approximately 1.6 watts of audio power will be required. Some additional power will be needed to supply the grid losses in the modulator and to compensate for the voltage drop in the coupling device. The job can be done by a Type 45 tube with 300 volts (as measured right at the plate). The "C" bias should be −67 volts and the plate current 30 ma.

Since the 11,000-ohm load refers to a single

* 201 E. 10th St., San Bernardino, Cal.

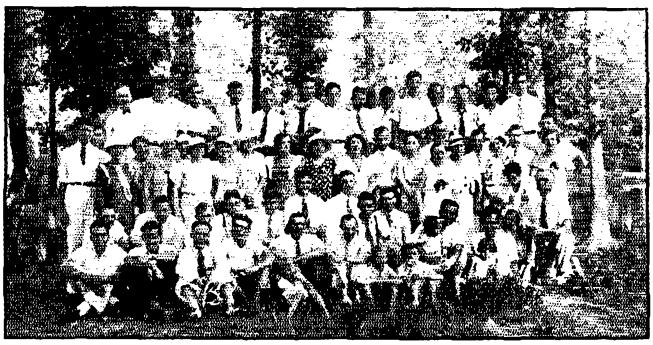
tube, the load for 2 tubes should be 5500 ohms. The peak output voltage swing of the modulator tubes, which is the steady d.c. voltage to be applied to the modulated amplifier, is 565 volts. The current should be 103 ma. for 5500-ohm load.

The complete circuit is shown in Fig. 2. The "C" batteries must be in good condition, and the choke Ch_1 must have low d.c. resistance. Although no oscillograph is available to "see the quality," reports from critical listeners are that it is as good as the conventional Class A system, and the power output is considerably increased. W6DGL also installed this system with an improvement in quality and increased output. In both installations the plate current to the modulators was steadier than when using Class A.

This system compares favorably in cost with a set-up of two Type 46 tubes in Class B. Although two Type 50's cost more, the driving power required is about the same, no special transformers are needed, no special precautions as to power-supply regulation are necessary, and the power output is higher.

The Central Carolina Radio Club

DOWN in Dixie there has been in existence a radio club which is unique in the annals of ham clubs. The lively gang of amateurs in North Carolina has visualized a club which did not go in for the usual technicalities and formalities which so often bristle forth in ham clubs. They



have organized to have monthly meetings, chew the fat, meet at different parts of the state, have a good time and go home; without having worried about election of officers or the status of unpaid bills.

It all started on the way home from a visit to former Director Gravely by W4DW, W4OC and W4EG. W4EG broached the idea of forming a club to meet in different cities in the state, but nothing was done immediately. A couple of months or so later, W4AVT, who was at that time trying to get a North Carolina traffic net organized, proposed the organization of some such club as W4EG had in mind. The two got together, perfected their plans for the first meeting, mimeographed letters stating the purpose of the club and giving the date and place of the first meeting, and mailed them to about 100 amateurs in the surrounding counties.

The meeting was held in Raleigh at W4EG's shack on the third Sunday in August, 1932. The attendance was surprising, some amateurs coming nearly 100 miles. Mrs. W4EG donated a watermelon slicing, and those attending thoroughly enjoyed the event. The second meeting was held at W4TR's in Durham, 26 miles from Raleigh; the third at the High School in Greensboro, 86 miles from Raleigh; the fourth at W4NC, the fine Club house built by the Winston-Salem amateurs, 115 miles from Raleigh; the fifth in the Chamber of Commerce building in Charlotte, 170 miles from Raleigh; then the same circuit was started over again, beginning with Raleigh. The minimum attendance at any meeting since the first has been not less than fifty while the maximum has been 105. The amateurs acting as host in each case furnish refreshments, although it is optional whether refreshments be served.

The meetings from the beginning have been more like a convention than a monthly club meeting. By getting together on making the trips and "dutching" on everything, we can make a 400 mile round trip for $1.50 each, leaving home in the morning, spending the afternoon at the meeting, and getting back home by ten or eleven o'clock that night. The YL's and OW's are getting interested, and they find that they enjoy the trips as much as the OM's.

The Club is now a year old. It meets on the *first Sunday afternoon* in every month. No notices are sent out; none are found necessary. There are no officers and no dues. In the one year of its existence it has been very instrumental in raising the Old North State from one of the lowest in amateur activities to one of the best. We have become acquainted with 150 to 200 amateurs in the state, and what is more important, we have made many new friends. It is easy to get technical advice on anything. We are kept informed on important A.R.R.L. matters, and we have a whale of a good time.

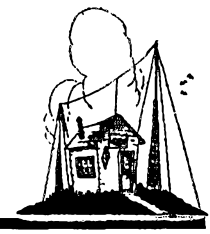
— *W4DW*

Strays

The foil wrapper on Kodak films makes a fairly good diaphragm for a condenser mike when no diaphragm material is available.

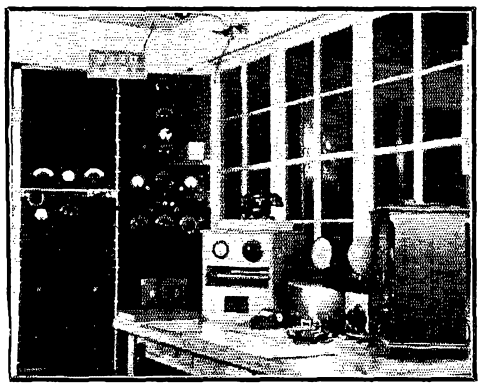
— *W5AUA*

Amateur Radio STATIONS



W3ZD, Chevy Chase, Md.

WINNING an International DX Contest requires something more than a good station — it takes a nice balance of intensive operating and judgment so that the time that the station is on the air can be utilized with maximum effectiveness. The fact that W3ZD piled up the winning total in the March contest shows that Roy C. Corderman knew how to make his



operating hours count — doubly proved, moreover, because the 14,000-odd points credited to W3ZD were snagged without burning much midnight oil. Corderman admits that he got his regular night's sleep every night of the contest!

W3ZD is not the "high power" station that one might expect — that is, the tubes and power supplies are no bigger than are found in hundreds of amateur stations. A pair of 860's in push-pull constitutes the output stage; the plate input is normally 500 watts, which is about the average amount of power used on a pair of such tubes when they are handled properly. The only feature of the transmitter which might be called "unusual" is the fact that all of the exciting stages from the crystal oscillator right on down the line use Type 46 tubes and the maximum voltage used on any of them is 400 volts. Following the oscillator, which operates on the 3500-kc. band, is a buffer on the same frequency, then comes a 7-mc. doubler and last, a 14-mc. doubler. Any of these last three stages can be selected by a switch to feed the following amplifier, a pair of 46's in push-pull, which feeds the grids of the 860's. The tank coils in the two final stages are plug-in for operation in different bands; the others are fixed permanently. Five crystals are available for operating on different frequencies.

The transmitter and power supply equipment occupy the two relay racks shown at the left in the photograph. The rectifiers in the high-voltage supply are 866's. Time delay in turning on the plate voltage after the filaments have gone on is secured by using a 27 as a delay tube; a second time-delay system using a condenser-resistor combination to give a time constant is used for automatic break-in.

W3ZD's receiver is a combination affair using a National converter and a super-het broadcast receiver with a separate beat oscillator coupled to the second detector in the latter. The b.c. set has high selectivity and single-signal reception is secured by using off-set tuning. W3ZD firmly believes that a good receiver is the prime requisite for working DX and that the transmitter is a secondary consideration.

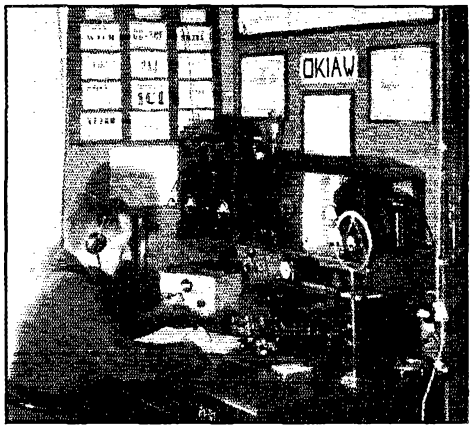
Those fellows who think that a good location is necessary for DX work should give a bit of thought to the conditions at W3ZD. The station is five miles from the nearest body of water, is not on a hill, has trees as high as the antenna within twenty-five feet on two sides, has trees underneath coming up to within ten feet of the antenna, and to top it off is located at the corner of two streets which carry a lot of traffic!

OK1AW, Mestec Kralove, Czechoslovakia

OK1AW, owned by Alois Weirauch, Mestec Kralove, Czechoslovakia, is one of the best-known of Central European stations. Although a WAC several times over, OK1AW cannot be classed as anything but a low-power station, since the maximum input used is only 40 watts on c.w. and 20 watts on 'phone. The transmitter has three tubes; crystal oscillator, frequency doubler or buffer amplifier and final amplifier, the latter being a Philips tube which corresponds approximately to an American Type 10 but with the plate and grid connections brought out the top. The buffer or doubler, a screen-grid tube, is

screen-grid modulated for 'phone work. Four continents have been worked on 'phone.

The photograph shows OM Weirauch at the operating position. The receiver, a screen-grid



OK1AW

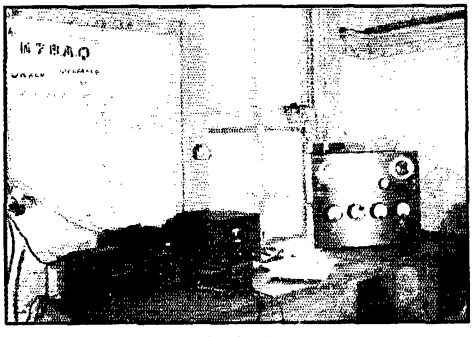
detector and one-step, is at the left of the desk, with the cabinet housing the speech amplifier within easy reach at the right. The transmitter and power supply are on a shelf above the desk.

OK1AW has been highly active on 28 mc. as well as on the regular DX bands, as detailed on page 22 of August *QST*.

K7BAQ, Skagway, Alaska

IN CASE you haven't an atlas, Skagway is to be found a few miles north of Juneau, almost at the tip of the point which penetrates into the southern border of the Yukon Territory. This is where K7BAQ, owned by A. L. Foster, is located.

K7BAQ has a neat and modern layout. The transmitter is a Collins 30-W, a crystal-controlled



K7BAQ

outfit which uses a 47 oscillator, 47 buffer and 10 amplifier, provided with appropriate power supplies. The receiver is a National SW-3 with the regular a.c. power pack. A fourth gadget on the table apparently is a frequency-meter monitor.

Working on 3521 and 3545 kc., K7BAQ has QSO'd stations all over Alaska and has been heard all along the Pacific Coast.

Regulation Items

OPERATORS of portable stations should note that the new portable regulations apply to existing stations as well as to newcomers licensed under the new regs. After October 1st *every* portable identifies its transmissions by the particular method set forth in Rule 384, it reports itself to its district inspector every thirty days, and it logs its location at each transmission in addition to other data necessarily logged. Details were in September *QST*.

Last summer we had a Stray as to how the F. R. C. would write a letter testifying to the existence of an operator license, when a fellow needed duplicate authority so as to operate a second station. That is all washed out under the new regulations. From October 1st on, revised Rule 221 applies. The new dope is set forth beginning near the bottom of page 22 of September *QST*.

The F. R. C. has sent to each radio club affiliated with A.R.R.L. a large map showing 125-mile circles around the 32 examining cities. Each state is divided into counties, so that it is relatively easy to see whether you go after Class-B ticket or Class-C. You can see it at your club. Your S. C. M. has one too.

When the F. R. C. printed up a supply of the revised ham regulations they changed the designation of paragraphs from that shown in September *QST*, although without changing the rule numbers. Some of the rules have more than one paragraph. Take Rule 221 for example. At the time we printed the text, the three paragraphs of this rule were numbered (1), (2) and (3). The new F. R. C. print calls the first paragraph just plain 221, the second one (a), the third one (b). They also moved Rule 416 so that it is now Rule 30 (b) Remember this note and you can readily translate 366(2) to 366(a), and so on.

WORRYING ABOUT MADRID "RATIFICATION"?

See the first letter in this month's Correspondence Department

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM *Vice-President:* C. H. STEWART *Secretary:* K. B. WARNER

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

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American Radio Relay League
Associazione Radiotecnica Italiana
Canadian Section, A.R.R.L.
Ceskoslovenstí Amatéri Vysilaci
Deutscher Amateur Sende-und-Empfangs Dienst
Experimenterende Danske Radioamatorer
Liga Mexicana de Radio Experimentadores
Nederlandsche Vereeniging voor Internationaal Radioamateurisme
Nederlandsch-Indische Vereeniging Voor Internationaal Radioamateurisme
New Zealand Association of Radio Transmitters
Norsk Radio Relæ Liga
Polski Zwiasek Krotkofalowcow
Radio Society of Great Britain
Rede dos Emissores Portugueses
Reseau Belge
Reseau Emetteurs Français
South African Radio Relay League
Suomen Radioamatööriili to r.y.
Sveriges Sandareamatorer
Unión de Radioemisores Españoles
Union Schweiz Kurzwellen Amateur
Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

National:

From unofficial sources we learn that amateur stations are now being allowed to transmit again in Germany. For a time they were barred by the Nazi government, although many of the existing unauthorized stations continued active — even these punctuating each transmission with loud "Heil Hitler" and "Heil Deutschland" hosannas. In the future, all licensed German amateur stations will have calls beginning with D4B—. Licenses for 'phone stations will not be issued.

General amateur activity in Ireland is confined to the 7- and 14-mc. bands, according to H. Hodgens, EI5F, head instructor of the City of Dublin's technical schools. It is possible to secure a special license for operation in the 3.5 mc. band from the Department of Posts and Telegraphs, but there is no work at all in the 1.7, 28 and 56 mc. regions. While a small portion of the country in the northeast corner is assigned the nationality prefix GI, licensed Irish Free State amateurs use call signs beginning with EI, a single numeral, and a single letter below G in the alphabet. Call signs not within this classification are illegal, and QSL cards for them are returned. The Irish Free State gang cordially welcome overseas visitors, and amateurs from other countries are assured an interesting and entertaining time. PA0QJ is one of the recent visitors who can vouch for this statement. We suggest that intending visitors communicate with Mr. Hodgens at The Bungalow, Clonasleigh, Shankill, Co. Dublin, I.F.S.

The *Association Radio Equatoriana*, with headquarters at Quito, Ecuador, publishes an excellent little magazine under the title "Revista A.R.E." — a copy of which was sent this department by Eric Williams, director of the Ecuador Broadcasting Co. — in addition to the various other services performed for its membership. While amateur radio is a comparatively small movement in Ecuador at the present time, the last two or three years have seen the addition of a number of enthusiastic amateurs to the ranks. Two factors have restricted amateur development in this country in the past: unsatisfactory regulations, and unfavorable import tariffs on radio goods. The first has largely been eliminated through the work of Dr. Herman Parker of Guayaquil, with the radio regulations now resembling those of the United States, and it is hoped that special trade concessions on radio apparatus will soon be arranged to the benefit of the amateur.

South Africa is another country with a cordial welcome for visiting amateurs. When J. E. Phillips, W1ZY, began wandering around the world after graduating from Yale, he encountered an ex-South African ham, G6UO, on shipboard between Singapore and Manila, and as a result called at S.A.R.R.L. Headquarters in Johannesburg upon his arrival. Despite somewhat limited time, he was royally entertained. Other overseas visitors are urged to also get in touch with the gang, either in Johannesburg or Capetown. Any call in the callbook will do, as a starter.

DX:

The proportion of WAC stations to the rest of the amateur stations of the world remains fixed at 2%, as it has since almost the beginning. It cannot be said that WAC is commonplace, when only such a small proportion have achieved such a signal honor. Yet, it is true that to more than 800 amateur station owners there is little left in the way of a formal DX goal to strive for.

One of these men is C. S. Taylor, VE1BV, of Stewiacke, Nova Scotia. In a recent letter he

proposes the creation of a new goal of achievement for WAC stations — that of three-band transoceanic QSO's — working a station which is separated from you by an ocean, on three different bands. Credit for the idea he shares with our good friend C. A. Gehrels, PA0QQ, it having been born during a three-band QSO between them on the night of July 16th. In fact, it is even proposed that a formal order be established, on the order of WAC — except that no certificates are available — and that it be called the TBTOC, or Three-Band Trans-Ocean Club. The following rules are suggested to apply:

1. Any station working another station on three different bands, when they are separated by an ocean, is eligible for membership.

2. The QSO's must be made with the same station.

3. The QSO's need not be made on the same day, but may occur at unlimited intervals.

4. Applicants for membership shall submit QSL cards or a statement from the other participant in the three-band QSO to this department, whereupon both stations will be declared members of the club and their names and calls published herein.

So be it. We pronounce, therefore, that VE1BV and PA0QQ become the first members of the TBTOC. May there be many more!

General:

Congratulations are being showered by the amateur world on Joseph White, president of the S.A.R.R.L., and his recently acquired OW .. .. .. Excuse us; perhaps we should have said "XYL!" .. .. .. The Irish Radio Transmitter's Society hid a 3.5 mc. transmitter in the Wicklow mountains near Kilbride last summer and had a glorious field day hunting for it .. .. .. The party led by Hugh McElligott, EI8D, who had a beautiful d.f. receiver, was first to find the transmitter .. .. .. "Rag-Chewing," inimitable organ of the European Rag-Chewer's Club, has suspended publication due to internal difficulties, largely financial .. .. .. The international field day of last June was won in England by the West London and Middlesex district, with the Scottish "A" district as runners-up .. .. .. The winners of the R.S.G.B. Society awards for 1933-34 were as follows: Rotab: J. Hunter, G2ZQ; Wortley-Talbot: L. Hill, 2AGM; Courtenay-Price: A. J. E. Forsyth, G6FO; 1930 Committee: J. Wyllie, G5YG; Somerset: S. A. French, G6FN; Somerset Goblet: J. P. Stove, G5ZX .. .. .. The letters "IARU" mean something more in radio than the abbreviation for our international organization .. .. .. They're the call letters of the Italian warship "Savoia," as well! .. .. .. Another ham contact for international travelers: A. H. Tilse, VK4WO, Avoca St., Yeronga, Brisbane "will be very pleased to receive a visit from any ham who may be visiting Brisbane from any country in the world" .. .. .. You'll find very much the same hospitable spirit throughout Australia — and among the amateurs of any country on earth, for that matter .. .. .. There's no more splendid a bunch to travel among, anywhere .. .. ..

Special:

Spanish-speaking American amateurs find the monthly review of their art in "Onda Corta," official organ of the *Liga Mexicana de Radio Experimentadores*. Ably edited by Ing. Manuel Medina, X1N, this magazine has been of pre-

A GROUP OF THE AUSSIES

Left to right, top row: VK5MU, VK5MY, VK5GR, VK5GW, VK5RT, VK5WR. Bottom row: VK5RP VK5WP. VK5BO, VK5MD, VK5FM.

dominant importance in the development of Mexican amateur radio to the position of favor it now occupies. Continuing in the policies it now upholds, it will remain dominant and flourishing. Each issue contains 28 pages. Technical advance is emphasized. The monthly editorial is of value to every policy-interested amateur. Published by the L.M.R.E. at 3a. de Mier y Pesado Num. 236, Colonia del Valle, D.F., the mail address is Apartado Postal 907, Mexico, D.F. The subscription rate is $1.50 to non-Mexicans.

Strays

(Continued from page 24)

while Secretary of Commerce during the period 1921–1924, gave annually a cup to be presented under A.R.R.L. auspices to America's best all-around amateur station the major portion of which was home-made. As Don Wallace himself will be the first to admit, the Hoover Cup for 1923 was awarded his station of those days, 9ZT in Minneapolis, for being America's best all-around amateur station that year, not for particular receiver performance. A complete description of the station commences on page 43 of *QST* for May, 1924. Winner of the first Hoover Cup for 1921 was 5ZA; for 1922 it was 2OM; 6AWT won the last one in 1924.

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager
E. L. Battey, Assistant Communications Manager

The General Traffic Period—Give It a Try

To facilitate general traffic movement a special daily period, 6:30–8:00 p.m. local time, was announced in September *QST*. Directional CQs stand best chance of success in this period. Use the general call CQ TFC.

Such a period enables stations *without* schedules to move any traffic they happen to have (or wish to start) to ORS, TLS, and stations in the proper direction who have schedules to expedite routing and delivery or are on Trunk Lines of the A.R.R.L. One can pick operators who "sine" ORS, TLS, RM, SCM, etc., to assure their absolute *reliability*. This period should assist the flow of "tfc" both on and off scheduled routes.

The period to move general traffic has already been approved by Route Managers and SCMs. We have yet to see fault found with the basic idea. The GENERAL TRAFFIC PERIOD will, of course, be just as useful (no more, no less) as you and every other amateur make it. It's a new idea. We think it a sound idea. Its success or failure is up to you. If you use it, it will help you and add something to amateur radio. We commend the idea to your attention. Please give it a try. For one month get on whenever you can from 6:30 to 8:00 p.m. and conscientiously devote a full hour of the period to *general* work.

Don't get a mistaken idea that we are trying to get hams to "do nothing but" handle traffic. We deplore any "narrow" view of amateur radio as a hobby. If you just "rag chew" all your life you are missing something valuable, tho. If you are a confirmed experimenter and never "rag chew" you are missing general contacts and friendships that could mean much. If you avoid "fone" you may miss advantages in experimenting and pass up new acquaintances. If you spend all your time on fone you are missing much opportunity to do constructive work, the chance to work "real DX" reliably and to make yourself a "real" operator. Have a purpose in what you do. Avoid the "formula" rag chew (but not necessarily rag chewing itself). Do *all* these things that make up amateur radio. Take a message when it comes your way. In doing so you agree * to handle it accurately, promptly and sensibly. If you consistently refuse to handle any traffic or otherwise render accurate service by amateur radio, your chance to strengthen your hobby and better your personal operating ability (or keep it top-notch) is being neglected. Amateur is a big field; one of diversified activities. Let us all strive to be familiar with all its up-to-now unplumbed possibilities. Let us be sporting, but not sports, loafers or unreliables. To enjoy our radio as completely as possible, we should be neither selfish or narrow. Let us recognize the diversified nature of amateur radio activities fully. Make due allowances for "the other fellow" whatever our own "big" interest. The more fully we take part in all kinds of amateur work the more fully shall we reap the benefits. — *F. E. H.*

* It is a service to amateur radio and a fellow ham just as truly to *refuse* traffic when temporarily *not* in a position to handle it properly, with such agreement as always tacitly implied.

W1MK

Addressed transmissions to amateurs are sent simultaneously on two frequencies, by automatic, from the Headquarters station, W1MK, on the following schedule:

Days	*Times (E.S.T.)*	*Speeds (w.p.m.)*	*Frequencies*
Thurs.	8:30 p.m.	13	3825–7034 kcs.
Thurs.	Midnight.	22	3825–7034 kcs.
Fri.	8:30 p.m.	22	3825–7150 kcs.
Fri.	10:30 p.m.	13	3825–7150 kcs.
Sun.	8:30 p.m.	13	3825–7150 kcs.
Sun.	Midnight.	22	3825–7150 kcs.
Mon.	8:30 p.m.	22	3575–7034 kcs.
Mon.	10:30 p.m.	13	3575–7034 kcs.

Traffic schedules at present are with W1BOF, W2DBQ, W3BWT, W5AFW, W6CUU, W8BBH, W9ENH, W9OX, W9USA, VE3AU, and NY1AA. The additional time is divided between 7 and 3.5-mc. bands for "general" contact with any ham who may call. In addition to QSP via above "skeds" operators try to "rag chew" with just as many hams as time permits. QRG service is also available. Operators "sines" at present from W1MK are "EV" E. L. Battey of W1UE, "AH" A. A. Hebert of W1ES, "CR" Clark Rodimon of W1SZ and "FH" F. E. Handy of W1BDI.

A HDQ. 'PHONE STATION—W1SZ

From time to time the idea of working 'phone at W1MK has been considered, but found impracticable due to limited space for new station equipment, the necessity for economies, and lack of operating time to be further partitioned for different frequency bands and types of work with amateurs. However, we are pleased to announce that W1SZ, station of C. C. Rodimon, *QST's* Managing Editor, will be operated by him Tuesdays, representing Headquarters on the air by voice. "Rod" has kindly volunteered to operate W1SZ for voice work in the 3900–4000-kc. band. A '61 modulated by '49 with carrier of approximately 125 watts will be used. Since W1MK will not be operating that night, W1SZ will be open for voice work between 7 p.m. E.S.T. each Tuesday and 1 a.m. E.S.T. of the following day, and will also repeat W1MK's "QST" on voice at 8:30 p.m. and midnight E.S.T., Tuesdays, starting in late October.

Traffic Briefs

W8EVM, W8AFY, W8KIC and W8KJO, Mohawk Valley Amateur Radio Club (Mohawk, N. Y.) members, maintained schedule with W8IDN (portable of W8FMX), which was operated at Boy Scout Camp Russell, White Lake, N. Y. W8IDN kept the gang busy handling messages "back home" for the Scouts, and the work was given considerable publicity.

The Fourth Annual Banquet-Hamfest of the Schenectady Amateur Radio Association will be held at Schenectady, N. Y., Saturday, October 7th, starting at 2:00 p.m. The afternoon will feature 56-mc. demonstrations, technical talks, contests (with FB prizes!), visit to WGY, etc. The dinner is scheduled for 7:00 p.m. All hams are invited! Reservations may be made from Mr. G. Gaynor, W2DTS, 1480 Nott St., Schenectady; price $1.00 per person.

W. B. Wimberly, W5BEN, advises that he will install a 1-k.w. transmitter at the Tri-State Fair grounds, Amarillo, Texas, for the purpose of introducing amateur radio to the public, September 23rd–30th inclusive. W5BEN is expected to be operated on both the 7-mc. and 3.5-mc. bands.

7-MC. DX TESTS

KA1NA wishes to establish direct communication between the Philippines and the Eastern part of the United States. Tests will start October 1st, Sunday mornings, 5 a.m. until 6:30 a.m. EST. The transmission will be automatic and will be broken at intervals to listen for calls. It is requested that these tests be *not* answered by West Coast stations. The frequency will be 7260 kc. with an input of 600 to 700 watts. Directional transmitting and receiving antennas will be used.

W2PF advises that an amateur radio booth and station will be in operation at the New York Radio Show, Madison Square Garden, from September 20th to 30th.

Ed Stevens, W7BB, and another operator at Alitak, Alaska, were instrumental in saving the life of a five-year-old boy, who lay desperately ill with appendicitis at Lazy Bay, Kodiak Island. After contacting Alitak, W7BB described the case to a doctor in a Seattle hospital; the doctor advised that the lad be rushed to a hospital. The Alitak operator being unable to get through to Anchorage, where the nearest hospital was located, Stevens communicated with the local Army station, through which contact with Anchorage was established. A seaplane carrying a doctor took off immediately. The boy was later reported safe after treatment and was taken to the Anchorage hospital. FB, W7BB and Alitak op!

LDUC

The Wyatt Expedition, LDUC, schedules W3QP, Monday and Wednesday, 7 and 8 p.m. EST and Friday, 8 and 9 p.m. EST. The Wyatt Earp will be in Antarctic for next 18 months. Operator Lanz, LDUC, gives calling frequencies as 8280, 11,025 and 12,420 kcs., and working frequencies 8300, 11,040 and 12,450 kcs.

Richard D. Watson, W1BGL, has been chosen as radio operator of the Byrd Antarctic Expedition's ship, *Bear of Oakland*. We hope to present complete data relative to call letters, frequencies, etc., in an early issue.

VE3XB was sponsor of a July contest open to all Canadian amateurs; 132 logs were submitted from all Canadian districts scoring under rules announced on page 46, July *QST*. The winners were: C. W.—VE3GT, 790 points; 'phone —VE3BM, 355 points. The eleven high c.w. scorers, in order, were VE3GT, VE3IR, VE5HQ, VE3DJ, VE3NO, VE5HR, VE1EP, VE3LZ, VE2FE, VE4DQ and VE3HF. Highest radiophone scorers: VE3BM, VE2CU, VE3PZ and VE3NZ. VE3XB is considering another Canadian contest for next January.

VOQH

W3ZX contacted VOQH, the Bartlett N. E. Greenland Expedition, on August 28th and 29th, at which time *The Morrissey* was in Foxe Basin, near Mellville Peninsula, and proceeding northward. W3DKT picked up the 14-mc. signals of VOQH on August 30th. W2NV, who has been scheduling the expedition, reports VOQH now on 14,158 kc. at 6 p.m. EST daily.

WANTED—STATIONS TO SEND CODE PRACTICE

The A.R.R.L.'s program of code practice on the 1715-kc. band is at this season being revised for the coming active radio season. Stations that engaged in the work last season are being requested to furnish a new schedule for publication in *QST*. There are great possibilitics to this 1715-kc. code practice work, and it is one of the most worthwhile of amateur endeavors. Any amateur working in this band wishing to volunteer regular schedules of code practice is invited to get in touch with A.R.R.L. Headquarters, so that his schedule may appear in *QST* and also be distributed by mail to those interested. Helpful hints relative to the sending of code lessons are furnished all volunteers by A.R.R.L.

CANADIAN HAMFESTS

On Saturday, July 29th, the Regina District Radio Association was host at a "funfest" at Hotel Champlain, Regina, Sask. Bountiful prizes were offered in the various contests, which always add so much to ham gatherings. An amusing incident was the reading of a letter wherein the R. I. was accused of interfering with her "Superpepsodyne" and of stopping chickens from laying. After trial the R. I. was found "guilty"! Some of the lucky prize winners were VE4BB, VE4AT and VE4CV.

A Quebec Division Conventionette, under the auspices of the St. Lawrence Valley Amateur Transmitting Association, Westmount Radio Club and South Shore Radio Club, was held at Montreal, September 2nd, with 93 amateurs registered. A visit was made to the Canadian Marconi's station CFCF. Contests were won by VE2CQ, VE2CV, W8DEJ, VE2FJ, VE2BC, W8EBP, VE2HG, W8FUD, VE2CU and W8FWH. Speakers at the banquet included VE2AP as chairman, VE2BE, CGM, W8FMH, W1BNR, W2CPU, VE3JI, VE2AB, J. M. Colton, RI, C. Fisher, N. E. Co. Activities were completed by a bus trip with 32 hams participating. Thanks for the FB time go to the committee composed of VE2CO, CX, CU, EM, AX, GN, DX, AP.

O.B.S.

The following is a supplement to the list of A.R.R.L. Official Broadcasting Stations in September *QST* (page 44):

W1AUY, W1AVJ, W1BFT, W1BMM, W1EAW, W2DBQ, W3UVA, W4BIP, W4BMM, W5AAQ, W5AVB, W5BQA, W6CIQ, W6EXH, W6UA, W8AXC, W8FTB, W9FTA.

Florida Hurricane Work

W4NN reports that on July 29th–30th a tropical hurricane struck the Florida east coast between West Palm Beach and Ft. Pierce. As it moved west amateurs were ready with portables, schedules, etc. Heavy rains flooded highways and people were removed from possible flood areas. Dozens of Red Cross messages were handled, with weather reports and accurate barometer readings from half a hundred points. In spite of QRN, the Knights of the Kilocycles and the Army-Amateur Fone Net were on continuously handling orders for moving food supplies as well as collecting WX information. SCM Atkinson adds that it took some time to "clear the band" for this work. Since the hurricane-season is now on, he requests that 'phone men keep an ear open for operation of Florida stations in their emergency net, and asks them to please QRT promptly (when they hear emergency operation in progress) to coöperate in such public service work.

W4KM (E. T. Kinkade) writes further that WDAE (Tampa), WRUF (Gainesville), and WQAM (Miami)

BRASS POUNDERS' LEAGUE

(July 15th–August 16th)

Call	Orig.	Del.	Rel.	Total
W3CXL	134	149	1846	3129
W6PQ	655	146	594	1395
KA1LG	113	849	206	1168
W6ETL	266	588	244	1098
W2EKM	42	51	960	1053
W6CDA	13	37	922	972
W9ZZAF	68	101	802	971
W3ALX	34	137	749	920
VE5DH	522	291	6	819
W6FWJ	143	87	582	812
W9PB	257	486	68	811
OM1TB	347	145	272	764
W8FFK	79	123	440	642
W2UL	60	61	512	633
W3CVD	460	125	44	629
W9DEI	36	26	560	622
W6EII	73	114	423	610
W9HCC	26	46	537	609
W9AET	10	48	546	604
W9AUH	24	62	512	598
W2CHK	14	16	556	586
VE5HP	149	83	346	578
VE5DB	253	320	—	573
W8BWL	105	127	340	572
W2CBB	80	157	332	569
W28C	36	67	462	565
W9JID	41	32	486	559
K6GUA	354	66	132	552
W6CUU	39	94	417	550
W6HHM	8	20	511	539
W9FLG	117	236	168	521
W9JNV	45	16	455	516
W6AZU	30	178	304	512
W6BPU	11	111	389	511
VE5GS	280	171	52	503
W3ADM	15	65	421	501

MORE-THAN-ONE-OPERATOR STATIONS

CX7	2618	1261	—	3879
W9USA	2206	243	195	2644
KA1HR	242	236	916	1394
W5OW	93	44	1109	1246
K6EWQ	245	159	510	914
W3BKQ	31	45	822	898
NY1AB	205	124	370	699
W6ECY	644	10	—	654

These stations "make" the BPL with *totals* of 500 or over. Many "rate" extra credit for one hundred or more deliveries. The following one-operator stations make the BPL for *delivering 100 or more messages;* the *number* of deliveries are as follows: Deliveries count!

W9GKJ, 276 W9FRC, 139 W3QL, 114
W9EIB, 201 VE5DF, 137 VE5AL, 111
W6NF, 177 VE5EE, 132 W6BZZ, 107
W9KDO, 174 W3CWL, 131 W8FX, 104
W9YAB, 157 W6BHQ, 126 VE5CH, 103
W8HGG, 156 VE5AM, 123 W3BWT, 103
W8CV8, 156 W3CL, 117 W8HSH, 103
W6QXM, 152 W3AXK, 117 VE5BC, 102
W9BNU, 146 W2BXS, 114 W6CVF, 101
W9GWN, 145 W9AWB, 114 VE5AC, 101

A total of 500 or more, or just 100 or more *deliveries* will put *you* in line for a place in the B.P.L. Make more schedules with reliable stations. Take steps to handle the traffic that will qualify *you* for B.P.L. membership also.

received information from the 'Phone Net while other communication was interrupted. Some of the stations in the path of the storm supplying weather information were W4AGY, W4BAM, W4AQU, W4AIV, W4LS, W4MM, W4KM, W4AGR, W4AFV, W4CFP and W4ADH. At request of W4AIV, W4KM was made the key station, at Lake Okeechobee. In addition, others in the Net on the air constantly including W4BIN, W4NF, W4DU, W4ADB, W4WS, W4GS, W4BGL, W4BE, W4ACZ, W4AYX, W4AKA, W4CFV, W4AXY, W4CJ, W4ANY and W4KB, should be commended on splendid work, as well as other threes, fours, and fives too numerous to mention who helped in QRXing and clearing the band. Much of the operation was continuous day and night work, from Saturday until Monday morning.

Radio Communication at Isle Royale

The newest of the national parks is the island of Isle Royale, Lake Superior, 45 miles from the mainland of Michigan. It is about 45 miles long, 9 miles wide, rocky, heavily wooded and noted for its wild life and excellent fishing. Several hundred tourists go to the island annually. Until recently there was no other communication except by mail twice a week.

In 1932 The Michigan College of Mining and Technology took it upon themselves to experiment with radio communication between the island and the mainland. With a portable station at Isle Royale, regular schedules were kept with W9YX at Houghton, Mich. (Francis D. Cook, chief operator). Several amateurs from the mainland operated the portable station at two week intervals until September 10th. During 1932 a well-known engineer spending his vacation on the island was out in Lake Superior when his motor became disabled. The operator radioed Cook at W9YX to telephone the coast guard. In a few hours the disabled craft was saved. It was apparent radio was needed, if only for such emergencies. This year three amateur stations were in operation. The operators worked at the lodges and operated in their spare time. They were chosen among the many members of the "Copper Country Radio Amateurs" because of their excellent qualifications.

The first station established this year was W9NPN (Audley E. Benson) at Rock Harbor. A type '10 TNT was used with 350-volt dynamotor driven by a 32-volt light plant. Any amateur operator might be proud of the work of W9NPN. A seaplane became disabled on the island and the owners were advised of safety of passengers and plane. A tourist became critically ill; hope for his life was given up. Operator Benson called W9BBP at Gladstone, Mich., who phoned Eagle Harbor coast guard

Relative Standings of the Ten Highest Sections—July-August

Messages Per Station (25%)		Stations Reporting Traffic (25%)		Gain or Loss (Traffic Reports) (25%)		Traffic Total (25%)		Standing Based on Average of All Four Ratings %		Section Communications Manager
P. I.	414.5	Los Ang.	(680)* 110	Wash.	+22	Kans.	8647	**Kansas**	**67.5**	**Spetter, W9FLG**
M.-D.-D.C.	273.8	Mich.	(624)* 91	Kans.	+21	Los Ang.	7929	**Los Angeles**	**67.5**	**Martin, W6AAN**
B. C.	245.5	Wash.	(374)* 79	Los Ang.	+18	E. Pa.	5125	**Washington**	**47.5**	**Belliveau, W7AYO**
Hawaii	211.5	Va.	(150)* 59	N. Y. C.-L. I.	+10	Ill.	5041	**Philippines**	**37.5**	**Thompson, KA1XA**
Kansas	210.9	Ill.	(890)* 57	San Joa.	+10	B. C.	4174	**Brit. Col.**	**35.**	**Cavalsky, VE5AL**
S. Tex.	173.5	N. C.	(140)* 56	Iowa	+ 8	P. I.	4145	**Illinois**	**32.5**	**Hinds, W9APY-WR**
S. Dic.	152.6	Mo.	(324)* 49	S. F.	+ 7	Mich.	2964	**Michigan**	**32.5**	**Conroy, W8DYH**
Wisc.	151.2	Ohio	(868)* 47	W. N. Y.	+ 7	M.-D.-D.C.	2738	**E. Penna.**	**30.**	**Wagenseller, W3GS**
E. Pa.	146.4	Kansas	(244)* 41	Ky.	+ 7	N. Y. C.-L. I.	2646	**M.-D.-D.C.**	**30.**	**Hudson, W3BAK**
E. Bay	125.6	E. Pa.	(528)* 35	E. Pa.	+ 6	Wash.	2599	**N. Y. C.-L. I.**	**22.5**	**Baunach, W2AZV**

KANSAS and Los Angeles are tied with an all-around rating of 67.5%. The Banner, however, goes to KANSAS on the strength of her "making" all four of the rating columns. Los Angeles has over 100 traffic reporters!! Washington makes the best "Gain" in reports. The total traffic reports for all 69 Sections was *1321*, a very slight gain over the previous month. The following Sections lead all other Sections in their Divisions, *order of listing showing relative standing of their different Divisions:* Los Ang., Kansas, E. Penna., Ill., N. Y. C.-L. I., Wash., No. Tex., So. Minn., Brit. Col., Va., Colo., Conn., La., Ala. During the July 16th–August 15th month: *1321* stations Originated 22,546, Delivered 19,801, Relayed 47,747, Total 90,094 (88.% Delivery) (68.2 m.p.s.)

* The Section A.R.R.L. membership (approx.) is shown parenthetically, so that the degree of traffic reporting activity may be indicated by comparison.

(175 miles). The coast guard arrived promptly with a doctor to take the sick man to a hospital.

The next station to operate was W9NSJ (William F. Martin) at Washington Harbor. A TNT with 270 volts of "B" on a 112-A tube was used. Important messages for the Michigan Department of Conservation were handled during a forest fire.

The last station to go into operation this year was W9NGT (John J. Tobola). The TNT employed a 112-A with 225 volts "B." Important messages and information was sent from the Isle Royale Fire Warden to his headquarters at Baraga, Mich.

Watching the moose and fishing were pastimes for all three operators. The island has no roads and few paths so the only means of travel is by boat. W9NPN and W9NGT took boating too seriously when their frail sailboat capsized far from shore July 15.

Monday, August 14th, all operators and their guests visited W9NGT for the first Isle Royale hamfest, replete with talks, boating, and sports.

The operators thank all hams, the Copper Country Radio Amateurs and Cook of W9YX for wonderful co-operation.

—Ralph Ziegenbein, Sec'y, C.C.R.A.

Lids or Beginners?

OF COURSE, there are some fellows who may rightly be called "Lids"; namely, persons who deliberately use the air for selfish amusement and enjoyment in such a way as to lessen the pleasure of others who are trying to accomplish something worth while from their hobby. The operator who thus abuses the privileges and authority given him may truthfully be termed a lid. There is no place for him in amateur radio.

Everyone has his own conception of this type of person, but the majority must not know the distinction (between lid and beginner) judging from some of the uncalled-for remarks so common on the amateur bands today. When the *new* fellow just getting on the air asks you to send a little slower or repeat something missed due to undue "speed," it often means a "CUL — SK" accompanied by remarks of "lid, lousy operator," etc.

A beginner, who has a sincere desire to learn, to better his procedure through practice, to operate correctly, should be clearly differentiated from a lid, even when his execution is short of perfection. How can any beginner learn from uncivil, stuck-up chaps who refuse to answer a poor unfortunate's questions? The insult of being classed with poor operators when one is sincerely and honestly doing his best, and rank discourtesy where one expected to find congenial friendly kindred spirits, is quite undeserved.

Avoid all unnecessary sarcasm and hostility. The experienced were always meant to help the inexperienced. Be glad of the opportunity to assist the fellow who is trying ever so hard to learn what it's all about, and who really and truly appreciates our interest. The fellows just getting started now are the ones who will carry on this great Amateur Radio in years to come. Live up to the true standards of Amateur Radio for unfailing good spirit, courtesy and consideration. Help the new operator. Make him feel it's really worth while after all, and a great, great game from start to finish.

— W9ZZAF

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 present 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 Hartford on or before noon of the dates specified.

Due to a resignation in the Idaho 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, October 16, 1933.

Due to a resignation in the Philippine 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, November 1, 1933.

Section	*Closing Date*	*Present SCM*	*Present Term of Office Ends*
Eastern Mass.	Sept. 15, 1933	J. A. Mullen	Sept. 16, 1933
Mississippi	Oct. 16, 1933	Wm. G. Bodker	Jan. 15, 1933
San Diego	Oct. 16, 1933	Harry A. Ambler	Oct. 20, 1933
British Columbia*	Oct. 16, 1933	J. K. Cavalsky	Oct. 20, 1933
Idaho	Oct. 16, 1933	Charles R. Thrapp (resigned)	.....
Philippines	Nov. 1, 1933	I. S. Liner (resigned)	.....
Connecticut	Dec. 1, 1933	Frederick Ells, Jr.	Dec. 4, 1933
Virginia	Dec. 15, 1933	R. N. Eubank	Dec. 15, 1933
Eastern Florida	Dec. 15, 1933	Ray L. Atkinson	Dec. 15, 1933
New Mexico	Dec. 15, 1933	Jerry Quinn	Dec. 15, 1933

* 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 By-laws 5, 6, 7, and 8.

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 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 date 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. 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 member shall sign more than one such petition.

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 on or before the closing dates that had been announced for receipt of such petitions. As provided by our Constitution and By-laws, when but one candidate is named in one or more valid nominating petitions this candidate shall be declared elected. Accordingly election certificates have been mailed to the following officials, the term of office starting on the date given.

Md.-Del.-D.C.	Edgar L. Hudson, W3BAK	July 15, 1933
Arizona	Ernest Mendoza, W6BJF-QC	July 15, 1933
New Hampshire	Basil Cutting, W1APK	Aug. 15, 1933
Washington	Stanley J. Belliveau, W7AYO	Aug. 15, 1933

In the West Virginia Section of the Roanoke Division, Mr. C. S. Hoffmann, Jr., W8HD, and Mr. L. J. Hahle, W8CDV, were nominated. Mr. Hoffmann received 54 votes and Mr. Hahle received 22 votes. Mr. Hoffmann's term of office began July 12th.

In the Eastern Pennsylvania Section of the Atlantic Division, Mr. Jack Wagenseller, W3GS, Mr. Ian F. Nutting, W3BVX, and Charles Foell, W3MC, were nominated. Mr. Wagenseller received 156 votes, Mr. Nutting received 83 votes and Mr. Foell received 63 votes. Mr. Wagenseller's term of office began August 7th.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA—SCM, Jack Wagenseller, W3GS—Thanks for reëlection, OMs. Send all reports to new QRA on page 5. W3BKQ, W3ADM, W8CVS, W3CL, W3ALX and W3AXK make BPL. W8IXC is going 1.7 mc. 'phone. W8IWT and W3DLY have been DXing. W8BEV is on 56 mc. The Shamokin Radio Club is now A.R.R.L. affiliated. W3DAB is back

after 6 months. W3CHL and W3MC are rebuilding. W3CUG is making c.c. rig. W3AQN is arranging fall schedules. W8CMF was heard in Illinois on 56 mc. W3AMR says hard job to get good schedules. W8ITS is leaving for school in N. Y. C. W3DXQ moved from Michigan. W3DUQ worked WTEF. W3AKB attended World Wide Convention. W3AAV increased power. W3DZ reports in person. W3AZF is ready for ORS. W3DIJ, DJL and EZ report for first time. W3BGD and BNY are c.c. W3GS gets out great. Watch for announcement of big contest for Eastern Penna.

Traffic: W3ALX 920 BKQ 898 ADM 501 CL 475 DUQ 366 AXK 355 AAV 99 AZF 89 DAB 83 BEY 34 EZ 31 AKB 27 GS 28 AHD 24 AMR 25 DXQ 22 CIQ 18 BNY 17 DZ 14 DAC 17 AQN 11 DIJ 9 DJL-ADE 8 DLY 4 BVX-ATR-BZC 3 AZT-MC 1 BPX 3 CVD 629. W8CVS 259 ITS 129 CMF 11.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA—SCM, E. L. Hudson, W3BAK—W3SN, CJS, CQS, RMs; W3BWT Chief RM; W3SM 'Phone RM. District of Columbia: W3CXL and BWT make BPL. W3IL took his port. CXA to Cape Cod. Maryland: W3BND reports things slow. W3SN is going to put up new masts. W3CDG is lining up schedules for New England-Florida trunk. W3CQS gets good reports on 1.7 mc. 'phone. W3CIZ is experimenting. W3CRB sends first report. Delaware: W3BAK is trying to get bearings on SCM work.

Traffic: W3CXL 2129 BWT 292 BND 161 SN 60 IL 31 CDG 27 BAK 6 CQS 2 CIZ 29 CRB 1.

SOUTHERN NEW JERSEY—SCM, Gedney Rigor, W3QL—W3CWL and QL hit BPL. The South Jersey Radio Ass'n was guest of Greater Camden Club at outing in Grenloch Park. W3ZX subdued the Camden Tigers, managed by W3ASG. W3BYM umpired. The directors of S.J.R.A. went to W3BGP's for a game of horse shoes, etc. W3DRP has been in the game 19 years. W3DGF works DX. W3BEI is nertz over Comet Pro. W3BO manned W3AKF in Pine Camp. W3CQO got unlimited 'phone. W3CUA sends first reports. W3BDO is back for ORS. W3CVE promises lots of traffic. W3APV suggests that deliveries count as 2. W3DSC, DPE, DPC are new hams. Would appreciate ALL clubs sending in monthly report to the SCM.

Traffic: W3QL 146 BZI 23 CWL 227 BDO 22 AEJ 29 AIU 14 CQO 3 DRP 17 DSC 5 APV 47 BEI 28 AKF 135 AOV 241.

WESTERN NEW YORK—SCM, Don Farrell, W8DSP —W8BJO rebuilt. W8DWJ is on at summer home at Lake Brantingham. W8EBK is new ORS. W8GWZ works 14 mc. 'phone. W8JUI is on from Utica. W8DMJ keeps schedules. W8GZM starts schedules September. W8JTT had 60 QSOs during month. W8CQW reports Jamestown Club held annual picnic Aug. 13th. W8BFG is returning to 3.5 mc. The S.T.T.A. held picnic at cottage of W8BHR. W8DHU reports electrical storms. W8EUY has Comet-Pro. W8EWF's operating license ran out. W8DME is on 14 mc. from his camp on Owasco Lake—call W8KCL. W8AFM is on 'phone. W8BOL is ORS. W8FDY visited W8JE. W8GWS was at A Century of Progress. W9AHX visited W8AWX. W8DSA is on daily. W8HB has new mast. W8GPX gets out FB. W8HWG is QRL garage. W3CCR uses portable at Saranac Lake. W3BVV (port. W8ZZCV) is running WNBZ at S. L. W8FYF has trouble getting going. W8BQJ has had sickness and a death in family. W8AED schedules W9USA. W8GWY uses portable rig on 3.5 mc. W8FTB, both Sr. and Jr., visited the SCM. W8DHQ spends his time rag chewing. W8CJJ says, "Too hot to handle traffic." W8JAK is back in Utica. W8IDJ and ARX have a fine station. W8DT has e.c. frequency meter calibrated. W8BAL uses gas engine-generator outfit. W8DII moved back to Binghamton. W8GPS took 15 day trip. W8DES schedules the SCM. W8JV handles traffic on 7 mc. W8EWB is on 1.7 mc. 'phone. W8HVS and GYP have c.c. The S.T.T.A. is going strong. W8AVM is working. W8ACK's antenna blew down. W8BOL is a life guard. W8FMH moved to Adams Center. Gang from north country had fine picnic at W8DSU's cottage on St. Lawrence. W8DSU, ECF and GHU are experimenting on 28 mc. The Elmira Radio Amateur Assn.: Several members made trip to Mt. Pizgah on Aug. 5th and 6th for 28 mc. tests. Those who kept night vigil during tests were W8ACQ, CJJ, EKL, DAY, ADV and KBS. W8QP is changing 46 buffer. W8AOW has new Dodge Coach. W8FOY is on 3.5 mc. The Central New York Radio Ass'n has 15 minutes each Saturday over the air through WFBL. New calls: W8KFX, KMS, KKR, KHT, DKI, JQF, JUJ. Rebuilding: W8FFU, GWT, JXZ, AWM. Want ORS: W8AQE, GPT.

Traffic: W8EBK 106 DMJ 36 GZM 32 JLG 31 CQW 13 GWT 31 DHU-EUY 45 FDY 53 AWX 50 FYF 8 IDJ 54 AED 29 JAK 81 DSS 102 DII 25 BAL 18 DES 35 JV 19 ADV 2 AQE 17 GPT 8 JJJ-JTT 18 DBX 6 AFM 5 BOL-BQJ 6 GWY 10 BWY 2 FTB 9 DHQ 6 CJJ 13.

WESTERN PENNSYLVANIA—SCM, C. H. Grossarth, W8CUG—RM W8DLG sends his resignation. W8BWL leads the gang. W8HGG is going c.c. W8GBC says schedules are irregular. W8GUX pounds plenty of brass. W8GSV says W8BAO changed QRA. W8KD has heard one station on 28 mc. Two first district hams dropped in on W8CQA. W8CFR and IOI landed jobs. W8DYV reports a new ham, W8KBR. W8IAT discovered a prospective ham on the same street. W8AVY is on 3.5 mc. W8AJE has c.c. rig working nicely. W8FKU will soon be ready to start traffic. W8JSU flunked code exam. W8IOH reports 83% QSL returns. W8ITV has been using portable. W8KME is a new ham in Bellevue. Welcome. W8CUG attended a swell hamfest in New Kensington. W8CMP has difficulty getting out from Northern Mich.

Traffic: W8BWL 572 HGG 401 GBC 257 GUX 84 GSV 49 KD 39 CUG 36 CQA 31 DYV 12 CCD 4 IAT 3 AVY 1.

WESTERN PENNSYLVANIA QSO CONTEST

A contest for all amateurs in the W. Pa. Section who report to the SCM for either of the reporting periods Aug. 15th to Sept. 15th or Sept. 15th to Oct. 15th will be held for two weeks beginning Nov. 4th at midnight E.S.T.

The staff at W8YA has donated two crystals either in the 3.5 or 1.7 mc. band. The A.T.A. of W. Pa. has donated a *Handbook*. Two "Hints and Kinks," 3 log books, and 3 pads message blanks will be given to the other high scorers.

RULES FOR WESTERN PENNSYLVANIA QSO CONTEST

1. Contest will last two weeks: Nov. 4th at midnight E.S.T. to Nov. 18th at midnight E.S.T.

2. Only amateurs reporting for either of reporting periods Aug. 15th to Sept. 15th or Sept. 15th to Oct. 15th will be eligible for prizes.

3. Contacts with *any station* in W. Pa. Section will count two points.

4. Only one contact per day per station will be counted.

5. Contestants are not permitted to arrange schedules for purposes of running up large score.

6. Any or all amateur frequency bands may be used.

7. A copy of your log listing the date, time, station, town, and frequency band used must be submitted not later than Nov. 30th, 1933.

8. RMs, W8DLG and W8HGG, W8YA, and the SCM, W8CUG, will not be eligible for prizes but contacts with these stations will count in your scoring.

—*C. H. Grossarth*
SCM W. Pa.

CENTRAL DIVISION

ILLINOIS—SCM, F. J. Hinds, W9APY-WR—R.M.s: W9DDE, CRT, VS, ERU. Every time W9FOC CQs West an 8 comes back. W9HHQ is building rig for State Fair. W9KCX is after traffic. W9GYP has 100 watts in final. W9HQH has 7 mc. Zepp that works. W9EVJ and LZU are after ORS. W9KEH celebrated his first Radio Station Anniversary with QSO number 2021. W9IWP is new traffic man. W9AAK is after Extra First Class. W9KA is WAC. W9IUF is knocking down DX. W9IYP has a '52 on when filament transformer does not break down. W9IEP says the hams along Illinois River are forming a club. W9IVF has a Zepp working on re-

ceiver. W9JZY is building up new Illinois Net. W9IYA is to be found on three bands. W9NUF has '45 TPTG. W9JOC cracked glass on 83 rectifier. W9JCG says boys around Charleston and Mattoon have fun on 56 mc. W9HNK has new receiver. W9KJY says schedules FB. W9ERU works Police Radio Station at Rockford. W9JZY rebuilt into e.c. W9EMN received Extra First ticket. W9MSG is on 1.7 mc. 'phone. W9KOQ says 7 mc. CW forever. W9MLH has been in Michigan with port. W8KJA. W9CUH is getting ready to put PDC on the '04As. W9DZU is doing BCL service work. W9DXZ blew a '66. W9DOU is looking for '03As. W9AAR enjoyed last ORS party. W9BYZ has '45s PP. W9LXX wants to know why they don't make ham transmitters like a certain auto. W9BIN gets results from his painted A.R.R.L. sign on Ford rear window. W9BSR has 300 watts input. W9LRN worked W6AM on Convention Hotel in Chicago. W3AZU paid W9AND and CKM a visit. All traffic at W9ENH came from W9USA. W9DDE is building e.c. rig for W9WR. Crystal controllers: W9MSV, LOK, MKQ, NIN, KIC, KIT, ITL, MRH. New reporters: W9ISG, NRV, MAJ. Attended World Wide Convention: W9CEO, AYO, CFV, AFN, AVB. Rebuilding: W9HMB, HUX, DBO, LNI, FXE, LIV.

Traffic: **W9USA** 2644 ERU 316 AND 315 ILH-KJY 220 DOU-NN 127 JZY 82 FCW 81 DXZ 67 ICN 63 EVJ 59 DZU 57 HHQ 56 LZU 55 ENH-JOC 44 HNK 39 IU 36 AMO-FOC-KEH 30 IEP 28 HQH 25 CUH 23 AFN 22 APY 16 DJG 15 EMN 14 GYP 12 BYZ-NRV 11 FGN 10 AYO-ISG-MLH 8 JCG 7 AVB-IUF 6 HUU-HUX-KIM 5 CEO-DBO-GRW-HMB 4 AAK-BSR-LNI-MSG 3 AAR-BIN-LRN 2 HPK-IYA-MAJ 1 DDE 17.

INDIANA — SCM, Arthur L. Braun, W9TE — W9AET is working at WOWO. W9AIP has '04A c.c. rig. W9AKJ spent few weeks in Mich. W9BTR is doing service work. W9CHA has e.c. monitor. W9CKB is doing big cond. business. W9CKG returned from vacation. W9CRZ is coming along fine. W9DET was visited by W8GIZ. W9FLV is on 1.7 mc. 'phone. W9EGV is lining up schedules. W9EPT went to Worlds Fair with HML. W9FQ is doing fine job as RM. W9FVI worked a K6. W9GFS worked VOQH. W9GYB will be back at Purdue to school. W9OMS is new at Evansville. W9HKH is preparing to enter Swarthmore College. W9HML visited the X-YL W9ILH. W9HOL reports traffic. W9HPQ was visited by W7CSE. W9HSF is working on 'phone rig. W9HUO will be on with c.c. rig. W9HUV heard W4MR and W5AVF on 28 mc. W9IMT will be on with new rig. W9JRR op'ed W9NWB this summer. W9KDD will go back to school soon. W9NTP-OWN-OPF are new at Terre Haute. W9DFE worked EAR. W9LLV won a Candler System course prize. New reporters: W9EGQ, HDB. W9MBG reported traffic. W9MIG is building MOPA. W9MQQ is open for good schedules. W9MYP worked a VK. W9NCT wants ORS. W9AEA is proud of his c.c. rig. W9VW is building high powered rig. W9JHY will be on 28240 kc. every day from 5 to 6 PM CST starting Sept. 15 with test schedules. W9LLE is getting ready for 1.7 mc. 'phone. W9OFA is new at Ft. Wayne. W9JTU works 14 mc. W9JQX has new receiver. W9KFS has c.c. rig. W9MZB is in the hospital. W9LWK wants reliable schedules. W9EBU will be on c.w. soon. W9APV and JLH were married Aug. 10. W9VW was one of the "Attendants." W9AXH has new FBX-A. W9MSZ has visions of new transmitter.

Traffic: **W9AET** 604 FQ 238 MQQ 115 GFS 149 EGV-HML 134 HKH 129 EPT 60 CRZ 31 CHA 15 DET 28 GYB 25 HDB 36 HOL 25 MBG 74 MYP 13 NCT 1 LLV 12 HUV 13 AIP 20 EGQ 5 AXH 4 HPQ 5 HSF 30 JRR 3 KDD 4 MIG 2 AEA 1 TE 18 FYB 2.

KENTUCKY — SCM, Carl L. Pflumm, W9OX — W9AUH leads with BPL honors. W9ALD changed to c.c. W9BWJ looks for bigger and better tubes. W9ERH is handling Fort Knox traffic. Listen to Ky. news from W9IFM at 6:30 a.m. and 7:00 p.m. Mon.-Wed.-Sat. W9AQV is working 14 mc. c.c. Somebody tell W9BAN where to find traffic. W9ETT and CNE have FBX receivers under control. W9FQQ needs 6 crystals for his transmitter! W9CIM used two '01As in Ky. QSO contest. W9BAZ goes to Chicago Convention and wins FBX! W9KTO visits W9USA. W9AEN and JYO return to air. W9MWR likes Ky. QSO party. W9IQK leaves for Purdue. W9JVA wants a 7 mc. rig. W9FZV is convinced ham radio is more important than a new XYL. W9OX is rebuilding FBX. W9HAX is busy at Fort Knox. W9FGK will be on in Sept. W9HCO has fine 14 mc. QSOs. W9NEP is new station at Owensboro. W9ABV is going 56 mc. W9IXN qualified for 3.9 mc. 'phone. You fellows who want copy of Ky. bulletin, be sure to report on 15th.

Traffic: **W9AUH** 598 ALD 87 OX 74 BWJ-ERH 46 IFM 43 AQV 37 BAN 31 ETT 29 FQQ 23 CNE 20 CIM 19 BAZ 17 ELL 10 KTO 8 AEN-JYO 5 MWR-IQK 2 JVA-FZV 1.

MICHIGAN — SCM, K. F. Conroy, W8DYH — Marquette Amateur Radio Club, Copper Country, Detroit Amateur Radio Ass'n and Owosso & Gratiot County Clubs all report successful Ham PicNics. W9CGP and EGF work 56 mc. W8AYO reports W8AFH is an old married man. W8EFI's YL found a better ham. W8BIU and TG handled first 56 mc. traffic reported. W8GA says "BOOST 56 MEGGIES." W8TG is on the verge of a life-long ticket. W8QT reports AZQ has typhoid, or is it nurse-fever? Nurstz! W9DAB on 14 mc. QSOed 5 continents — from W9GXE. Yeah, W9CWR, W9BBP now claims he's been fighting forest fires! W8NQ tried twisted feeders per Kwist. W9FBC is going west — where men are men — but why? W8IFD is back from Scout camp. Milt is back at W8BGY. W8GSZ schedules Hudson Bay Exp. W8GDR will be a two-op (say it fast) station with 9IJH there this fall. Amateur radio sent a doctor to Isle Royale from mainland and saved man's life — good work, W9BBP & W9NPN! W8CSL's 2x2 mast still stands. W8GMB's ears are burning and his nose is itchin' for new receiver. W8FEE is winning that HFU/FEE traffic contest. W8BKU is hitting the old bottle hard — '10. W9EEM-NGT reports first Isle Royale hamfest a success. W8BHH is getting ready to dig in. W8FAV complains of Detroit not hearing him well — we hear all and know nothing. W8EVC went YL Woozzie! W8BIN is on with W8DZ and Mr. & Mrs. W8DYH op-ing. W8BJG & W8EVJ keep Monroe on map while W8PP rebuilds. W8AIJ reports W8JNK as new ham. W8HSH and W8FX make BPL with over 100 deliveries. FB. W8BTP's YL is back. W8HAN knocks off his pile. W8JK reports first time in years. W8HA's MOPA isn't moping yet. W8DCQ betters his total again. W8FTV issues warning to the gang with "shacks" in damp basements — 3 months, 24 hrs. a day in bed in hospital for TB and few more months to go! W8HUD DXes. W8EHD is crystalizing. W9AAM is taking to traffic. Congrats to D.A.R.A. President, W8SS, on the Code speed cup won at W9USA! W8AIN schedules Yacht KFZT. And is W9CSI gonna give 'em this fall!! W8BJ is putting out a better Bulletin all the time. W8HBZ closes a successful season at lake — W8HNB. W8FTW, back from N.G. Camp (where he won the war) prepares for schedules. W9HXB is looking for a QRM-less freq. Lookie W8IFE go up! W8DED reports from QSL-ville. Hi. W8AGD, IWM, IXM, KLR, and IXJ are new reporters. W8JO wants a job. W8WG lives again. W8HCC is W8EGI's summer call. Report activities on 16th of month to W8DYH, 19538 Waltham, Detroit — receive free copy of D.A.R.A. Traffic Bulletin and help get Michigan on top.

Traffic: **W8AEQ** 411 BIN 272 FX 197 HSH 183 HFB 140 BJG 123 GSZ 93 FTW 72 CPH 71 FAV 62 IFD 58 HAN 51 GDR 33 JO 32 AIN-HCC-EAM 30 BMG 28 EHD 24 HNB-IFE 22 GQB-TS 19 BGY-GRB 17 AGD-IWM 16 CPY 15 BHH-DDO 12 DED 11 ECG-GQS-GRN-SS 10 FEE-IXJ-JCS 9 ADU-BJ-DCQ-DSQ 8 AIJ-AW-CUP-ETP-JK 7 DVC-JVI-QT 6 BKU-IXM 5 FWG-ICX 4 EGI-EFI-GSP-HUD 3 ACB-BTP-CTD-FRW-WG 2 BIU-CSL-FOV-FXB-TG-WR 1 CFM 100 HZV 1 DXQ 50 **W9NPN** 148 NGT 61 IJH 43 CE 36 DAB 24 CGP 18 BBP 17 IOV 13 AAM 10 HXB-KDE 8 CSI 5 EQQ 3 CWR 2 DSJ-EGF-LLD 1 NSJ 48 FSK 30.

OHIO — SCM, Harry A. Tummonds, W8BAH — Chief RM W8DDS Russell Karg —

It is with a heavy heart that I write this report. Every ham in traffic work knew "Storky" W8BYD ORS and former Ohio Route Manager. W8BYD was drowned at Saulte St. Marie Michigan, August 25th. He was radio operator on the Steamer Marquette. He loved the A.R.R.L. and traffic handling. Let's carry on, fellows.

Dist. No. 1: W8FJX is on 3.5 mc. W8RN is on WTCR. W8EBY is having one grand vacation. "Back on air Sept. 14," says W8DDS. W8BKB reports Cleveland 56 mc. club meeting at W8HC. W8HPW entertains members of C.A.R.A. W8IRM "grinds his own." W8GUL has com'l ticket. W8EFW reports KKQ new ham. W8HGE is X-ray operator in hospital. W8AOA wants ORS. W8BKV and GPG won $800 scholarships to Case School. F. B. W8BAC is Ohio's most consistent reporter last five years. Can somebody find W8DVL a job? W8BON attended Worlds Fair Convention. New vibroplex at W8AUM. W8IAW wants schedules. W8FFK leads whole state twice in a row. W8ACZ has 100 kc. bar for O.O. work. W8GFA reports by telephone. Welcome, W8KIP, Macedonia. W8BFT took charge at Cleveland Waterfront Festival, having ham stations along 25 mile lake front for boat races. Assisting him were W8CIO, COG, DFZ, ZZAW, JMS, ISJ and GOS. Dist. No. 2: W8EEZ joins U.S.N.R. W8BSP is grinding crystals. W8BKM has been ill. W8DDM's call stands for "Where Eight Dirty Dogs Mix." Dist. No. 3: RM W8APC reports for EYP, EIO and EME. Dist. No. 4: 50 watter in final at W8HMH. MOPA for 'phone and c.w. at W8ICC, reports W8KES. W8BWV has receiver trouble. W8ANZ has port. JBJ. W8WE schedules W9ENH and W8EEQ. All portable stations note that W8PO is Route Manager in charge of portable station activity for Ohio. RM W8EEQ wants to know, "Where are all the Cleveland hams." Dist. No. 5: W8HCS says DX in all states. W8BMK uses port. HPO. W8BKP handles traffic with NY2AB. W8FGV is rebuilding receiver. W8FDV has been at Camp Perry with N.G. New reporter from East Liverpool: W8KLP. Dist. No. 6: W8BBH schedules W6BKY, W9OX, W1MK. W8GGU responds with FB report. W8GDC reports that JPW is new Columbus ham. W8GZ says "A.A.R.S." W8FJW and HTI want to know how to get traffic into Columbus without mailing. W8GSO has port. JDD. 100% 'phone at W8ARW. Report from W8EQC. W8IZQ has been training at Camp Perry. W8HEY is building new rig. Dist. No. 7: W8EBQ operates on 7050 kc. New rig using '61 at W8FRV. Dist. No. 8: W8EDY reports new hams: W8ES, HXQ. '52 final at W8BRQ. W8FSK burns up a lot of equipment. Dist. No. 9: W8DTD schedules W9AET, W8EEZ, HVV, DGZ, IZQ, AUM, GUB. Transmitter trouble at W8DUV.

Traffic: **W8FFK** 642 EEZ 316 IAW 202 DTD 106 EEQ 68 BBH 67 AUM 69 HTI 59 BSP 58 GGU 46 EQB 45 BON 39 HCS 38 DUV 33 HMH 32 ICC 31 DVL 29 BMK 28 BKP 26 GDC 24 GZ 21 FJW-GSD 20 BAC 16 BWV 15 BRQ 11 GFA 10 FSK-ANZ-ARW 9 IZQ-BKM 7 BKV-FGV 6 AOA-HGE-ACZ 5 EFW-GUL-ZZB 4 FRV-EDY 3 EIO-EME-IRM-WE 2 EYP 1.

WISCONSIN—SCM, Harold H. Kurth, W9FSS—W9HRM leads traffic. W9GFC bought a ping-pong table. W9HMS took over AMB's schedules. W9DNU kept two schedules. W9LFK did traffic work. W9HKL reports. W9ARE attended Chicago hamfest. W9MPV built new receiver. W9JAN is satisfied with new regs. W9IYL is QRL night work. W9BCF visited Milwaukee hams. W9CD married. Ex-9CJU is W9LSW. W9AKT is cruising. W9JDP, FSS, and HAV visited W9USA. W9HVB is home after sailing. W9KQL vacationed at Devils Lake. W9HVA is going on camping trip. Milwaukee Radio Amateurs Club had a picnic at Pewaukee Lake August 13. W9JBI is QRL YL (W9FSS' sister). W9LJJ is building neat transmitter. W9NLE is good at blowing fuses.

Traffic: **W9HRM** 352 AMB 350 HMS 222 DNU 185 ATO 168 HSK 94 FSS 20 LFK 16 HKL 8 HGF 97.

DAKOTA DIVISION

NORTH DAKOTA—SCM, Wm. A. Langer, W9DGS-IFW-W9KBE attended World's Fair Convention. W9DOY has "Grammer" TRF receiver. W9JAR and DYA received licenses. W9EVQ is QRL BCL servicing. W9IGR is experimenting with Lamb's new crystal circuit. The J.R.R.C. sponsored a "Hamfest" August 11, climaxed by an interesting talk by A. A. Hebert, A.R.R.L. Treasurer and Fieldman. W9FIV moved to Minneapolis. The SCM has an SW3.

Traffic: **W9KBE** 79 DGS 22 DOY 14.

SOUTH DAKOTA—SCM, Carrol B. Miller, W9DKL-GIO-RM Dist. Nr. 1, W9DGR. W9BJV, DKJ, and IEK attended World Wide Convention. W9CAU received Extra First Ticket. W9CFU is preparing for big winter. W9IQD received new ticket. W9GYG completed new rig. The Aberdeen and Redfield Amateur Radio Clubs are sponsoring a Dakota Hamfest at Redfield. For more details write Mert Hassie, W9DKJ, Aberdeen. W9AZR is now RM Dist. Nr. 2. W9AZR and DKL are planning a mimeograph bulletin. W9IQZ is on 3.9-mc. 'phone. W9JLA has new power supply. W9ALO is using '01A Ford spark coil supply. W9NM awaits station license. W9NCN is new Cottonwood ham. W9GTG will be on 1.7-mc. 'phone. W9GQH sends O.B. at 5:30 p.m. and 7:30 p.m. each day on 3978 kc. (phone). W9CRY sends O.B. at 7:30 p.m. Wed. and 11:00 a.m. on Sat. on 7250 kc.

Traffic: **W9DKL** 71 TY 42 IQZ 25 GTG 17 FOQ 9 JLA 4 ALO 3.

NORTHERN MINNESOTA—SCM, Robert C. Harshberger, W9JIE—Our new RM, W9JID, leads the Section and hits the BPL! New ORS: W9HNS. W9HDN's best DX for month: LU2. W9NVU is John Lilly's port. to be located at Calif. Tech. W9DJW is building NVU's port. W9HRB gets QSA5 R8 in ZL. W9GBG works K6 on 3.5 mc. W9JIE is heard in ZL on 3.5 mc. W9LEX is putting in 50 watter. W9IPN would like reports on his Official Broadcast Mon., Wed. and Fri. at 5:30 p.m. and Sunday at 10:00 a.m. C.S.T. W9KEE (port. JID) is at Anoka County Fair. W9LAY is new reporter. W9AEL is moving to Florida. W9HNS is underfeeding his 242A.

Traffic: **W9JID** 559 JIE 267 IPN 135 HDN 48 HNS 26 IMI 24 OBE 18 AZV 8 IBJ 7 DPP 8 AEL-AZJ 4 BBL-ISA 1.

SOUTHERN MINNESOTA—SCM, Norman Beck, W9EPJ-CGR—W9DEI maintained six schedules to make BPL. W9HCC reports poor traffic work. W9BLG is located at Mpls. W9BN is preparing for fall traffic. W9JFH wants ORS. W9CPP handled W9USA traffic three weeks old. W9HFF reports via radio. W9EPJ is building April SS superhet. W9KDI is rebuilding for 1.7-mc. 'phone. W9IDF is building new receiver. W9IAE's new SS works like million bucks! W9AIR is on the river operating WNBG. W9BNN sends his 36th consecutive report with traffic!! W9FCS is experimenting. W9RKK and GLE are getting lined up for fall. W9LDQ is looking for schedules. W9ZT is taking a trip to New York. W9CSY rebuilt rack and panel. W9CSJ is QRL new receiver. W9FNK is taking it easy at summer cottage. W9DH is moving again. W9FIV moved to Mpls from Bismarck, N. D. W9JYA and DEV attended World's Fair. W9DCM is getting all set. W9EYL is building 56 mc. rig. W9WY leaves for Schenectady, N. Y. to make his home.

Traffic: **W9DEI** 622 HCC 609 BLG 63 BN 53 JFH 45 CPP 32 HFF 16 EPJ 15 KDI-IDF 13 IAE 7 AIR 6 BNN-FCS-BKK 5 LDQ 4 ZT 3 GLE 2.

DELTA DIVISION

ARKANSAS—SCM, Henry E. Velte, W5ABI—W5SI built new receiver. W5BDR won a cup at World Fair Convention. W5ABL, BMI, CLQ, CNB and IQ took in the Fair. W5LK has 'phone rig. W5PX is new RM. W5BED is responsible for many nice reports from N. W. part of state. W5CCW has new bug. W5BTX has pair '03As. W5DEQ, DRW and DKX are new hams. W5CSN is at KUOA. W5BSG worked VKs. W5BXM can't keep his mind off the Kansas YL—W9CMV. W5MU is QRL new OW. W5DFM is having MG wound. W5DHN has

MOPA. W5CVO has new antenna. Crystalizers: W5BDD, ABI.

Traffic: None reported.

LOUISIANA—SCM, W. J. Wilkinson, Jr., W5WF—W5CEN visited 8th district. W5BFB sold out. W5CAX is in hospital in Battle Creek, Mich. W5BYY and BYQ have combined. W5PY is laid up. W5CW is building 14 mc. 'phone. W5BZR visited sixth district. W5DLD wants ORS. W5AYA is trying to get doubler to work. W5AXU, EB and ex-W5NS visited in Shreveport. W5ASJ-WJ let NRA put him out of QSL business. W5ANQ is in Monroe at KMLB. W5BI is in New Orleans. 28 mc ers: W5AGM, AKW. 56 mc er: W5CUR. W5NM wants traffic. W5DAQ handles traffic. W5ACY is selling Coca-Cola and 3.2. W5BN, AO, EB, ZK and VT will be in A.A.R.S. net. W5AFW has been working hard on plans for convention. W5ACV has transmitter working FB. W5AOZ blew '66. W5CXQ has doublet. W5DKR is in N.O.L.A. W5ACA has motor cycle fever. W5CSD is on 1.7 mc. 'phone. W5LA is on 14 mc. 'phone. New hams: W5DMF, DIQ, DPQ.

Traffic: W5ZK 45 BYX 22 DLD 46 AYZ 144 BZR 59 NM 1 AFW 170 AEH 1.

TENNESSEE—SCM, F. F. Purdy, W4AFM—Chief RM, W4RO, sends nice report. W4BTQ promises better report. Don't forget Delta Division Convention at Memphis, October 21 and 22 at Gayoso Hotel. W4AAD, EM, ZZ and BGQ attended World's Fair. The East Tennessee Amateur Radio Association is planning big hamfest at

MRS. ROOSIE CAMPBELL, W4CDR, JOHNSON CITY, TENN. W4APF'S YF AND FIRST AND ONLY YF OPERATOR IN TENN.

Johnson City latter part of October. For dope write D. G. Sherrtize, No. 5 Washington Apts., Johnson City. W4AFM, BOZ and RO are preparing for A.A.R.S. W4TM says gold is like Class B modulation, "it don't mean a thing if it ain't got that swing." W4BDZ, VT, ADX and PL report good DX. The SCM acknowledges letters from W4AEP, BOZ, BKI, PL, HA and BPC. W4AOY has at last achieved that W6CXW note. W4ADI has '45s. W4BKI will return to hard study in Fla. W4HA will be QRT indefinitely due to long hours.

Traffic: W4RO 223 BKI 137 PL 87 AAD 78 BOZ 76 AFM 75 BQK 72 AYU 60 OV 41 BTQ 36 BDZ 35 CCN 30 ABQ 28 ATW 26 ACT 14 BBT 11 AOY 6 ADX 5 VT 4 ABX-AEP-AFI 2.

HUDSON DIVISION

EASTERN NEW YORK—SCM, Robert E. Haight, W2LU—W2UL leads the section. W2BXS is portable of W2AJD. W2BLU reports traffic increase. A rush message was put in Phila. by W2EGF in fifteen minutes. W2FPH applies for ORS. W2ACD is on 3502 kc. W2FEQ QSPed direct to K6EWQ. W2ATM has FB schedules. W2BIA has watch repair business. W2QY uses portable W2FMW at Liberty, N. Y. W2CFU is completing 1934 model transmitter. W2BJA is lining up for fall. W2CJS with W2EGF visit S.A.R.A. W2BLL was vacationing. Thanks, W2CSM, for report. Welcome, W2GFD and GIH. W2CL visited HQ. W2CO attended S.A.R.A. picnic with SCM. Don't forget S.A.R.A. annual banquet in October!

Traffic: W2UL 633 BXS 194 BLU 132 LU 108 EGF 53 FPH 47 ACD 40 FEQ 35 ATM 22 BIA-QY 16 CFU 8 BJA-CJS 3 BLL 1.

NEW YORK CITY AND LONG ISLAND—SCM, Ed. L. Baunach, W2AZV—W2CHK is now L. I. RM. W2DRG and ELK are ORS. W2DBQ has been touring L. I. with W2AZV. W2BYL was heard in Germany on 3.5 mc. W2AWT sends last report due to YL. W2EYS' receiver went bad. W2EXO will soon have WAC. W2FAS blew power transformer and '66. W2ETD has a Collins 32B. W2DFO reports for Harlem Radio Club, W2ESK. W2CPY and DSR report traffic on 56 mc. W2CEH is teaching YF how to be a ham. W2FHB is High School Football captain. The outdoors have claimed W2DBE. W2EGA is experimenting. W2EWS has SW3. W2FDQ's transmitter was rebuilt by W2EYQ. W2BVT is now a "papa"! W2CYX sends big report. W2CBB has 2 ops. W2DOG blew a '66. W2BSR gets plenty of DX. W2US has remote controlled outfit in attic. Tennis keeps W2UK from the key. W2FLD says current fed Hertz with twisted pair lamp cord feeders works FB. W2AIZ reports for W2AND. W2BIN will be QRL Cornell "U." W2DTT worked EAR185 three times in succession. W2PF and AZV are QRL Radio Show in Madison Square Garden. W2CLM handled traffic for President Roosevelt. W2GBQ, GGS and GIA are new reporters. W2CAC sends first report. W2DFS takes traffic on 3.9 mc. 'phone. W2BNJ is doing FB portable work from 'plane. Rebuilding: W2AGL, DL, ELB, ETL, FIS, LB, LG. W2SC makes BPL. W2DUP is working on key-kliks problem. W2BPJ is after ORS. W2CHK and EWF returned from trip from HQ minus one good tire. W2DNW's MOPA gets out FB. W2GAU can be heard on 1.7 mc. 'phone. W2BFR is on 3.9 mc. W2BST has remote control zepp. W2FLL gets R7 reports from N. J. on 56 mc. W2BFG is QRL fishing. W2FFG is radio service man for Nassau County Police. W2HP had BV success with Aug. *QST* Transceiver for 56 mc. W2FHR and VL can be heard on 28 mc. W2WX went to HQ. W2DJX is on 56 mc. W2AEN has taken the final step. W2CIH is building 56 mc. transreceiver for work with port. W2GHD.

Traffic: W2CHK 586 CBB 569 SC 565 EYQ 284 CYX 164 BNJ 103 DBQ 96 AGL 59 ESK 22 CAC-AIZ 21 EYS 19 AWT 18 DJP 16 AZV 15 BAS 14 BIN 12 PF-CPY-VL 10 ELK-AND 6 LB 4 DOG-DRG-CLM 3 GH-DSR-ASG 2 DFS 1.

NORTHERN NEW JERSEY—SCM, Walter A. Cobb, W2CO—W2EKM carries the load with grand total of 1053!! W2ELJ had to revert to '01A. W2CGG reported via W2EKM. W2ABT spent his vacation in Akron. Laying out a 200 watt MOPA at W2ESX. W2CIM reports Rutherford Radio Club on vacation. W2AIF threatens to reapply for ORS. W2EKV tried 7 mc. W2AFK of Bayonne would like schedule with Monmouth County. W2AHL reports for first time in five years. W2DSP graduated from Rahway High leaving W2CTT all by his lonesome. The Tri-County Radio Assn. has been formed and will meet every Monday at Rahway Y.M.C.A. Officers: BTZ, Pres.; ALK, V. Pres.; AUQ, Secy.; AMB, Treas. W2BXM received a heard card from Tunis. W2CTV and EIC are moving. W2SN is doing a remarkable job in handling of the QSL Bureau and new Boy Scout network. W2BZM went on a 15 day U.S.N.R. cruise. W2DGU would like to swap ham photos. W2FLP reports from vacation on Cape Cod. W2EXQ got started with PP '45s. W3BGA at Green Pond complains of dearth of visitors to his shack.

Traffic: W2EKM 1053 ELJ 37 CGG 15 ABT 11 ESX 9 EJK 7 CIM 4 EIC 2 EKV 52 AFF 34 CTT 29 BXM 13 AHL 4 AVP 82 CWK 44 CIZ 30 EIP 17 BPY 7.

MIDWEST DIVISION

IOWA—SCM, George D. Hansen, W9FFD-JXA—RMs, W9ABE, BPG, HPA. What a total W9ZZAF has! W6ZZBL runs second. W9AHX gets a few. W9ABE reports new ham, DNG. W9ERY works on Old Settlers at picnic and adds to totals. W9GWT keeps schedules. W9DZW-GP is on 3875 kc. W9DUE installed transmitter at local fest. W9FFD schedules W9USA. W9LFF in-

creases power. W9ACL misses the 3.2. W9GXU uses c.c. W9FZO returns to activity. W9JDV reports skywire on strike. W9JMB had W6HMR for visitor. W9NDN is open for schedules. W9CWG had good time at Chi. W9EIV is building s.s. W9CYL visited W9HMOQ and IQR. W9DNZ is resuming activity. W9DBW reports a dandy vacation. W9FYC is rebuilding port. W9HOH had trouble with QRI. Council Bluffs Club is affiliating with A.R.R.L. W9NTW has ORS aspirations.

Traffic: **W9**ZZAF 971 ABE 137 ERY 86 GWT 26 DZW-DUE 23 FFD 22 LFF 19 GXU 17 ACL-FZO-JDV 10 JMB 7 NDN 6 CWG 5 EIV 6 CYL 2. **W6**ZZBL 213.

KANSAS—SCM, O. J. Spetter, W9FLG—W9KG and CFN, RMs. CX7 sets the pace. Following make BPL: CX7, W9PB, FLG, GKJ, EIB, FRC, GWN, KDO, YAB, AWB, and BNU. W9MUY is new ORS. W9AHR is looking for reliable schedules. W9CSK, late W7DQI, moved to Mildred. W9EHA is building c.c. job. Southeastern Kansas hams staged a Hamfest at Burlington. W9IQI was operator at CX7. W9LVS is on 1.7-mc. 'phone. W9BNU sends a fine report. W9BUY is trying line coupling between stages. W9IQV is building new receiver. W9COA is on 56 mc. W9CWW sends first report in seven years. W9FLG has new receiver. New reporters: W9HLD, IFR/NIR. New stations: W9OQC, NOG. Rebuilding: W9AWB, DEB.

Traffic: CX7 3879 **W9**PB 811 FLG 521 GKJ 363 EIB 331 FRC 288 GWN 256 KDO 234 YAB 195 AWB 164 BNU 161 IGQ 230 BYM 128 APF 127 MUY 122 EYY 114 KCR 97 IEL-KG 80 AWQ 75 GBP 65 KFQ-CNW 28 BEZ 26 IPD-CWW 14 GHI 12 LGV-EFE-BDB-BGL 10 HLD 6 ESL-IFR-COA 5 CSD 2 LVS-NL-CTP 1 AHR 100. **W5**ZZD 38.

MISSOURI—SCM, C. R. Cannady, W9EYG—RMs W9BMA and FTA. W9BAU leads section with two days' traffic work. W9CJR holds scant margin in NEW CUP race. 3.5 mc. traffic stations: W9JAP and AAN with one schedule; W9LBA; DHN; MLR; W9ENF; JBZ, HC2 dx; W9MZD holds three schedules. W9JBV has one schedule. Rebuilding: W9AIJ, IYT, FZJ, BKO, AHH. W4DIC, OKR and W9KOI are new 1.7-mc. 'phones. W9LCG works all U. S. with 3 watts to '01A. W9GQY is experimenting. Moving: W9HNM to Brookfield; W9ARH back to Kirksville with KVN. W9EDK wants schedules. W9CRM sent message via W8JGR for WWJ, "The Detroit News" and got nice write-up in the "News." W9LBM is on 7 mc. W9LBA is on 14 and 3.5 mc. W9ASV keeps ZL3AR schedule. W9NIH is new ham. W9HUG keeps two schedules. W9GBJ is back to work. W9FVM holds one schedule. W9EHS, FYU, and IXO nearly QRL. W9HUZ, 102 QSOs last month! W9IJW kept dope on revolution by working CM's. W9BGE rebuilt 'phone. W9EFC is new secretary to OBP. W9FTA had convention QRM. W9HWE hooks HC2JM on 14-mc. 'phone. W9GCT goes back to Michigan. W9DGI, EOW, BMA "Waiting for convention." W9GDU sends convention data report. W9RR, CFL, GSF, INX and LEO get cruises in U.S.N.R. Reported by W9LHQ: Heart of America Radio Club held an outdoor picnic at which W9EDT es W9JRR gave 56 mc. demonstration. W9LLW blew filter. W9LWO expects to be on 14-mc. 'phone. W9LLW is out for schedules. W9JOS is ready for winter. W9HON QRL YLs.

Traffic: **W9**BAU 188 RR 182 ARH 100 CJR 70 ASV 66 JBV 60 MZD 42 HUZ 40 JBZ 38 CRM 34 EYG 26 ENF-FTA 22 AAN 16 AHH 15 FVM 14 BGE 13 HUG 12 EDK-MLR 11 GDU-HWE 10 IYT 8 EFC-GLY-IGW 6 AIJ 5 GBJ-ZZ 4 JAP 3 LBA-LBM-DIC-OKR-DHN-EHS 2 BYN-LCG-IJW-NOY-JPT-HCP-CON-FEH-LLJ-LTN-DGI-MAK-JUB 1.

NEBRASKA—SCM, S. C. Wallace, W9FAM—W9DFF takes the lead. W9DI was operated on for a "pin-in-the-seatus." W9DXY has 2604 kc. rig for U.S.N.R. work. W9AFD-IFZ at N. G. Camp. W9EWO is QRL attending hogs. W9GNZ has new transmitter. W9DHA reports foresters going hot at Chadron. W9NPJ has new baby boy. W9HTU made a couple dollars for new junk. W9EIZ went to Denver via aeroplane and took second class exam. W9NPJ is on 1970 kc. 'phone. W9FAM has been busy with BAND work this summer.

Traffic: **W9**DFF 112 DI 87 DXY 5 AFD/IFZ 10 EWO 3 IFE 86 HTU 22 EIZ 19 NPJ 5 CUY 63.

NEW ENGLAND DIVISION

CONNECTICUT—SCM, Fred A. Ells, Jr., W1CTI—RMs: W1BHM, CJD, AFB, AMG. W1MK is operated by Rodimon Mon. night, and by Battey, Thurs., Fri. and Sun. W1CVL turned in fine report. W1DOW has sure fire schedules. W1BQS reports new ham, W1GUL. W1EWD promises ORS application. W1GC is painting house. W1CJD's power transformer went up in smoke. W1ERU added a buffer stage. W1GXR is located at boys camp in Southington. W1BDI is about ½ on the air with temporary antenna. W1ETE is going to M.I.T. W1AMG is working on Navy net. W1UZ is building 1000v power pack. W1EBT's ambition is to own a 50 watt c.c. rig, s.s. receiver and South Sea Isle. W1GGX and his brother, AMG, visited CJD. W1DGG is sailing the ocean blue. W1TD is rebuilding. W1EEY has antenna trouble. W1EFW says W1BQQ boasts four operators. Hamonics is still published by W1CBA. If you don't receive it, drop a line to P. O. Box 502, Norwalk, Conn. W1GUC went to N.G. Camp. W1FVR is struggling with power supply. W1HAG got some filter.

Traffic: **W1**MK 273 CVL 154 DOW 80 BQS 70 EWD 49 GC 15 CJD-ERU-CTI 14 GXR 11 BDI-ETE 8 AMG 7 UE 6 UZ-EBT 4 GGX 2 CNU 2 CBA 16 GKM 1 HAG 3.

MAINE—SCM, J. W. Singleton, W1CDX—New hams: W1GGF, HIL. W1BOF is publicity manager, U.S.N.R. section one. W1GKC has nice schedules. W1EFA is building A.C. receiver. W1FJP is putting in c.c. W1APX is QRL boat races. W1DHE earned WAC. W1FKH is back from N.G. camp. W1VF is rebuilding Frequency Meter. W1BNC is on vacation. W1CIP is QRL work. W1ABQ holds down Portland traffic terminal. W1DKO moved to Panama Canal Zone. W1CDX will be on regular schedules soon. Mrs. W1CDX thanks all the gang for their hearty congratulations. The Bar Harbor gang put over a bang up Hamfest Aug. 5 and 6. W1CRP will be back soon. W1EFA of Dover-Foxcroft doesn't have to worry about his QSL cards going astray. His father is postmaster of the town.

Traffic: **W1**BOF 154 GKC 93 ABQ 46 CDX 30 EFA 29 FJP 26 APX 9 GGF 8 DHE-FKH 7 VF-AQW 4 DHH 21.

EASTERN MASSACHUSETTS—SCM, Joseph A. Mullen, W1ASI—Here are the finals on Eastern Mass. Traffic Contest: W1BZO gets Handbook with total of 249; 1AGA was second with 232; W1EVJ gets log books with 77; W1ESK with 76 gets message blanks. W1ASI is QRL studies. W1ABG has gone NRA by adding a Jr. op. and cutting down on operating hours. W1KH advises that 1st meeting of E.M.A.R.A. will be held Oct. 4th. W1BFR is organizing for fall. W1BBY visited his VE1 friends. W1EVJ has new rack and panel. W1ABF reports YL QRM. W1BMW makes his dollars while the summer sun is shining. W1DFS is working in Boston. W1JL has '01As in PP. W1RE shows prospects of good ORS. W1CEL sky-rocketed past 100 for a total. W1ESK handled Alaska's SCM report to Hartford. W1IB uses 242-A. W1ALP is on 7 mc. W1ENN took in Chicago Convention. W1WU is QRL with his "FLOURS," (at the bake shop). W1FEU has abandoned c.c. How many of the gang would like to have a traffic meeting the first part of October? Write W1ASI, if you so desire.

Traffic: **W1**ESK 286 CEL 108 KH 58 DFS 55 AGA 51 EVJ 42 ABG 34 BBY 32 BEF 29 JI, 27 RE 24 BMW 18 FEU 17 GAG 14 BZO 9 ENN 3.

WESTERN MASSACHUSETTS—SCM, Earl G. Hewinson, W1ASY-RB—W1DGW reports traffic. W1EOB built a bug. W1BVR promises visit to Springfield Clubs. W1EAX reports for first time. W1FAU raised power 100%. W1DVW and ASY are rebuilding. W1ADF has new keying arrangement. W1CJK was QRL Century of Progress. W1OF spends summer QSOs at W1AWW. W1BNL moved again. New officers at Western Mass. A.R.A.: W1APL, pres.; W1BGY, vice-pres.; W1GBZ,

secy.; W1DJB, treas.; W1EVZ, act. mgr.; mem. at large, W1BPN; tech chair, W1CCH. W1EFM handled a rush message for medicine.

Traffic: **W1**DGW 51 APL 44 EOB 43 BVR 40 EAX 27 DCH 26 EVZ 25 ARH 22 AJD 18 ASY 19 FAJ 13 DVW 10 ADF 9 COI 4 CJK-BVP 2 AWW 6 EFM 89.

NEW HAMPSHIRE—SCM, Basil F. Cutting, W1APK —Hello, gang. Here goes my first report. Let's give W1ATJ many thanks for his work in the past. W1AVJ spends spare time at Lake Winnepesaukee. W1BFT is experimenting on 56 mc. W1AUY is vice-president of New England 'Phone Ass'n and Phone R.M. of N. H. W1IP is still c.w. R.M. W1EZT rebuilt power supply. W1BMM will give 7 mc. gang competition this fall. W1ANS has been busy fishing, etc. W1EAW and APK had an FB week-end at EAW's camp at Tucker Pond. W1BXU is QRL gasoline station. W1AVG is going to put up 70 footer. W1DSX has been working in Boston. W1CE is going into session with the R.I. W1BVJ is QRL. W1SK offers ham rates on all dental work.

Traffic: **W1**EZT 2 BMM 1 APK 14.

RHODE ISLAND—SCM, Stanley W. Atkinson, W1AFO—W1EOF is lining up schedules. W1DBA, EZW and DDY moved. W1ASZ says, "1.7-mc. 'phone FB." W1FAH continues E.C. experiments. W1AGB gets out on 1.7 mc. W1CZB reports from port. station in North Kingston. W1CPH sticks to 7 mc. W1GPE gets traffic on 1.7-mc. 'phone. W1FNE works DX on 14 mc. W1EI is on 3.9-mc. 'phone.

Traffic: **W1**EOF 28 DBA 26 AFO 25 ASZ 16 FAH 14 AGB-DDY 13 CZB 11 CPH 10 GPE-FNE 8 EI-EZW 6.

VERMONT—SCM, Roy L. Gale, W1BD—W1EFC took traffic from G6YL. W1GAE sends first report. W1DTF is drill-sergeant at C.C.C. camp. W1BCK and DAQ visited ATF. Ex-W1BZD was in Windsor. W1DHX leads in traffic. W1DQK is trying 28-mc. 'phone. Several hams visited W1BJP.

Traffic: **W1**DHX 89 BJP 20 GAE-EFC 4 FPS 3.

NORTHWESTERN DIVISION

ALASKA—SCM, Richard J. Fox, K7PQ—This report received by radio at W1ESK and mailed to HQ. K7CHP is at Cape St. Elisa Lighthouse. K7CCL joined Army net. K7BDB is at Juneau. W6ESP and K6GRV were visitors at K7PQ. K7AHK is leaving Alaska. K7AZS is moving. K7BAQ's Collins 32 is getting out fine.

Traffic: **K7**TF 10 BNW 21 VH 21 FF 26 CCL 43 AZS 69 PQ 80.

MONTANA—SCM, O. W. Viers, W7AAT—W7FL attended Jenny Lake convention. W7ASQ is QRO. W7CCR is on 'phone. W7BGC has "unlimited." W7CTP has new receiver. W7AOD worked G2IO. W7BDJ says nobody has traffic. W7CSG is A.A.R.S. W7BYR resumes schedule in Sept. W7BVE worked K6DSF. W7AHF is getting on at Kalispell. W7AFS received heard cards from Germany. W7CEG has c.c. W7CRH has '10s, PP, for final. W7CDG has port. DRX. W7BXZ handles traffic. W7DSQ is out of hospital. W7DTC has transmitter trouble. W7ARP, BDC, BUM, and DOQ visited AAT and COX.

Traffic: **W7**CTP 22 AAT/COX 15 FL-ASQ 7 CCR 12 AOD 10 BVE 1 CRH 3 BZA 15.

OREGON—SCM, Ray Cummins, W7ABZ-CBB—The R.C.A.R.C. wants to thank all who attended the convention. RM W7KL hands in biggest total. W7DTW is port. 1.7 mc. 'phone. W7CMK is back after long seige in hospital. W7AJX and AHJ made headquarters at ABZ's during convention. W7BLN threw his crystal out the window. W7AZJ hooked first K6. W7DCI and AVB have gone c.c. W7LI is grid modulating the '52s. W7CHB holds unlimited 'phone license. W7BNX is going to 56 mc. W7AXO won FB7 at convention. W7DIU has 50 watt c.c. rig. W7CUJ-CUI is in gov't Airways service. W7BUB wants to fall heir to some '66s. W7CUV has 3 stage c.c. rig. W7CXK is A.A.R.S. W7CBA rates a new receiver. W7ASG returned from trip to Atlantic coast. W7QY-K7CFQ is back from Alaska fisheries. W7HD was the hard working boy at convention. W7AIG gets an antenna to work. W7AYV reports that BXQ was presented with a new YL op! W7BWD says operating is tough in Calif. W7WR says the nature of traffic seems to be improving. W7AXJ worked first ZL, VK, and J. W7AOI has developed speech amp. trouble. W7ED moved to Nevada. New hams: W7DVQ, DWA, DVT, DAV, DJI.

Traffic: **W7**KL 416 HD 251 AXJ-WR 215 AYV 128 CXK 76 QY 74 LI 60 ABZ 54 CUV 52 CUJ/CUI 43 ANX 39 APF 26 AHJ 25 DIU 15 BUB-AJX 11 LT-BLN 10 CBA 7 ALM-DJI 4 BNX 2 AIG-BWD-AOI 1 AMF 52. W6GZF 30.

WASHINGTON—SCM, Stanley J. Belliveau, W7AYO —New appointments: W7WY Chief RM, W7LD RM and W7CZY ORS. W7TD, AQ, UO and CBU handled traffic on 'phone. W7DJJ works East on 3.5 mc. W7AHQ was at Portland convention. W7AZA schedules K6. W7BSX and APS send nice reports. New reporters are W7CXL, DLN, DET, BVB, CYW, DPU. W7APR went on vacation. W7AZO, DJO, DDO, AJ, and AF report by radio. W7BUW clicks K6. W7BPM reported personally to SCM while in Yakima. W7CHU and CNC pound on 7 mc. W7BBY reports for Spokane gang. W7CTS and AWY keep ether hot around Ritzville. W7FS and CGO handled lots of Alaskan traffic. W7CSK and CPD think Wash. would look swell with the banner again. W7DGX took trip to Canada. W7BQX and CCT are proud papas of junior ops. W7IG says WX too hot for traffic. W7CHH added another '10. W7ABU has receiving doublet. W7CQI keeps about a dozen schedules. W7AVM clicked first VK. W7CND has c.c. rig. W7DVL is new ham at Lyman. W7AWF keeps tabs on things around Birdview. E.c. rig at W7BKE. W7BFL is moving to Calif. The Tacoma gang gave W7AZI a pleasant surprise on his birthday. W7ACY schedules Alaska. W7BCS' sister ended up with call W7DWF instead of W7DUC. W7UE is active at Edmonds. W7AUP and CAM keep the ether warm. W7AYC has bad case of YLitis . . . yup, it's W7DCN, YL op. W7BGO has c.c. '10 rig. W7AGP is lucky at winning prizes. According to W7BCV things are going to happen this winter. W7BEX gets QSLs from Police Dept. W7BKZ is active in VCR. W7GW puts on a red shirt now and then??? W7TH is QRL ice cream business. W7AHH operates with the baby in one arm. W7AYO got a heard card from Germany. W7DUJ is moving to Eastern Wash. W7BYB is planning 75 watt c.c. job. W7CYO is about to QRO. W7BYS sent report to Director instead of SCM. W7BB spent two weeks visiting S.F. and L.A. gang with AC8GO and W7DL.

Traffic: **W7**WY 341 CQI 257 FS 200 BFL 182 BSX 163 LD 148 CHH 69 AJ 65 APS 64 CGO-CZY 63 CFK 35 AF 33 AZA-DPU 30 IG 29 BCV 27 AGP-BYS 24 DGX 23 BHH 21 BEX-BHJ 19 CAM-CPD-ACY 18 BKZ-DJJ-ABU 17 AWF-DET 16 BUW-CSK 15 DJO-TH 14 CHU 13 CWU 12 CYW 10 DDO-US-BKE 9 GW-CTS 8 AZI 7 AZO-DLN-BCS-CNM 6 AHH-CYO-UE 5 CNC-AYC-AHQ-CXL-CND 4 AMA-BUX-AQ-AVM-AWY 3 CFY-CEZ-CBU-AAN 2 BVB-AUP-BGO-BYB-TD-BPM-UO-APR-CCT-CFZ-RL-DLR-BBY 1 BB 295.

PACIFIC DIVISION

HAWAII—SCM, C. D. Slaten, K6COG—This report received by radio via K6COG—NY1AB—W9BLG. K6ALI is on 7 mc. K6GQF has c.c. rig. K6HZE and K6HVB are new calls. K6COG schedules NY1AB. Chain runs from East Coast through NY1AB clear to China. K6IQL is on his honeymoon. OARC recently gained four members.

Traffic: **K6**EWQ 914 GUA 552 COG 100 AJA 34 EBR 33 GQF 32 EDH 22 CIB 5.

NEVADA—SCM, Keston L. Ramsey, W6EAD—W6AJP has super het. W6HHY is on 1.7-mc. 'phone. W6HCE has XYL now. W6ATN is out in hills. W6UO is installing c.c. W6GYX has key click trouble. W6EGA is installing MG set for a mining company. Nevada Amateur Radio Assn. is building club transmitter.

Traffic: **W6**AJP 31 GYX 33 HGL 19 UO 10 HHY 3.

LOS ANGELES—SCM, Francis C. Martin, W6AAN—A.R.R.L. affiliated clubs of the Section have formed Central Organization. W6ON reports hot WX. W6BLS is rebuilding. W6CPM takes portable job to Lake Elsinore.

W6FZL eloped to Reno, or was it Las Vegas? W6FTV is new RM. W6ALR is rebuilding. Exposition of Progress at San Pedro handled by W6ECY with BGN, DYJ and EDW pounding. W6IX of KFI is new reporter. W6DTS is Alt. NCS, Unit No. 4, Sect. No. 1, U.S.N.R. High power 600 watts building at W6HXU. W6EII is QRL power boat racing. Portable W6IJJ is manned by CQM, GXR, and ENA. W6LC reports FB vacation at Yosemite Park. W6ZZA was in operation at three major radio conventions during July and August. Too bad W6FRB didn't get those other four points for BPL. W6AEO is Sound Engineer at Hal Roach Studios. QRA change for W6FXR. Double team station is Mr. and Mrs. W6DBC. W6HTL looked 'em over at W9USA. W6ACL is pounding at W6CUH and W6QD. W6CVZ blew '52. DX improving at W6ESK and W6DTN reports just the opposite. Sandham, former SCM of the Section, is now Lieutenant, JG, attached to Commanders Staff, U.S.N.R. W6FJT puts his little brother in as Second Op. W6AGF is moving rig back in house. Fifty-ninth country worked at W6CXW. Unlimited 'phone tickets at W6DOK and FJS. The old rig at NDT is being rebuilt by W6EQW. Sick report shows W6IDA with broken arm (glassy) and W6ILV with mumps (and he's 'phone), with W6AHP narrowly escaping serious injuries in auto accident. W6BZZ at Scout Camp is closed until next summer. W6GOR will be QRL Occidental College this winter. W6WT is back at KMPC with better job. Silent Key at W6GHV-Stanley Sidelsky-30. San Gabriel Valley Club will have station on at Los Angeles County Fair in September. Still keeping in touch are W6BIF, BPD, EQJ, FPR, FTU, FUU, FVU. HTO, IGO, IRD, IYI, IVU. Here's the gang that bring up the totals: W6ETL, EII, AZU and BPU make BPL on totals and on deliveries and W6NF, BZZ, GXM and CVF on deliveries.

Traffic: **W6ETL** 1098 ECY 654 EII 610 CUU 550 AZU 512 BPU 511 FRB 415 NF 409 BZZ 357 GXM 323 FGT 216 BGN 206 ESK 195 DTN 186 CVF 170 GNM 102 FTV 108 IX 74 GKZ 67 FOZ 64 CVV 55 EQW 52 GYU 40 AHP 39 CWZ-DYQ 36 FKF-EUV 34 DBC-GEX 33 CXW 31 EAR 30 FDE 27 GJA 26 AAN 25 HXU 22 DJC-DZC-FNG-GAL-GFG 19 GLZ 18 FWN 17 FJT 16 CPM-EQD 15 DWP 14 AM 12 DOK-DQZ-PD 13 CLY-SN-TE-TN 11 BVZ-HBG 10 FZL-GGA-GMA-ILV-IRX 9 BLS-EMY-FMP-IRD 8 FXI 9 FEW-DEH-DOP-HOS 7 CIX-DJS-EGJ-FXL-RZ-IJJ 6 GOX 8 AEO-DGH-DRQ-IIK 5 BGF-DCJ-IXH-WT-ZZA 4 AIF-GC-GNZ-GSL-HT-INC-MA 3 AEM-AGF-EDZ-FDM-FFN-HLS-HTL-IDU-VO 2 AQU-DZI-EWY-GGT-IDZ-TW-EGC 1.

SANTA CLARA VALLEY—SCM, Bruce Stone, W6AMM—This report written by W6DBB due to AMM being on vacation. W6FQY handles transpacific traffic through K6 and K7 schedules. W6FBW has been preparing for Convention. W6DBB received commercial second. Power leak near W6AZC makes traffic handling almost impossible. W6QR is experimenting on 28 mc. W6HJT sends a 'photo of his new c.c. rig. W6DBQ's transmitter went haywire. W6CNN received two cards from W9USA. W6CDX commends the work of sixth district QSL manager. W6DSE has been QRL summer work. W6CEO is rebuilding. W6BMW returned from fighting forest fires at C.C.C. camp. W6HTP returned from vacation.

Traffic: **W6FQY** 248 FBW 122 DBB 67 AZC 63 QR 22 HJT 21 DBQ 17 CNN 15 CDX-FMT 7 DSE 3.

EAST BAY—Acting SCM, J. H. MacLafferty, Jr., W6RJ—CRM, W6AUT. W6AUT has a "sniggle sniggle snooper." W6RJ thanks the gang for big increase in reports. W6CDA is high traffic man. W6CZN says "cheaper to move than pay rent." Who can loan W6APB a power transformer? W6GYA is on 1.7-mc. 'phone. W6BYS took unto himself a wife!!! W6AOJ is QRL A.A.R.S. W6FWO and FMY want 28-mc. schedules. W6AIJ moved to 7000 Lacy St., Oakland. W6HUW is a newcomer. W6GHO got a W1 card. W6HLR makes his own meters. W6FAC's new HV transformer went west. W6CIQ sends the OB 7:15 p.m. P.S.T. Tues. and Thurs. and wants QSL. W6IMI is an old timer. W6AMC is teaching code to beginners. W6HHM is new RM. W6CUG moved across street from a 60 KV line. W6BMZ rebuilt c.c. W6AQO gets out on 3.9-mc. 'phone. W6DUA is grinding crystals. W6ZM is opr. at Redding C.C.C. W6IY joined A.A.R.S. W6IT is QRL service work. We welcome W6BBM back from sea. W6IFO is active at St. Helena. W6HH says traffic picking up. W6FII is "summer active." W6CIZ sends in fine OO report. W6AF is "workin' on the railroad." W6IFO reports for St. Helena. W6EJA schedules KA1CO. W6HWB and IFZ are new reporters. W6ATR has new 211. W6EDO reports nice total for U.S.N.R. W6HRN has 50 in final. East Bay Section organization completed at August 25th meeting. All hams cordially invited to Section meetings second and fourth Fridays at Central Trades School, Oakland. Rebuilding: W6BPC, ANK.

Traffic: **W6CDA** 972 HHM 539 RJ 160 EDO 148 EJA 89 IY 64 FAC 31 FII 28 IFZ 23 IFO 22 HRN 17 ATR 15 HH 10 AUT 9 CIZ-HWB 4 CTE 1.

SAN FRANCISCO—SCM, Byron Goodman, W6CAL—W6PQ BPLs. W6ABB seeks ORS. W6AWA has s.s. super. Plans for coming year at W6NK. W6ATP and BIP worked Africa. W6EKQ celebrates return of job. W6ARG sends dope on Eureka gang. W6BTZ seeks ye shiny gold in the raw. W6GIS asks, "Convention or c.c.?" W6AZK threatens to get a '52. School QRM at W6GKO. W6FCX swears by c.c. oscillators. W6JAL reports over 400 QSOs in two months. W6CIS says TL will be perking next month. W6GXV is building c.c. PP '03As. Three VKS in one night for W6GWW's '45s. First reports from W6IDN, JCC. GWH, IPH, IYN. W6AVX vacationed upriver. W6DO says s.s. super batting about 98%. Receiver grief for W6GNV. W6HTI *almost* raised his 1.7 mc. K6. W6COP is rebuilding. W6MV had swell trip up north, visiting W7BB and Col. Foster. W6HPC is quenching his thirst for 1.7-mc. 'phone. W6OS gives high power a rest. Lamb 5 tuber at W6BVL. W6IVN got rid of his clicks. Bugs finally out of super at W6IU. 28 mcers: W6CAL, ZS, FVJ. W6HIR reports from Spokane. Lil sojourn in hospital for W6AAR. W6DZQ reports direct from Hartford via W1MK. Unlimited 'phone ticket for W6CBN. W6WF and KJ are lining up U.S.N.R. units. W6ZF was elected chairman of Vigilance Committee.

Traffic: **W6PQ** 1395 ABB 347 AWA 118 NK 78 ATP 67 EKQ 37 ARG 29 BTZ 24 GIS-AZK 23 GKO 22 FCX 20 CAL 18 JAL 16 CIS-GXV 10 GWW-IDN-AVX 9 DO-GNV-ZS 8 HTI 7 COP 6 MV 5 HPC-FVJ-OS-BVL 3 BIP 2 GWH-IVN-IU 1.

SACRAMENTO VALLEY—SCM, Geo. L. Woodington, W6DVE—W6DVE-AHN, BYB, UM, GDJ, FOD and CKV are going to San Jose Convention. W6CIR is on the air. W6GKK is going to attend Virginia Military Institute. W6GAC is thinking of making a bug to tease the natives with. W6GSP is interested in being O.O. W6GGD worked his first station across the big drink. W6FKM blasts out on 3.5 mc. W6GUV is on 7 mc. W6GBA is using '45s PP. W6DGS is QRL college. W6BHM says 1.7-mc. 'phone band is working FB. W6GHP reports that Everett Best passed his ex. W6EUH was visited by CFP and CKH. W6EUH is rebuilding. W6AIS is new operator at WUBB. W6GL is taking a carload of hams to the convention. W6GDJ has new '03A. W6FLR is back from his trip east. W6GVM had a fine time at the scout camp. W6CKV is building new receiver. W6GBB is now in Susanville. W6HVM is visiting in Santa Barbara. W6FND was trying to make a TPTG oscillate, when he discovered that he had a 281 in the socket. W7BHN of Payette, Idaho, is back in Susanville with BBB Call. W6DFT is an ex-Marine. W6FRP is on 1.7-mc. 'phone. W6GNO says they are changing officers so fast at C.C.C. camp in Georgetown he can't keep track of them. W6IHZ is new traffic man. W6HLQ added an amplifier. W6NT is on 3.5 mc. c.w. W6CKO says because of bad health he may have to give up the work. W6JDD is new A.R.R.L. ham. W6DTU has c.c. job. W6CMJ is back after 5 years absence.

Traffic: **W6CKO** 430 GAC 26 EWB 22 DVE 18 CGJ 16 IHZ 8 EUH 6 SK 5 GCM 3 FRP 2 HLQ 1.

ARIZONA—SCM, Ernest Mendoza, W6BJF-W6QC—This report written by Ruby LaRue. W6GCU will be c.c.

MOPA soon. W6IFF is on 1.7-mc. 'phone. W6JDO holds radiotelephone ticket. W6EGI-GZG is leaving for Doctor Mayo's. W6GCU is Private in radio section at camp. National Guard Encampment at Flagstaff calls several hams for 15 days of intensive Army radio training: W6ALU and BJF have portables CLE and QC at the camp. W6CLE keeps daily schedules with HEU and BRI. W6CKF is Staff Sgt. in ordnance. W6GDF is radio op for 2nd battalion of Tucson. W6HKX is new addition to Regimental Hqs. Co. of Phoenix. W6UG is going to National Guard camp as 2nd "Louie." W6IEY is Master Sgt. of Brigade Hq. Co. at Chandler. W6DSQ and AND are on 14-mc. 'phone. W6IIG and IIF are teaching their mother the code. W6DHR works FB DX. W6FOH has gone back on 1.7 mc. W6HCX found 82's won't stand 1100 volts. W6DFE has new 60 ft. poles. W6HBQ's QRA is at garage. New hams: W6JHF, JHS, JJO, IZV, JCE, IIB, JIW, ISO. A few more paydays and W6FIP will be on the air. W6CQF is experimenting on 56 mc. W6BLP is going to the convention. W6DRE sends one of his rare reports.

Traffic: W6ALU 268 BRI 63 BLP 36 HUZ 35 CQF 29 IIG 6 DRE 3.

PHILIPPINES—Acting SCM, Newton E. Thompson, KA1XA—W6ELO is now KA7AC at "Bicolod Occ Negras."

Traffic: KA1HR 1394 NA 209 LG 1168 CO 80 BA 168 WS 84 OR 21 TS 107. OM1TB 764. KA7AD 150.

SAN DIEGO—SCM, Harry Ambler, W6EOP—W6FWJ leads the Section. W6DQN left for vacation. W6FQU is new RM. W6AKY took a 127 word message from Alaska. W6BLZ has a new Zepp. W6BAM blew power trans. W6GVU has PDC on all stages. W6GWY worked VE and W7. W6BCF is working at KFSD. W6AXN worked VK. W6EFK is holding down Trunk Line "F." W6HVT is working DX. W6CSQ is on 'phone. W6DNW, DNS, EOL, VQ, BOW, QY met at EOP's for rag chew. W6FEW called on SCM.

Traffic: W6FWJ 812 DQN 353 FQU 85 AKY 59 BLZ 27 BAM 23 GVU 6. AXN 6 EFK 3.

SAN JOAQUIN VALLEY—SCM, G. H. Lavender, W6DZN—W6EJE (Portable W6FKS) and DQV are in C.C.C. camp. W6AOZ is building a "He man" rig. W6GJO is on the air. W6AGV is making an MOPA. The Stockton Radio Club meets in the Hotel Lincoln in Stockton. W6BBC keeps a "blind" schedule with DZN on 3.5 mc. W6BHQ has daily schedules with ZLs. W6AME had his portable out on a 6000 acre fire in the national forest for a week. He showed the value of amateur radio and the Forest Service was pleased with results. W6AOA joined A.A.R.S. W6CVT will have news of his vacation next month. W6GKE has power leak QRM. W6EPQ is building a directional beam antenna for Philippine schedules. W6GIV's ranch work keeps him from the key. W6FZA is in the mountains with port. W6GFR and FFU new ports.

Traffic: W6BHQ 222 AME 69 AOA 57 CVT 28 FYN 22 EPQ 4 GKE 6 DQV 144 EJE 76 AOZ 81 GJO 13 AGV 6.

ROANOKE DIVISION

NORTH CAROLINA—SCM, G. H. Wright, Jr., W4AVT—Copy of "Tar Heel Ham" free to all stations reporting. New CD appointments: W4BRK, ABT—ORS; W4ATS—OO; W4BIP—OBS. New calls W4CCO-CLJ-CCH-BPL-CJD-CKJ-BWC-CLO-CGU-CIW-BKK-CHY-CJW-CLI-CLV. W4AEH reports "Best DX-Mars." W4JR and 4CQ are moving WSOC from Gastonia to Charlotte. W4EC, VW and BRK are officers of new "Cape Fear Amateur Radio Association" in Wilmington. W4BJY is building transmitters for C.C.C. work. W4CEB is servicing Aeroplane radios. W4AAK is adding power stage. W4AIS wants burned out 211-D & E, 203A, 852, and 204A. W4MR and ZH are on 28 mc. W4OC, NP, and RV are 100% 'phone. W4AWU has c.c. MOPA. W4AAE, EJ and AMC attended World's Fair. W4BV is moving. W4BLV moved to Weldon. W4BLU "Chews the Rag." W4BWD has receiver trouble. W4CLB has FB c.c. rig. W4BLN, WX and BVD are rebuilding. W4GZ has "YL-itis." W4BXB is QRL service work. W4ANZ and AYH have FB schedules. W4ADG added "fifth stage." W4OG is moving to 3.5 mc. W4IF works all bands. W4BRJ has low power 3.9-mc. 'phone. W4AHF has new rig. W4CFR uses '45s self excited. W4BJZ is going FB. New ham: W4CLO. Increasing power: W4TR, JB. Blew equipment: W4RE, BXK. 1.7-mc. 'phone. W4AHH, BIP. W4EG is lining up for opening of Army operations. W4ANU made 95 on 'phone exam. W4BTC is on 7 mc. W4DW now has 3.5, 7, and 14 mc. transmitters for winter traffic.

Traffic: W4AIS 80 BRK 39 BJZ 38 AEH 34 ANZ 32 AWU 26 UB 22 BRJ-ACW-AYH 18 BPL 17 NC-AVT 16 AUE 15 BV-TO 14 OG 12 BHP-IF 10 JB-BAH 9 CCO 8 MB-WX-AGD-AZD-CGU 7 BDU-BWE-CJA 6 BHR-BX 5 CQ-LY 4 RE-JR-BXK-ANX-MI 3 ZH-MR-BVD-BWV-CS-BVA-BHA-CAY-ABN-BKH-DW 2 CJM-TP-PW-ATS-ADZ-PCG 1.

VIRGINIA—SCM, R. N. Eubank, W3AAJ—If you are licensed station in Virginia and are not receiving "Va. Ham News" or report cards, write me right away. Equal chance Virginia Contest now on! New Va. calls: W3DUG-EAI-DWJ-DZW-DZH-DPY-DKD-CYK-DBV-DQT-DQD-DXO-DZJ-DVO-DKJ-DVP-DZK-DSH-DZT-CXQ. FB work at camp: W3DCH, AVU. W3CVN is now in Dillon, S. C. Request ORS: W3CFV-CYM-APF-DVO. New RMs: W3BYA-BAD. Active: W3BIW, CLV, BXN, BRY, CFL, MQ, CEY. New rigs: W3BRE, AAF, GY, BYQ, AIJ, DFS. Attended Frederick Field Day: W3BJX, AHQ, AAJ. W3BRQ works low power. Attended World Fair Convention: W3BSY-BRL-UVA-AAJ-AZU. W3CUR visited W8CDE. W3CVQ sends FB dope. W3COO worked VEs. W3AUG QSPed W9USA traffic. W3BUY's brother is home. W3DCU visited Wash'n & Balto. W3AHW is on 28 mc. W3CIJ uses unlimited 'phone. Have FBX's: W3CA, ADD, LY. Have FB7's: W3BAD, BNH, CHE. W3AKN has s.s. receiver. Rebuilding: W3AMB, CYU, BPI. W3BAN says off frequency operation less. W3DZW reports traffic 1st month. W3CVF worked Kansas. W3DAM has new ZEPP. W3BDQ reports again. W3BPA worked W1MK. W3CPN sends two new calls. Storm got W3HV's antenna. W3CMJ visited W3NT. W3CLD increased power. W3BUR is back to work. W3APU is QRL work. W3BTR has MOPA coming. W3AGY is working on club. W3AGW will be on Oct. 15. W3GE is in north. Worked DX: W3BZE, WM, CWS, BSY, CSI, CLZ, CHE, DVO, AG. Helped in Virginia storm work: W3CA-FJ-BZE-AKZ-CYK-BTM-AAJ-APF. W3DQT is Staunton Club station. R.S.W. Club is planning to operate at Richmond Radio Show.

Traffic: W3DCH 200 CVN 181 CFV 67 BYA 55 BIW 29 AHQ-CLV 24 BXN-CEY 21 BRQ 15 AAJ 14 CUR 13 BRY 12 BRE-CVQ 11 COO 9 AUG-BZE 8 BUY 7 DCU 6 AVU 5 AAF 4 CLD 2 DVO 1 CHE 17 BNH-WM 16 CMJ 14 CYK 8 CPN-HV 6 BDQ 5 BPA-CA-CIJ 3 APF 4 AG-AHW-AKN-BAN-CWS-DZW-DFS 2 BSY-CSI-CVF-MQ 1 FJ 34 ADD 3 CZX-BWA 2. CXM 83 COJ 5 AKZ 18 DXO 1. W1ZZAR 97 CVQ 50 BEB 20 BDZ 3.

WEST VIRGINIA—SCM, C. S. Hoffmann, Jr., W8HD—W8EIK is first in state to have "four point" traffic schedule. W8JBU has portable KOO. W8DFC is rebuilding. W8CSF is with reforestration camp in Circleville. W8HCL worked EAR231. W8BTV, BOW and ELO visited Convention at Chicago. W8BKG QRT for QRN. W8JWL worked Kansas on 1.7 mc. W8DSJ has KIV at Steubenville, O. W8DPO, JM, LS and GBF are building new c.c. sets. W8DMU is building 1.7-mc. 'phone. W8CAY is planning station at Mountain State Forest Festival, Elkins, Oct. 5 to 7. The Ohio Valley Amateur Radio Club will install station at W. Va. State Fair, Wheeling, Sept. 4 to 9. W8DMF worked 5 continents on 7 mc. W8FQB desires State schedules for Fri. and Sat. nights. W8CMJ has receiver trouble. W8DMF is new ORS. New stations: W8KFV, JFP, KJH, KCY (XYL).

Traffic: W8EIK 434 BOW 114 HD 63 DMF 44 FQB 36 CAY 25 JM 18 HCL 17 DMU 15 BKG 12 CMJ-JBU/KOO 1.

ROCKY MOUNTAIN DIVISION

COLORADO—SCM, T. R. Becker, W9BTO—Colorado Springs: The Convention was a "WOW." Those active in convention work: W9KZS, NRZ, HDI, EYN,

JCQ, JNV, FXQ, Al Jentz, James Hale, George Dickinson, Carl Drummeller. Visitors included X24A, W6CQL, W5LS, "Felix," and 5CRU. W9JNV schedules W6CUU, W9CTW and W9MUY. W9IPH's "Pop" secured his "Ticket." W9FYY lost his father. W9BTO will be on 7, 14 and 3.5 mc. W9BYK will be a reliable traffic station. W9AAB will be on as soon as he gets "bottles" for final. W9EMU has final perking OK. W9BJN helps fellows get tickets. W9GVN is operating from Alma. W9CJJ got new 212D. W9LYE secured an RK-18. W9BYY has new Super. W9HRI has YL-itis. W9BCW is rebuilding for Navy service. W9JB is active in N.R. W9HOO is North Denver High School. W9ACV is using a '10. W9ECY applies for ORS. W9APZ uses B batteries. W9GNK was visited by W9BCW, DNP, ESA, HIR. W9NUP is located at Sugar City. W9IFD was a visitor at Denver. W9JFD was promoted in U.S.N.R. W9GCM is handling traffic. W9DQD is pounding out. W9BRZ has new AC receiver. W9CKO and FG are trying 28 mc. W9FFU and NIQ are in C.C.C. W9KKR moved to Nebraska. W9HIR has new FB7. W9JRV worked X1AX. W9HKN is heard on 7 mc. W9CKO operates on 28,640 kc. on Sundays. W9GLG burned out power transformer. W9GLI furnished canteloupe and water melons for convention. On soon: W9HGL, FRP, AQN, JFQ, FNR. Active A.A.R.S.: W9CDE EKQ. Visitors at Loveland: W9DMF, LYV. New hams: W9NDM, LEK, MXJ, OGE. C.C.: W9IUH, LLP. The Division extends thanks to Colorado Springs "Gang" for wonderful hospitality during convention. Our hats are off to you, Colorado Springs!

Traffic: W9BTO 10 ECY 7 JNV 516 CDE 2 GNK 27 EHC 5 GCM 16 IPH 6.

UTAH-WYOMING—SCM, C. R. Miller, W6DPJ—W6GQC is building c.c. rig. W6AHD uses "unity coupled." W7COH went to Chicago. W7ARK worked K6BAZ on 'phone. W6HWI works 1.75-mc. 'phone schedules. W6GPH moved to Salt Lake City. The Wyoming hamfest was a big success. W6DWH, GIO & YF and W6AFN attended. W6HHI has new skywire.

Traffic: W6GQC 147 AHD 26 HHI 38. W7COH 31.

SOUTHEASTERN DIVISION

ALABAMA—SCM, L. D. Elwell, W4KP—W4AAQ RS, DS, BJA, JX, BMM, BDH and Chris, the other op at 4RS, visited the SCM. W4CXR is an old timer. W4CCP's antenna is 230 feet high at one end. W4BAI will enter Auburn. W4BS, 17 yrs. old, made a grade of 94.8% on First Class Broadcast exam. W4OA is rebuilding. W4CBI and DD went to N. G. Camp. Thanks to Secy. of Mobile Club for FB report. W4JY and BEP have nice traffic reports. W4BTU worked nice DX. W4AJP worked ZL, X, NY1AB with Antenna 3 ft. off ground. W4BZG blew 6 type '46s. W4BSL reports W4CLQ a new station. W4APU is to change QRA. W4AYK likes the "BULL." W4BJA and GL are new ORS. W4BRA is back from Naval school. W4GP has been in hospital. W4BMM is the 'phone RM. W4HO handled traffic from boys at Camp. W4BLZ is now in B'ham. Send your registration fee for Convention before October 1st, and win a 50 watt bottle in the drawing. New stations: W4VZ, TT, BTA.

Traffic: W4AAQ 102 HO 51 DS 52 BJA 34 BZG 29 JY 20 DD 18 BMM 12 BEP 11 BAI 10 AYK-AIH 9 OA-KP 8 BTU 5 APU 2.

EASTERN FLORIDA—SCM, Ray Atkinson, W4NN—The SCM's new address is 4524 College St., Jax. W4BIN visited W4BBO. W4CJR is on 1.7 mc. W4BT is building 1.7 mc. 'phone. W4UX is at sea. W4BNI kept storm schedules with W4AUA. W4VP scheduled W4WJ during storm. W4BDM is c.c. 7160 kc. W4AZB says many stations in Fla. must use filter by Oct.! W4AGB will be on 14,184 kc. with 800 watts input Class "B." W4BGL worked Navy ship "Bravo" XBAH at Vera Cruz. W4BGG had the highest total. W4HY has FB-7. W4NN is recovering from auto accident.

Traffic: W4BGG 58 NN 32 VP 14 BGL-AGB 10 BNI 6 CJR 4 BIN 5 BRI 2.

WESTERN FLORIDA—SCM, Eddie Collins, W4MS-ZZP—RM, W4ACB. W4ASV has m.g. trouble. W4CV operates NDD. W4AXP has been ill. W4AQY reports 14 mc. FB. W4KB worked OA1B on 'phone. W4AGS is building 1.7 mc. 'phone. W4ABK has filter trouble. W4AQA has FB note. W4ZZAO is going to sea. W4CFF has '60 MOPA. W4QK has SW3. W4AUV's son is W4CMB. W4QR is going to get new shack. W4BSJ works "G"s on 7 mc. W4BMJ schedules Pensacola to get reports from hospital on sick case. W4AUW bought "COMET PRO." W4ASG will be oping from China soon. W4QG schedules W4CCC via W4BGA. W4ARV and BGB keep 3.5 mc. hot. W4UW in Texas wants schedules with the gang. W4AUA is doing FB U.S.N.R. work. W4ACB is back from F.N.G. Camp. W4BKV pumps them out. W4BPI is going to U. of F. W4VR is working in shack. W9ZZAF was a visitor to Pensy. Crystal controllers: W4BFD, BGA, MS.

Traffic: W4BGA 30 BFD 8 AQY 2 ACB 12 KB 35 AXP 4 BSJ 10 MS 28 QG 8.

WEST GULF DIVISION

NORTHERN TEXAS—SCM, Glen E. Talbutt, W5AUL—W5BII, C.R.M. The Section has been divided into four traffic "districts." Each dist. has an R.M. under the supervision of Chief RM. The dists.: 1st Dist., Eastern, W5ANU, RM. 2nd Dist., Central, W5AJG, RM. 3rd Dist., Northwest, W5ARS, RM. 4th Dist., Southwest, W5BKH, RM. W5BII was finally dethroned by W5AVF. W5AUL manages to keep in the running. W5OY moved to Calif. 1st Dist.: W5BZT worked a "D." W5BBQ resigned from A.A.R.S. W5NW reports from Kans. W5BKC and CBK come through. W5AHC is blanketed with QRM. W5CMJ tied the RM on traffic. 2nd Dist.: W5IA is chirping along. W5ARV is building Super. W5AMK's YF is now W5DQF. W5AHZ wants ORS. W5JA is doing U.S.N.R. work. W5CCD is going to the Fair. W5CAV is joining A.R.R.L. W5CHJ is on 14 mc. W5PJ attended Chi. convention. W5CRZ is new reporter. W5BKJ is rebuilding. W5AID went to war with TNG. W5AJG is on 3 days week. W5SU is building new transmitter. 3rd Dist.: W5IT has new MG. W5BCW says the new FRC receivers ruined the OO's. W5CIJ has new receiver. W5DMQ, DQH, and CLT report from Olney. W5CPB and CPT are on 1.7-mc. 'phone. W5APW is moving to Austin. W5BJX is on 7 mc. W5BEN will have 1kw. on 7 mc. for Tri-State Fair Sept. 23-30. 4th Dist.: W5CCD and CTU report. W5AUJ will be back on soon. W5CYU says lots local QRM. W5AW reports muddy time at T.N.G. camp. W5DAG is on 1.7-mc. 'phone. W5BVF is building c.c. rig. Plan to attend 7th Annual West Gulf Convention at San Angelo October 13–14. Report and get your copy of the Nipper.

Traffic: W5AVF 428 BII 404 AUL 159 ANU-CMJ 140 CCD 103 ARS 106 BKH 51 CIJ 41 IA 28 JA 27 ARV-BVF 26 AJG 16 BCW 20 AHC 12 CBK 11 AMK-AW-BJX 10 CYU 9 BZT-BKC 6 IT 3 AHZ-DAG 2.

OKLAHOMA—SCM, Emil Gisel, W5VQ—W5AMC leads the Section. New OBS: W5AAQ and BQA. W5CEZ is new RM. W5BKK took prize at Tulsa convention for being youngest there—15 yrs. old. W5BDX worked K7PQ on 3.5 mc. W5DET has a new zepp. W5BAR has FB schedules. W5CJZ has new QSL's. W5AND is perkin' FB. W5DRE is newcomer. W5BOE will be on at Tulsa State Fair. W5GF has new YL. W5CZB manufactures Tombstones.

Traffic: W5AMC 355 CEZ 289 BKK 130 BDX 70 DET 26 BAR 14 CJZ 11 AND 7 BQA 6 BOE 2.

SOUTHERN TEXAS—SCM, D. H. Calk, W5BHO—W5OW handles lots of traffic. The San Angelo Radio Club held semi-annual election; results: Pres. W5BHK, Vice-pres. W5BYF and Sam Price, Secy. W5BDT moved back to San Angelo. W5BEB and BDH are QRL service work. W5CUE and BHK work 'em on 1.7-mc. 'phone. W5QX is on 7 mc. 5BFA has new c.c. 200 watt rig. W5DOJ is new ham. W5BXH is going to 14-mc. 'phone. W5BDA says QRN. W5DGG has MOPA. W5CTW sports FBX receiver. W5AFQ reports via radio. W5BNJ works 14-mc. 'phone. W5ES is back on active ORS list. W5BQI reports W5DDB a "Silent Key." W5MN sends nice reports. W5CVW gets out FB. W5YL is visiting in Okla.

W5ADZ visited a Century of Progress and W9USA. The Houston Amateur Radio Club will be on with 50 watt rig with call W5DPA. The San Angelo gang is getting all set for the biggest and best A.R.R.L. West Gulf Div. Convention yet held; come out to San Angelo, Oct. 13–14th and meet the fellows.

Traffic: **W5OW** 1246 MN 193 CTW 38 AFQ 24 CVW 27 YL 18 BDA 10 ADZ 4 BKY 2.

NEW MEXICO—SCM, Jerry Quinn, W5AUW—W5CGJ is helping AIC get c.c. rig going. W5BNT is experimenting with 56 mc. W5AUW got a QSL from a "D." W5CVG left for Amarillo. W5CSR, AOP and CPO are QRL N.M.N.G. camp. W5CDY and W9MKN were visitors at SCM's shack. W5AXV (ex) will be on soon.

Traffic: **W5AUW** 107 AAX 75 CGJ 27 ZZQ 25 CVG 6.

CANADA

MARITIME DIVISION

NOVA SCOTIA—SCM, A. M. Crowell, VE1DQ—1AI and EX visited 1EA. 1CZ uses B Batt. powered Hartley. 1DO has '45s P. P. 1EK celebrated first anniversary on air. 1DI joined R.C.M.P. 1AX is building ANOTHER transmitter. 1DH is secty.-treas. M.A.R.A. 1AG's low power 'phone gets out FB. 1FB, QSL manager, has been swamped with cards. Send him YOUR envelope for yours. W4BBV, Columbus, Ga., visited Halifax gang. 1BC was seen tearing by in his Phoard.

Traffic: **VE1EX** 36 EK 5 AG 3.

ONTARIO DIVISION

ONTARIO—Acting SCM, W. Stephens, VE3AD—VE3HB has resigned as SCM. His term of office certainly saw this Section at a higher peak than was ever before attained by any Canadian section. Well done, Hec. 3QY has MOPA. 3LS ran his car in the ditch while touring Niagara Peninsula with Mrs. 3DW. 3JP is disgusted with MOPA. 3AU was busy with Toronto "EX" traffic. 3GT worked Captain Hawks while the latter was on non-stop flight from N. Y. C. to Regina. VE3AR, op at 9BX, will be heard from Cochrane this fall. 3WJ is operator on U. of Michigan expedition on Hudson Bay, under call VE3TJ. 3XX handled a message to schooner "Gertrude L. Thebaud." 3IQ and QH are heading for ORS. 3WN has three-band c.c. rig. The QSL Manager, 3QB, asks that each station send him a stamped envelope. 3GL ran a successful portable at Stoney Lake. 9AL is making an air tour of the Maritimes. 3NM sent a good report on Toronto gang. 3NQ and "MM" were successful in commercial exam. 3LR has YLitis. 3CF is on 14-mc. 'phone. 3OD persuaded C.N.E. to print QSL cards. 3EW blew '10s. 3MI has 40′ masts. 3LE stripped the north country of its fish. 3OF is rebuilding. 3GO is new ORS. 3HA is QRL O.F.B. 3JI, RM, is warming things up around Ottawa. 3HP is getting around again after being laid up umpteen weeks with a game leg. The Hamilton Amateur Radio Club held a very successful picnic at Grimsby Beach on Sunday, August 20th. 3GT won the big power transformer in the VE3XB Canadian contest. 3SC, Fraserdale, believes he is farthest north station in Ontario; he would like a few schedules.

Traffic: **VE3GT** 53 GO 46 AU 33 AD 31 QB 28 DW 18 RK 12 LI-HP 11 GL 7 SH 6 QY 14 QU 2 QH 3 OB-TO 1. **VE9AL** 1.

QUEBEC DIVISION

QUEBEC—SCM, John C. Stadler, VE2AP—2GG is c.c. on 7 mc. 2ES uses '46s on 1.7 mc. 2EU gets out well on MS 7 mc. 2FZ has 1.7-mc. 'phone. 2BO and 2CU are going to Petawawa. 2CG is moving to Verdun. 2AA says golf and radio won't mix. 2GM topped the matriculation list. 2DD has radio on his boat FB-73. 2EC bought a Comet Pro. 2FE resumed traffic schedules. 2BE is leaving for holidays. 2DX is on 3.9-mc. 'phone. 2EM is back from holidays. 2DG schedules 2HI during 2EM's absence. 2FG reports 80% experimenting. 2DB had visit of 2AB, 2AU and 2BA. 2AS pounds in nicely on 3.5 mc. Welcome, 2BV, 2CI, 2CK and 2DJ.

Traffic: **VE2BB** 29 BG 21 CX 4 FE 17 FG 5.

VANALTA DIVISION

ALBERTA—SCM, C. H. Harris, VE4HM—4EA is on C.J.C.A. staff during holidays. 4EX is second op at 4BB. 4BA has c.c. going. 4DQ ran up good score in 3XB contest. 4AW, 4NC, 4BJ, and 4HM had contacts with KHEVE, Capt. Hawks plane "Sky Chief." 4EO and 4AF put out FB signals. 4GY is QRL harvest. A real hamfest was held at Edmonton for Capt. Hawks, at which were present 4BW, 4EA and 2nd op., 4FR, 4BV, 4HA, 4GT. 4AH, 4EX, 4HM and YF.

Traffic: **VE4LX** 17 EO-HM 10 DQ 6.

BRITISH COLUMBIA—SCM, J. K. Cavalsky, VE5AL—When eleven stations can make BPL in one month it sure must be a real Section! In one night the following 1.7-mc. 'phones around Vancouver were heard: 5IA, FP, HI, HJ, ID, EU, ED, EO, AO, GQ, GG, AC and HZ. They invite Victoria and other nearby cities to join their prayer-meetings. 5GI moved to Surf inlet. 9AJ has new receiver. VE5CP's 'phone was heard in New Zealand. A general "get-together" of amateurs is being planned by B.C.A.R.A. 5CE and CR have gone 'phone. One of the New Westminster boys did some nice relaying for a Mining Camp in the interior of B. C.

Traffic: **VE5DH** 819 HP 578 GS 503 DB 573 CH 350 DF 322 AM 187 AL 183 BC 170 AC 142 EE 266 GI 22 EC 15 HJ 18 EU 15 EO 7 ED 4.

PRAIRIE DIVISION

SASKATCHEWAN—SCM, Wilfred Skaife, VE4EL—4BB says the gang got a big kick out of Hamfest at Regina. 4EL was on vacation. 4AO is looking for new location. 4FY and GA have new receivers. 4ML gets FB results on 14 mc. 4CM has c.c. rig. 4BF is c.c. 'phone and c.w. 4AU, IE, EB, GI, GA, KE, LU, MD wonder when 1.7-mc. 'phone is coming back to normal. 4EB, the gopher hole station, is rebuilding above ground. 4EH is busy flying. 4ML, FY, IG, JH are experimenting with 28-mc. 'phone.

Traffic: **VE4BB** 26.

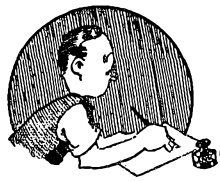
Standard Frequency Transmissions

Date	*Schedule*	*Station*	*Date*	*Schedule*	*Station*
Oct. 4	B	W1XP		BB	W9XAN
	BB	W9XAN	Nov. 3	BB	W6XK
Oct. 6	BB	W6XK		A	W9XAN
	A	W9XAN	Nov.. 4	BX	W6XK
Oct. 7	BX	W6XK	Nov. 5	C	W6XK
Oct. 8	C	W6XK	Nov. 10	A	W6XK
Oct. 13	A	W6XK	Nov. 12	C	W1XP
Oct. 15	C	W1XP	Nov. 15	A	W1XP
Oct. 18	A	W1XP	Nov. 17	B	W9XAN
Oct. 20	B	W9XAN		B	W6XK
	B	W6XK	Nov. 22	BB	W1XP
Oct. 25	BB	W1XP		C	W9XAN
	C	W9XAN	Nov. 24	B	W9XAN
Oct. 27	B	W9XAN		A	W6XK
	A	W6XK	Nov. 29	B	W1XP
Nov. 1	B	W1XP		BB	W9XAN

(See September QST for schedules)

Strays

In the June 10th–11th Field Day, W8IDP rolled up a total of 405 points on behalf of the Ludington Amateur Radio Association. The portable, W8CPY's, was located 5 miles south of Ludington, Mich., and the Secretary, W8JTK, reports that the fellows had a whale of a time setting up antenna, tent, etc., in high winds, not to mention swimming, hunting for Indian relics — and the mosquitoes! A commendable score, 45 stations worked in 9 Sections, and all set for the next Field Day.



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A Letter to Colonel Foster

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn.
August 14, 1933

Col. Clair Foster,
Carmel, California
Dear Clair:

I have noted your interesting article on the Madrid regulations appearing on page 4 of "Radio" for August. I feel it my duty to point out to you that there are a number of serious misconceptions in this article, all of them apparently arising from the fact that you have an incorrect translation of the French text. I take it you will be glad to know about this, because it radically changes the situation. If this text were as you state, your conclusions would be correct and there would indeed be room for uneasiness. But the representatives of the A.R.R.L. at the Madrid conference would never have accepted such a situation as you outline, and the actual facts are very different.

The provisions of the Madrid regulations on the subject in question read as follows:

"The exchange of communications between amateur stations and between private experimental stations of different countries shall be forbidden if the administration of one of the interested countries has given notice of its opposition to this exchange. When this exchange is permitted, the communications must be carried on in plain language and be limited to messages bearing upon the experiments and to remarks of a private nature for which, by reason of their unimportance, recourse to the public telegraph service might not be warranted. It shall be absolutely forbidden to licensees of amateur stations to transmit international communications emanating from third parties. The above provisions may be modified by special arrangements between the interested countries."

This translation differs in several very important respects from that published by you, leading to the following errors in your discussion:

1. First and foremost, you have omitted the word "international" in the prohibition of third-party messages, stating that this text "declares against the handling by amateurs of third-party messages right here in the United States." This is not correct. The prohibition is specifically confined to international traffic. Even if the word were not there, it could not influence practice within the United States, since this treaty concerns itself only with international relations.

2. You state that under the Washington regulations of 1927 these provisions applied solely to private experimental stations, not actually including amateur stations, whereas under the Madrid regulations amateur stations are specifically included. The Washington regulations defined amateur stations as one branch of private experimental stations and therefore did put them under this Washington regulation. Separate status for amateur stations was achieved at Madrid, they no longer being experimental stations, and consequently they are mentioned separately in the Madrid text. There is no change in the effect.

3. You state that under the 1927 regulations only an "interested country" may prohibit certain communications by its amateurs, whereas under the Madrid regulations any one of the countries "convened" at the Madrid conference may, by objecting, prohibit the intercommunication between amateurs of two other countries. This would be alarming if it were not absurd. Your error arises from the fact that the word "convened" is not in the text. The text reads "one of the interested countries," just the same as at Washington. I have seen this translated "one of the countries concerned" and it occurs to me that your word "convened" possibly comes from misreading the word "concerned."

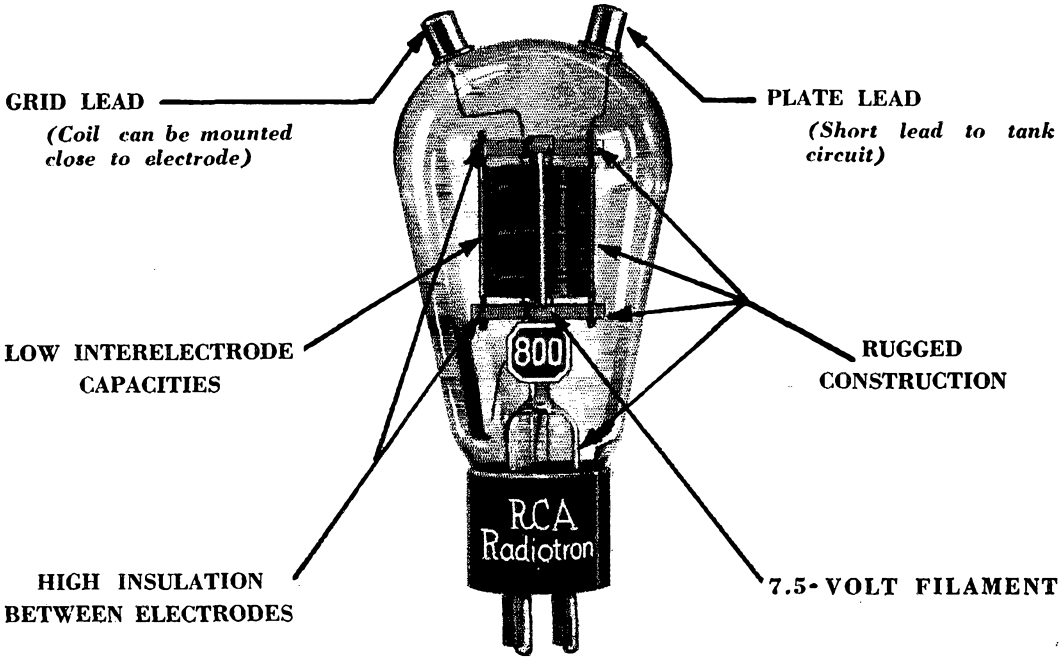
4. You state that the 1927 clause, "unless the interested countries have entered into other agreements among themselves," has been cut out. But your translation omits the substitute sentence "The above provisions may be modified by special arrangements between the interested countries." The administrations still have this right.

5. You state that "plain language" does not permit the amateurs of one country to talk with those of another country in ham language. This is incorrect, as the discussions at Madrid show. The prohibition is against the use of secret language and ciphers. The Czechoslovakian administration suggested that this text possibly did not permit amateurs to use the Q abbreviations and that this should be permitted. The conference of course, held that Q abbreviations are plain language. Moreover, in this provision there is not the slightest change from the Washington text.

It is not true that the Madrid regulations adversely affect our domestic traffic handling — they cannot. It is not true that the opinion of a

THE ANSWER TO THE AMATEUR'S PRAYER

• • • THE RCA-800 • • •



MEDIUM 4-PIN BASE

The RCA-800 is a new transmitting Radiotron of advanced design, capable of approximately 35 watts output with 1000 volts on the plate. The RCA-800 will find varied applications in amateur equipment. Due to the low interelectrode capacities, the RCA-800 will give full output at 60 megacycles, and will operate up to 200 megacycles. The RCA-800 can ordinarily be used in existing equipment with power-supply systems designed for tubes of corresponding voltage ratings. For complete technical information write to the

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RCA RADIOTRON CO., INC.

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third country can affect the communicating rights of amateurs of two other countries — only the countries concerned have that right. It is not true that the right to make special arrangements, as in the case of our special agreement with Canada, has been abrogated — the right still exists. It is not true that ham lingo has been prohibited. Let us then determine precisely what changes in amateur communication are made by the alterations in language at Madrid, if any. First, there is no change whatever within the United States and its possessions, which subject never was within the scope of the Madrid treaty. As to international communication, there is no change in the language relating to "important" messages. We continue under the old regulation which originated at Washington in 1927 which forbids the handling with a foreign amateur of a message of such importance that normally it would go by paid public service. Therefore, if there is any change in the Madrid regulations, it relates to the handling of messages so unimportant in character that "recourse to the public telegraph service would not be warranted." The amateur stations of the United States and Canada are the only licensed amateur stations I know of that have not always had a prohibition against the handling of any communication on behalf of a third party. The net change at Madrid therefore boils itself down to the following: We are now forbidden to handle *unimportant* third-party messages with *unlicensed* foreign stations.

I think you will agree with me that this constitutes no "threat" to or important change in the communications of amateurs.

Sincerely yours,
K. B. WARNER
Secretary and General Manager

QSL Forwarding

Box 237, Astoria, Oregon

Editor, *QST:*

Here's one in appreciation for the QSL forwarding bureau, and one for Ripley. On 14 June, 1932 the writer, then KA1AF, QSO'd KA3NA, was heard by AUX2NP, Moscow. Card was forwarded via QSL bureau in Moscow, U. S. S. R., to A. R. R. L. bureau in Hartford, thence to the Philippines where KA3NA (the other half of the QSO) received and forwarded it to W7BBO, ex-KA1AF, who received it exactly one year from date of QSO, on 14 June, 1933.

Enclosed please find five three-cent stamps which would just about pay postage on this card during its travels. A. R. R. L. members as a whole do not fully appreciate this service. Here's one that does and wants the bureau to know it.

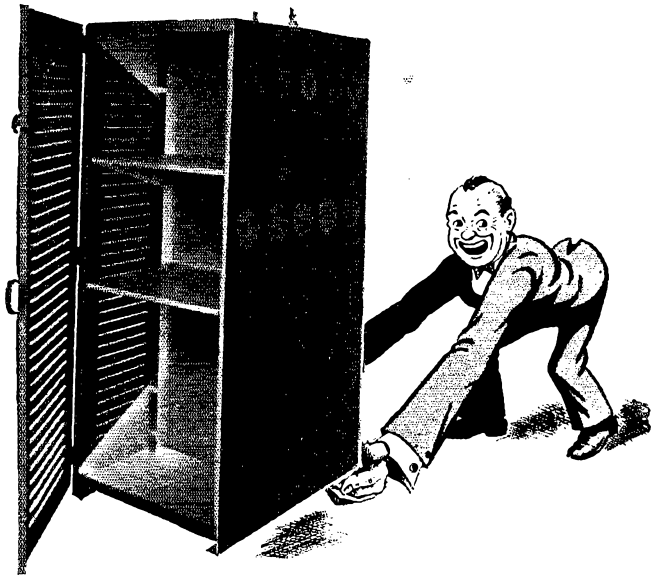
— *T. C. Lusk, W7BBO, ex-KA1AF*

Money's Worth

5 Cliff St., Verona, N. J.

Editor, *QST:*

Last January I assembled a push-pull transmitter, the construction of which is given in last



"Here y'are 'hams' - - a frame that'll put your Xmitter in the BC class!"

YOU'LL agree this frame is FB. With four adjustable shelves, it provides ample room for power supply, crystal control, freq doubler and amplifier stages, without crowding.

Nine 3½" covered instrument holes are provided in the front panel, which is finished in true BC style in black baked crackle lacquer. The top is the same. The inside is aluminum lacquered. All steel parts are copper-plated under the finish, making negligible the losses at ultra high frequencies and providing a good ground.

Two RF bushings are provided in the top of the cabinet. A hole for incoming power and control leads is located in the bottom plate. The entire frame is rigidly constructed of ⅛" sheet steel, spot welded and bolted to angles and tees. Both the front panel and rear shield are bolted to the frame while the two side covers are hinged to the rear shield as shown in the illustration.

The size?—19" deep, by 27" by 49¾" exclusive of RF bushings and shield handles.

Price?—Frame, panels and shelves only $20. The protective outside safety shield, $7.00 additional.

Send money order or check. Frame will be shipped promptly.

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year's "Handbook." I simply want to say how much I think of it and how well it works. So far, its frequency stability has been splendid, the note always d.c. and once or twice have even had a report of x.d.c.! . . . So far, have only used it on 3590 kc. and have been fortunate enough to work Victoria, B.C., California and a ship in the Gulf of Mexico.

Also, am I glad I subscribed to *QST!* In the very first issue I received, February, I found and tried out the circuits for screen-grid feedback in the detector circuit and for the vacuum-tube bug key. The first I found quite an improvement and the second works very well indeed. In fact, I feel quite repaid for my whole year's subscription as the amount saved on a bug is several times that amount. But, that doesn't mean that I don't want the rest of this year's issues! . . .

Gentlemen! Your health, and keep up the good work! Amateur radio, as we all well know, certainly would be a nonentity without A.R.R.L.!

— *William Underhill, W2DVN*

"— In a Bottle"

1357 So. Orange Drive,
Los Angeles, Calif.

Editor, *QST:*

It is hardly necessary to describe the QRM that exists on the 40-meter band between the hours of 7 and 10 p.m. every day. . . .

Constructive criticism should offer a solution, so here goes. The plan would consist of a voluntary abdication from half the forty-meter band by each district during 7 to 10 p.m. For example, districts 1, 3, 5, 7, and 9 would leave the high-frequency end clear, while districts 2, 4, 6, 8 would stay off the low-frequency end. In this way, adjacent districts (and half the other districts) could be worked without local QRM.

The idea probably would not work because there is always some egg who would park on the free end and spoil the fun for the rest, but the plan may have some merit.

Before closing, I'd like to air a grievance about key clicks. I have one of the receivers built per the January *QST*, and it sure is a honey. But it takes more than a good receiver to eliminate the other fellow's key clicks. It seems that you can't put a key click in a bottle and paint it green after it has left the transmitting aerial; you have to perform the operation before it gets out. I get key pops from gents a mile or two away and it ain't right.

Ho, hum. Its a great old game, anyway. Guess I'll go to bed and sleep off the grouch.

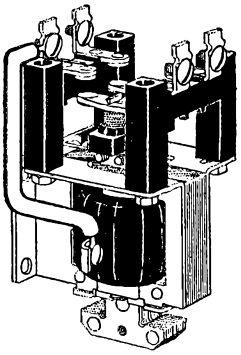
— *Frank H. Wiegand, W6BO*

Editorials

(*Continued from page 8*)

and wonder where we are headed. We do not know what form the amateur radio of a generation or two hence will take but we do know that right now we are the custodians of the only channels in the spectrum open to the private citizen, the only ones not given over to government or

A.C. RELAYS



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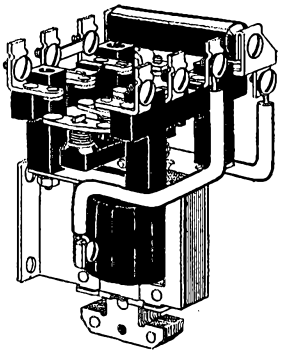
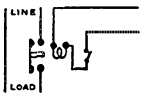
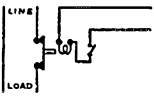
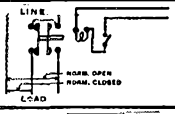
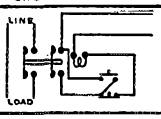
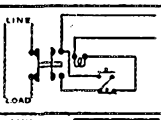
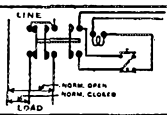
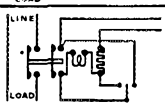
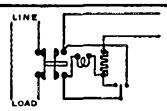
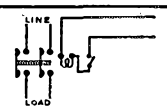
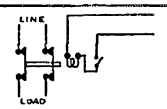
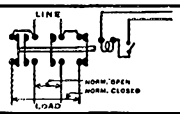
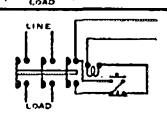
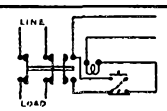
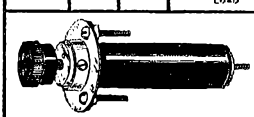


These A. C. solenoid relays are ideal for remote control of transmitters, for control of crystal ovens, and for any general remote control application except for keying. THESE RELAYS WILL NOT OPERATE IN KEYING SERVICE. Silver-to-silver double break contacts are used throughout.

The maximum contact rating is 10 amperes at 220 volts. The relay coils are wound for 115 volts 60 cycle alternating current. Relays for other voltages can be supplied on special order. Use coupon below when ordering.

Type No.	Poles	Normally	Circuit Diagram	Price Open	Price In Cab.
A107	1	Open		$3.00	$4.00
A117	1	Closed		3.00	4.00
A127	1	Open and Closed		3.50	4.50
A137	1	Open		3.50	4.50
A147	1	Closed		3.50	4.50
A157	1	Open and Closed		4.00	5.00
A167	1	Open		5.00	6.00

Type No.	Poles	Normally	Circuit Diagram	Price Open	Price In Cab.
A177	1	Closed		$5.00	$6.00
A207	2	Open		3.50	4.50
A217	2	Closed		3.50	4.50
A227	2	Open and Closed		4.50	5.50
A237	2	Open		4.00	5.00
A247	2	Closed		4.00	5.00



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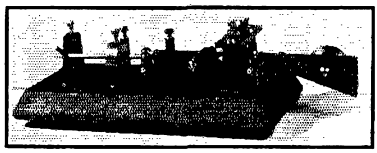
commercial work. We have a responsibility there that far transcends our present problems of mike and key communication, because at the same time that we are having our fun out of present-day amateur radio we have the duty of building solidly for the eventual citizen radio communication of the future. Everything that we have ever built in American amateur radio has been achieved through coöperation in our American Radio Relay League. We have only to continue to pull together in A.R.R.L. and we shall continue in that success. K. B. W.

A New Automatic Key

A NEW transmitting key, for which several features making it especially suitable for radio work are claimed, has recently been placed on the market under the name of "Go-Devil." Although resembling in several respects the automatic keys or "bugs" with which most of us are familiar, a number of improvements are incorporated in the design. Important among these is an arrangement which insures having the



surfaces of the contacts perfectly plane at the instant of closing regardless of the contact-spacing adjustment, which reduces contact resistance and minimizes sparking and wear; and a choice of single or double speed in the dot lever action, accomplished by a simple change in the adjusting screws. When the double-ratio speed is used the dot contact swings through twice the arc described by the operator's hand in producing the movement; consequently the lever can be set for a very small movement for high-speed sending and the dots will be very distinct.

The Go-Devil key is provided with heavy coin-silver contacts, has a heavy cast-metal base to prevent "walking" during operation, and has a speed range of 10 to 50 words per minute with a single adjusting weight. The key is made by A. H. Emery, 263 Mill St., Poughkeepsie, N. Y.

Automatic Temperature Compensation for the Frequency Meter

(Continued from page 19)

meter. The use of scales in multiples of ten throughout makes the reading much easier than would otherwise be the case.

A rough estimate showing the relative importance of the various factors entering into the ultimate accuracy (referred to 3500 kc.) is as follows:

Temperature ± 10° C.	150 cycles
Calibration	125 "
Reading ± 1/16 div.	60 "
Line voltage ± 5 v.	20 "
Mechanical shocks	10 "
Total	365 cycles

The arithmetical addition of all the factors of

course assumes the worst possible condition. The calibration error comes mainly in drawing the curve, for although some twenty-five points are used, this much error between points may occur. Assigning to the micrometer frequency meter an accuracy of to plus or minus 500 cycles, or .015 per cent, therefore errs on the side of conservatism.

The Roanoke Division Convention

BLUEFIELD — or else!" With this as their slogan amateurs from every corner of the Roanoke Division started the trek to their annual convention, held in Bluefield, W. Va., Saturday and Sunday, May 27–28, under the auspices of the Bluefield Amateur Radio Club.

The convention was opened early Saturday afternoon by Bill Wade, master of ceremonies. Mr. H. C. Weller, Gen'l Sup't, N. & W. Ry., an old telegrapher, presented the address of welcome. Mr. L. E. Tiernery, president of Bluefield C. of C., greeted the gang on behalf of the city. A talk on transmitter design by Roy Corderman, W3ZD, a round table led by the SCMs, and musical selections by local artists made up the afternoon program. "In between times" many amused themselves at the Club's "Radio Cottage" where W8IPH is in operation. In the evening, Mr. L. S. Fox, National Carbon Co., spoke on battery construction, and Miss Elizabeth Zandonini, W3CDQ, presented an illustrated lecture on the "Work of the Radio Section, Bureau of Standards." Later, stunts and contests added their usual pep, and still later a theatre party was held (of which nothing will be said here!). As the midnight hour passed those eligible assembled to receive initiation into the "Royal Order of the Wouff-Hong," following which they retired — with plenty to sleep on!

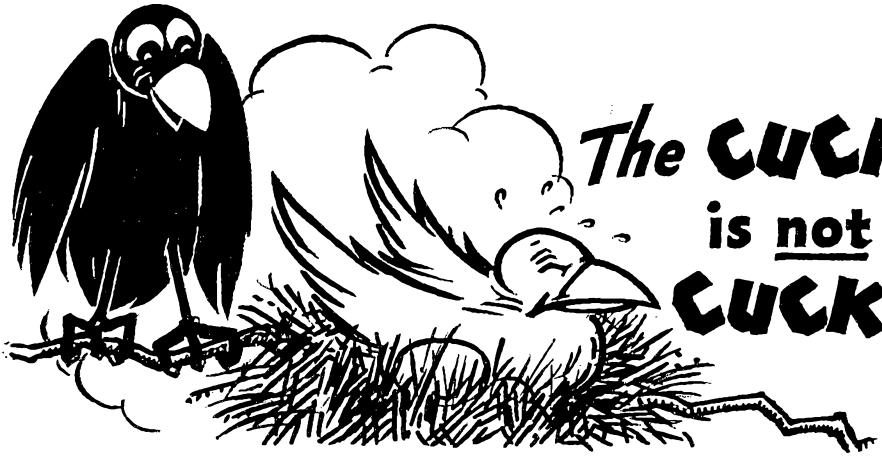
On Sunday morning Mr. F. E. Beaudry, W4AI, described "Crystals and Crystal Cutting," with demonstration. A communications meeting featuring ACM Battey, SCMs W3AAJ, W4AVT, W8HD and their RMs, closed the morning activities. As happy and congenial a gang as will be found anywhere assembled for the noon-day banquet. A concert by the 150th Infantry Band, W. Va. N. G., added much to the festivities. Director Caveness, W4DW acted as toastmaster. Speakers included Capt. Baldwin, U. S. A., W3CXM; Lt.-Comdr. Rogers, U. S. N., W3AAV; Director Caveness; SCM Eubank, W3AAJ and ACM Battery. Prize drawings and awards wound up activities.

Total attendance was about 140, including 29 from North Carolina, 36 from Virginia, 53 from West Virginia, and others from Tenn., Ky., Penna., Conn., D. C., Md., and N. Y. Everyone had a "swell" time. Thanks, Bluefield! C U in 1934.

— *E. L. B.*

The Atlantic Division Convention

THE Congressional Medal for meritorious service should be awarded to "Tom" Connette, Chairman, Atlantic Division Convention



The CUCKOO is not so CUCKOO...

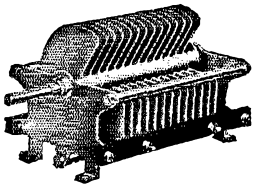
IT ALL DEPENDS—substitution, in one sense, is an old device of shady merchandisers, suggestive of the Cuckoo taking advantage of another's efforts by slyly laying her eggs for hatching with those of another bird. In a different sense, substitution may wisely be employed in choosing for the job in hand *better* condensers at no greater cost and with sure and lasting results.

This constructor and Amateur located in a remote section of Canada, profiting by his experience, chooses wisely; he writes:—

"Replying to your informative letter of June 29th, please accept my order for the following . . . * * *
Although specifications called for a different make of condensers, I have had such good results with Cardwell condensers in the past eight years that I use them exclusively in transmitters and receivers I build. Condensers purchased eight years ago are as sturdy and efficient as when they were installed.
Thanking you for your favors, I remain"

You, too, may choose CARDWELLS with confidence because no inferior piece of apparatus has ever been produced by CARDWELL. *Send for literature.*

★ *Any reliable supplier should cooperate with you to enable you to get what you want. He can get CARDWELLS for you if he does not keep them in stock. Get what you want — insist on CARDWELLS. Order direct from us if your dealer will not supply you, or let us tell you where you may buy.*



Is it News to you that CARDWELL

manufactured much of the equipment used in connection with the newest transatlantic cable installation, recently laid from the Newfoundland Coast to England?

The widely diversified activities of the Cardwell Manufacturing Service have developed a resourcefulness well worth your investigation.

Have you a designing or manufacturing problem? Put it up to CARDWELL.

"THE STANDARD OF COMPARISON"

CARDWELL MIDWAY "FEATHERWEIGHT" CONDENSERS, RECEIVING and TRANSMITTING
CARDWELL "STANDARD" MODELS FOR RECEIVERS and MEDIUM POWER TRANSMITTERS
CARDWELL 16-B TRANSMITTING CONDENSERS FOR LARGER TRANSMITTERS
CARDWELL HIGH VOLTAGE CONDENSERS FOR COMMERCIAL RADIO-TELEGRAPH and BROADCASTING STATIONS
CARDWELL S-2244 OIL DIELECTRIC FIXED CONDENSERS FOR HIGH FREQUENCY FURNACES and TUBE BOMBARDERS
THERE'S A CARDWELL FOR EVERY TUBE, PURPOSE and POCKETBOOK

The **ALLEN D. CARDWELL MFG. CORP'N.**
83 Prospect Street, Brooklyn, N. Y.

NRA MEMBER U.S. WE DO OUR PART

To Our Readers who are not A.R.R.L. members

YOU *should* become a member of the League! That you are interested in amateur radio is shown by your reading of *QST*. From it you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on the page opposite the editorial page of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have *QST* delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

A bona fide interest in amateur radio is the only essential qualification for membership

AMERICAN RADIO RELAY LEAGUE
West Hartford, Conn., U. S. A.

I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3 00 outside of the United States and its Possessions, and Canada) in payment of one year's dues, $1.25 of which is for a subscription to *QST* for the same period. Please begin my subscription with the .....issue. Mail my Certificate of Membership and send *QST* to the following name and address.

.....

.....

.....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may send him a sample copy of *QST*?

.....

Thanks

held in Buffalo, N. Y. on June 23rd and 24th. To him and Dr. Simpson who had charge of the meetings go the honors of having set a mark in A.R.R.L. conventions that will be difficult to outdo elsewhere. With an attendance of 425 delegates from every section of the division including Canadian visitors, the program given fully repaid those who attended.

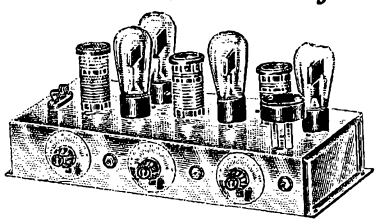
One of the best technical programs was presented after an address of welcome by Flod Miers, president of the Radio Association of Western New York. There have been many articles on superhet receivers but those who listened to C. L. Dirickson, soon realized he knew his subject. L. D. Geno, W8PE, was right there with practical transmitters. L. S. Fox, Engineer, National Carbon Co., a real ham besides, gave "Battery Facts and Fallacies" which still makes the use of batteries in receivers interesting. J. V. Brotherson, W8BHN, talked on "Broadcast Interference." Radio Inspector M. W. Grinnell, while active with examinations, found time to talk and his subject "Radio Examination Pitfalls" was most timely. The outstanding lecture of the convention was that given by Dr. J. O. Perrine, of the American Telephone & Telegraph Co., on the subject "Television—Its Fundamental Physical and Psychological Principles." With apparatus to demonstrate and a fine delivery the lecture will long be remembered by all and we are more than appreciative to the A. T. & T. for their kindness in sending Dr. Perrine. The first evening closed with an initiation of the Royal Order of the Wouff-Hong by a degree team that was perfection. Traffic Meeting for ORS and also another meeting for practical discussion were held under the chairmanship of Don Farrell, SCM, Western New York; the question of traffic is still the great interest of amateur radio. As we wandered about Saturday forenoon we were impressed by the interest shown at the few exhibits the committee had arranged for. Saturday proved of as much interest as the Friday meetings with such speakers as John Reinartz, representing RCA Radiotron; O.W. Pike, Vacuum Tube Engineer, General Electric Co.; R. B. Dome, Radio Experimental Dept., General Electric Co. Then came some of our local hams: John J. Long, Jr., W8ABX; W. S. Heston, W8APN and John C. Miller, W8CTK. We had some magic, too. "Tom" Connette was the "Thurston" of the evening and the gang wanted more. Dr. L. Grant Hector, Professor of Physics, Univ. of Buffalo, used "Electron Magic" as his subject. With so much "magic" being talked about we wondered what that "super-magician" Director Doc. Woodruff would do. Well, his "Bag of Tricks" filled the Mahogany Room.

A big "phone" meeting was held during the convention and the foundation for an Atlantic Division 'Phone Club, working through the director was laid with credit to Bob Adams, Mr. Wolff and Mr. Carter. Little Jean Hudson, the 8-year old licensed radio operator was present as a special guest. With so many meetings it was a

(*Continued on page 82*)

FAIR WARNING!! These prices can't last forever — replacement costs will be 30 to 40% higher.

THE NEW "20-W JR." Crystal Controlled Transmitter Kit, $10.95

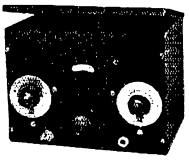


This efficient little transmitter is very low priced, making it possible for anyone to use crystal control at less than it would cost you to get the parts together for a self excited rig of this type. The "20-W Jr." is simple to wire and get on the air and the most inexperienced operator will have success with it. The size of the transmitter is only 6" x 17" and is therefore suitable for portable use. Only one milliammeter is required for tuning the transmitter and jacks are provided for this purpose, for each stage. The plug-in crystal holder is supplied with the kit at no additional cost. The "20-W Jr." uses one '47 as crystal oscillator, one '46 as buffer or doubler and two '46's in the amplifier. One set of three coils is supplied with the kit for either 20, 40, or 80 meters, 50 cents extra for the set of 160 meter coils. When ordering mention your choice of coils.

80 or 160 meter X cut crystals supplied for only $2.75 if purchased with the "20-W Jr." kit. Hoyt milliammeter if purchased with the kit, only $1.25.

Power Supply Kit, $6.95.

The "EAGLE" Three-Tube Short Wave Receiver



Only finest material used thruout — employs one '32 R.F., one '32 Detector and one '33 Pentode Audio — 15 to 200 meters — four coils supplied. The "Eagle" is economical — two dry cells will operate the filaments. See March or April QST for full description on this most excellent value in short wave receivers.

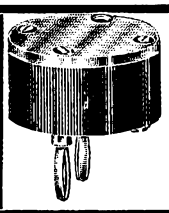
"Eagle" Completely Wired and Tested... $11.95

Three Tubes Tested in Your Receiver.... $3.00

DeForest 410's 99¢ ea. in lots of 4

$1.10 ea. in pairs $1.19 singly

Every tube transmitter tested at 650 volts. The last time we had a batch of these tubes we sold them in two weeks. Were you one of the many whose orders we could not fill? With tube prices going sky high — better stock up while we have them.



The Perfect Crystal Holder
only $1.00

A commercial type crystal holder for half the price you have to pay for ordinary holders. New type pressure spring, square inside to prevent movement of crystal, one piece molded body — dustproof — will take crystals up to 1¼" square or round. Plugs standard ¼" spacing. This holder must be seen to be appreciated for the extraordinary value offered.

Gross Special Power Transformer

for use with '83 tube will give an output of 500 volts D.C. at 350 MA with choke input. Run your entire R.F. and Class B off this transformer. The regulation for the Class B is about 5%, filaments are two 7½ v. and one 5 v. *Special*..... **$5.75**

A transformer having the same filament windings as above — at 300 MA having 750 volts each side of C. T. *Special*..... **$6.00**

750–1000 V. each side of C.T. 300 watts. Extraspecial..... **$6.80**

1000–1500 V. each side C.T. 300 MA **8.50**

1500–2000 V. each side of C.T. 800 Watts. **$11.95**

Case 6.3 V. 2 amp. transf..... **1.25**

2.5 V. 6 amp. C. T. (midget)..... **.80**

5 V. 3 amp. C.T. for '83 (midget)..... **.80**

2½—2½ and 5 Volt C.T..... **1.25**

2½—7½ and 7½ Volt C.T..... **1.45**

2½—5 and 7½ Volt C.T..... **1.45**

5–5 and 5 Volt C.T..... **1.45**

5–7½ and 7½ Volt C.T..... **1.45**

Thord. 30 H 75 MA..... **.60**

Thord. 15 H 250 MA..... **2.95**

Thord. No. T-2458 double 18 H 250 MA..... **6.50**

Gross cased 30 H 200 MA choke..... **1.95**

High Grade filament transformers shielded in metal cases, center tapped secondaries.

2.5 volt 10 amperes for 866's..... **$2.50**

10 to 12 volts at 8 amperes..... **2.50**

Special 10–12 Volt 7.5 ampere filament transformer, extra special... **1.10**

Oil Impregnated cased condensers 1400 Volt D.C. 2–2 mfd..... **1.85**

Ward Leonard Vitreous Resistors 200-Watt 8½" Long with Variable Sliders.

1000 ohms..... **$.99**
2500 ohms..... **1.05**
5000 ohms..... **1.05**
10000 ohms..... **1.11**
15000 ohms..... **1.20**
25000 ohms..... **1.29**
35000 ohms..... **1.35**
50000 ohms..... **1.44**
60000 ohms..... **1.44**
80000 ohms..... **1.44**
100000 ohms..... **1.44**

SOLID ENAMELED ANTENNA WIRE

No. 14 (any length) per 100 ft..... **$ .35**
No. 12 (any length) per 100 ft..... **.55**
No. 10 (any length) per 100 ft..... **.90**
No. 8 (any length) per 100 ft..... **1.30**

Polymet cased cond. 8 mfd 1000 V. DC..... **$1.65**

SPECIAL TRANSFORMER, 550 V. each side C.T. 150 MA 2½ V. 10 amps. 5 V. 3 amps. 7½ V. 3 amps..... **$3.75**

Bakelite 7" spreaders with set screws .16

EXTRA SPECIAL

Sangamo 5000 Volt .002 condensers **$.90**
Baldwin Type "C" Mica Dia. Phones **3.75**
Acme featherweight 4000 ohm Phones..... **1.45**
R.C.A. 3 section S.W. chokes, only.. **.25**
E-S Bradleystats 50,000 ohm for C Bias—only..... **.69**
Flexible Shielded No. 18 stranded wire single—per 100 ft..... **1.45**
double—per 100 ft..... **2.50**
5 wire cable, any length, per ft..... **.03**
8 mfd Dry Electrolytics in metal cans **.59**
Franklin Transmitting keys..... **.65**
W.L. Adjustats for fila. transf. primary control—20, 50, 75, 100 ohm. **1.80**

Tiny-mite ½" and 1" stand-off ins... **$.05**
Egg Strain Insulators..... 20 for **.25**
Beehive stand-off ins. Per doz..... **.50**
3" Isolantite spreaders..... 10 for **.35**
Jewel Pilot lights, red, green..... **.20**
Double-button mike transformer.... **.95**
5-meter oscillator coils..... **.65**
Frost 500,000 ohm Potent..... **.35**
5-slot wood choke forms..... **.06**
1½ volt keying relays. Special..... **.55**
8 mfd. paper case 450 v. electrolytic cond..... **.40**
Bakelite dials 5" diam..... **.15**
Bakelite knobs 2" or 2½" diam..... **.10**
¼. ½ and 1 watt neon bulbs..... **.40**

Hoyt 0-1 M.A. moving coil meters
3" type **$3.95** 2" type **$3.50**
(limited quantity)

70-WATT CLASS B MODULATOR UNIT KIT $50.00

Uses 1-57, 1-56, 2-45's P.P. & 4-46's in P.P. Parallel Class B. All parts including power supply and metal chassis furnished — less tubes. Will fully modulate a 50 watt tube with an input of 140 watts.

NEW!! WESTINGHOUSE BAKELITE CASED METERS

Finest high grade meter you have ever used.
3½" milliammeter 5 to 1000 MA range, each..... **$5.50**
3½" R.F. Thermo ammeters 1 to 5 amperes, each..... **8.50**

GUARANTEED TUBES

Heavy Duty Isolantite top 866..... **$2.15**
888 or 871..... **1.15**
83 and 47's..... **.70**
281 Plain..... **.90**
210's..... **1.30**
46's..... **.60**
DeForest 250's..... **1.35**

BLACK SHRIVEL SHIELD BOXES

Length	*Height*	*Width*	*Price*
6"	5"	5"	$.65
9"	6"	5"	1.15
10"	7"	9"	1.35
10"	8"	8"	1.45
14"	8"	10"	1.75
18¼"	9"	8"	2.85

(for 20-W JR.)

HOYT ANTENNA METERS

Hot wire antenna meters, 1½, 3 and 5 ampere ranges. Why do without antenna meters when you can buy them at this Special price!..... **$2.85**

Hoyt perfectly damped meters at a price. These are not to be confused with the usual meter "bargains." 2" mounting hole, flange 2½" diameter, supplied in the following sizes: 10 m.a., 50 m.a., 100 m.a., 150 m.a., 250 m.a., 300 m.a., 4 volt A.C., 10 volt A.C., 15 volt A.C., 10 v. D.C. Price each, **$1.50**, 3 for **$4.00**.

20% deposit with all C.O.D. orders. Remit by M.O. Include postage. Prices subject to change without notice.

GROSS RADIO INC.

NRA

51 VESEY ST., N. Y. C.
TEL. BARCLAY 7-0161

NATIONAL RADIO PRODUCTS

are marketed through the following distributors who carry a large and complete stock of all the items listed in our new No. 220 catalog, presented herewith.

These concerns extend to the amateur and experimenter

a discount of 40% from the list prices

By dealing directly with the distributor in your territory you will not only be assured of prompt and dependable service but will also be certain of receiving the latest type products in factory sealed cartons.

Prices quoted in No. 220 Catalog become effective Sept. 15, 1933. Subject to change without notice

CALIFORNIA
Radio Supply Co., 912 S. Broadway, Los Angeles, Calif.
Radio Television Sup. Co., 1000 S. Broadway, Los Angeles, Calif.
Pacific Radio Exchange, 729-31 So. Main St., Los Angeles, Calif.
Electric Supply Co., 329 Thirteenth Street, Oakland, Calif.
I. S. Cohen's Sons, Ltd., 1025 Market Street, San Francisco, Calif.
Offenbach Electric Co., 1452 Market Street, San Francisco, Calif.
Coast Elec. Co., 744 G Street, San Diego, Calif.

COLORADO
Interstate Radio and Supply Co., 1639 Tremont Street, Denver, Colo.

CONNECTICUT
Hatry & Young, Inc., 203 Ann Street, Hartford, Conn.

ILLINOIS
Chicago Radio App. Co., 415 S. Dearborn Street, Chicago, Ill.
Midwest Radio Mart, 520 So. State St., Chicago, Ill.

MARYLAND
Radio Electric Service Co., 303 W. Baltimore St., Baltimore, Md.

MASSACHUSETTS
H. Jappe Co., 46 Cornhill, Boston, Mass.

MISSOURI
Walter Ashe Radio Co., 1100 Pine Street, St. Louis, Mo.
Burstein Applebee Co., 1408 McGee Street, Kansas City, Mo.
Radio Laboratories, 1515 Grand Ave., Kansas City, Mo.

MINNESOTA
The Lew Bonn Co., 2484 University Ave., St. Paul, Minn.

MICHIGAN
Radio Specialties Co., 171 E. Jefferson Ave., Detroit, Mich.

NEW YORK
Wholesale Radio Serv. Co., 100 Sixth Ave., New York City, N. Y.
Leeds Radio Co., 45 Vesey Street, New York City, N. Y.
Sun Radio Co., 227 Fulton Street, New York City, N. Y.
Buffalo Radio Shack, 1604 Main St., Buffalo, N. Y.
Roy C. Stage, 265 West Erie Blvd., Syracuse, N. Y.
Maurice Schwartz & Son, 710-712 Broadway, Schenectady, N. Y.

OHIO
Northern Ohio Laboratories, 2073 W. 85th St., Cleveland, Ohio

OKLAHOMA
Southern Sales Co., 130 W. 3rd St., Oklahoma City, Okla.

OREGON
Wedel Co., Inc., 443 Washington St., Portland, Ore.

PENNSYLVANIA
M & H Sporting Goods Co., 512 Market St., Philadelphia, Pa.
Radio Elec. Serv. Co., N.E. Cor. 7th & Arch Sts., Philadelphia, Pa.
Eugene G. Wile, 10 South 10th St., Philadelphia, Pa.
Cameradio Co., 603 Grant St., Pittsburgh, Pa.

TEXAS
Straus-Frank Co., 1209-1217 Milam St., Houston, Texas
Straus-Frank Co., 301-307 S. Flores St., San Antonio, Texas
Amateur Supply Co., 1614 St. Louis Ave., Fort Worth, Texas
Western Battery & Magneto Co., El Paso, Texas

VIRGINIA
Hudson Radio Supply Co., 27th and Marshall Sts., Richmond, Va.

WASHINGTON
Wedel Co., Inc., 520 Second Ave., Seattle, Wash.
Spokane Radio Corp., 611 First Ave., Spokane, Wash.

WISCONSIN
Radio Parts Co., 332 W. State St., Milwaukee, Wis.

DISTRICT OF COLUMBIA
National Elec'l Sup. Co., 1328 N. Y. Ave. N.W., Washington, D. C.

Obviously it is impractical to list in a general catalog all of the radio products of our manufacture. Should you not find listed such apparatus as will fully meet your particular requirements we invite you to write direct to our engineering department.

• DESCRIPTIVE PRICE LIST • BULLETIN NO. 220 •

• NATIONAL COMPANY, INC. • ENGINEERS AND MANUFACTURERS •

• 61 SHERMAN STREET • MALDEN, MASSACHUSETTS •

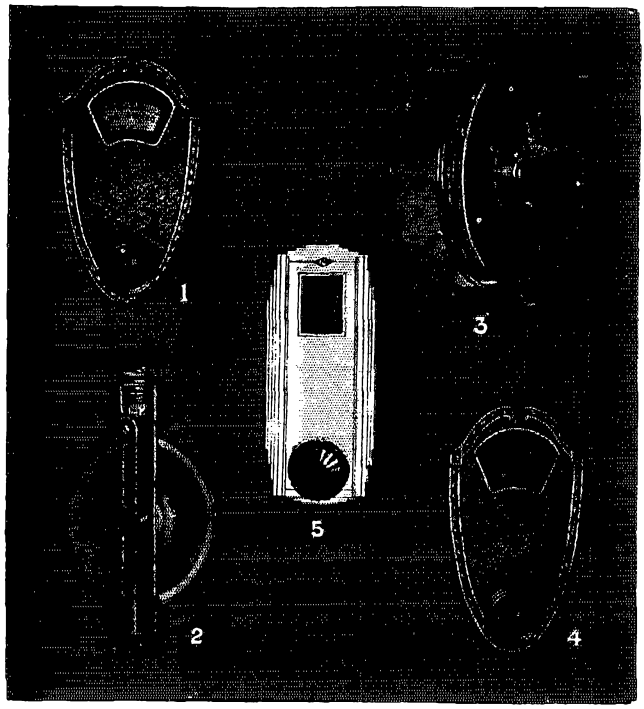
NATIONAL
RADIO PRODUCTS

In the past it has been our custom to announce new catalogs in our QST advertisements. That these catalogs are desired by practically all members of the ARRL has been proven time and time again by the number of requests for copies being approximately equal to the circulation of QST. In order to save you the inconvenience of writing for your copy of our new 1933–1934 catalog, we have, therefore, arranged to present it to you this year in a new manner. Additional copies may be had for the asking at any time.

JAMES MILLEN

NRA MEMBER U.S. WE DO OUR PART

• + + + + ESTABLISHED 1914 + + + •



NATIONAL

Velvet-Vernier

DIALS

In the NATIONAL VELVET-VERNIER DIALS, Types G and H, the scale is projected onto a ground-glass screen on the dial opening by a brilliant illuminator, and the dial reads the same from any position. In other words, you do not see the scale itself but you see its image thrown on the screen considerably enlarged.

An added attraction of the Type H Drum Dial is an arrangement by which the color of the figures and scale divisions shifts kaleidoscopically as you turn the tuning knob

Type "E"—(Figs. 1 and 2)

U. S. Patents Nos. 1,656,532; 1,713,146; Des. 76,957.

This dial embodies a *Velvet-Vernier* disc type of mechanism that assures a positive drive on condensers mounted perpendicular to the front panel. Ratio — ten to one. Hammered silver or bronze finish escutcheon plate. Dial reading available for all types of condensers. Standard type designed to fit ¼" condenser shaft — supplied at no additional cost to fit ⅜" shaft.

Catalog Symbol		*List Price*
VED	0–100–0	**$2.75**
VEC	200–0	**2.75**

Type 28 Illuminator, extra 50c.

Type "F"—(Figs. 3 and 4)

U. S. Patents Nos. 1,789,912; 1,751,658; Des. 76,957.

NATIONAL *Velvet-Vernier* Drum Dial Type F. Constructed with a mechanism that has a velvet smoothness in operation, automatic spring take-up assures a positive drive at all times. All Metal parts cadmium, nickel plated or painted to eliminate possibility of corrosion or rust. Ratio — ten to one. Standard dial is made to be attached to ¼" condenser shaft.

Catalog Symbol			*List Price*
VFCC	Counter Clockwise (0–100)	(180°)	**$4.00**
	Type 28 illuminator, extra		**.50**

Type "G"—Disc Projection Dial—(Figs. 2 and 5)

U. S. Patents Nos. 1,744,675; 1,656,532; 1,713,146; Des. 79,378.

This dial employs the same type of mechanism and assures user of same velvet smoothness as that embodied in our Type E dial. For use with condensers where shaft is at right angles to the panel. It is a monocolor projection type of dial. Standard color is green. Ratio — ten to one.

Catalog Symbol				*List Price*
VGCC	Counter Clockwise	(0–100)	(180°)	**$3.75**
VGE	Clockwise	(150–0)	(270°)	**3.75**

Type "H"—Drum Projection Dial—(Figs. 3 and 5)

U. S. Patents Nos. 1,790,939; 1,789,912; 1,751,658; Des. 79,378.

The Type H Dial employs the proved and popular NATIONAL *Velvet-Vernier* drum mechanism with its powerful non-conducting drive and spring take-up that is similar to that used in our type F mechanism. When furnished as a monocolor dial. Standard color is green. Ratio — ten to one.

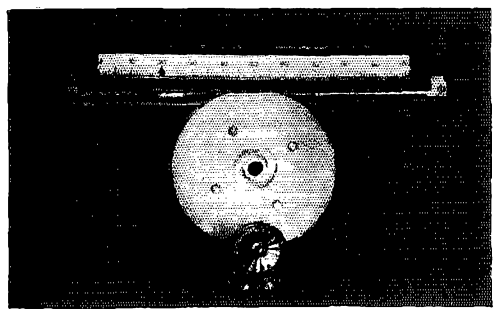
Catalog Symbol				*List Price*
VHCC	Monocolor — Counter Clkws.	(0–100)		**$5.00**
VHC	Monocolor — Clockwise	(100–0)	all	**5.00**
VHCCR	Rainbow — Counter Clkws.	(0–100)	180°	**5.50**
VHCR	Rainbow — Clockwise	(100–0)		**5.50**
VHCE	Monocolor — Clockwise	(150–0)	270°	**5.00**

NATIONAL Full Vision Dial

U. S. Patents Nos. 1,656,532 and 1,713,146.

The new NATIONAL *Full Vision* Dial shown at the right fills a definite need for a dial having none of the tailings usually so noticeable in a unit of this type. The scale is fully seven inches in length, insuring accuracy of reading which is quite essential in high frequency work. The pointer moves evenly across the scale and remains vertical at all positions. The mechanism is similar to that of the Type E, noted for its smooth and positive drive which improves with use. The escutcheons can be supplied in either silver or antique bronze.

Catalog Symbol	*Scale Reading*		*List Price*	*Direction of condenser rotation for capacity increase*
VKC	100–0	180°	**$4.00**	Clockwise
VKCC	0–100	180°	**4.00**	Counter Clockwise
VKE	0–100	270°	**4.00**	Counter Clockwise



NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL
Velvet-Vernier
DIALS

Type "A"—(Fig. 1)

U. S. Patent No. 1,744,675, others pending

The Type A is the original NATIONAL *Velvet-Vernier* Dial with its smooth, matchless mechanism, which gives perfect control for highly selective circuits. The development of the new form of Gearless transmission used in this mechanism permits a motion that is even and regular throughout its range. No backlash exists, none can develop, dials equipped with this mechanism may be used under all operating conditions and assures user of a positive and even drive at all times. Ratio — five to one.

On the Type A dial the mechanism is mounted to a bakelite shell and knob with readings as follows.

Catalog Symbol			*List Price*
VAC C3 3⅛" Diameter Counter Clkws.			
(0–100)	(180°)		$2.75
VAC C4 4" Diameter Counter Clkws.			
(0–100)	(180°)		2.75
VAC 4 4" Diameter Clockwise			
(200–0)	(360°)		2.75
VAC E4 4" Diameter Clockwise			
(150–0)	(270°)		2.75

Type "B" and "C"—(Fig. 2)

U. S. Patents Nos. 1,653,875 — 1,656,532 — 1,713,146

This NATIONAL dial embodies a standard *Velvet-Vernier* mechanism that is smooth, free from backlash, and furnishes a positive drive on condensers where the shaft is at right angles to the panel. Variable ratio of 6 to 1 and 20 to 1. It is equipped with a black bakelite shell and easily attached to front panel. Diameter across front of dial 4".

Both types are identical except that Type B is without light and Type C includes the illuminator.

Catalog Symbol				*List Price*
VB C Clockwise	(200–0)	(360°)	}	Type B
VB D Dual Range	(0–100–0)	(180°)	}	$2.75

Dial Illuminator and Bracket, extra, 50c.

Type "BM"—3" Dial—(Fig. 3)

U. S. Patents 1,656,532 — 1,713,146

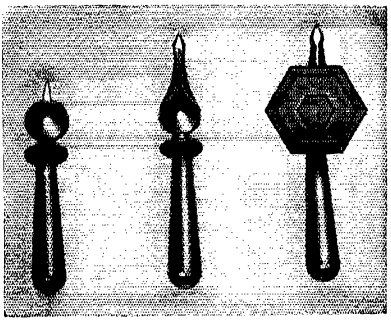
Similar in appearance to our Type B except that diameter is 3". Has the same *Vernier* mechanism but does not incorporate variable ratio feature. Especially adapted for small receiving and transmitting equipment where space is limited.

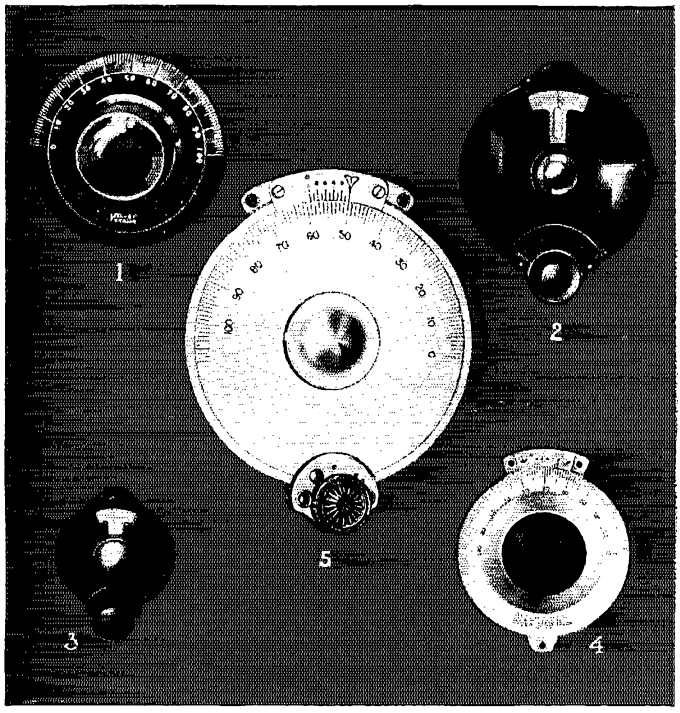
Catalog Symbol			*List Price*
BM D	Dual Range	(0–100–0)	$2.50
BM C	Clockwise	(200–0)	2.50

PRECISION Velvet-Vernier Dials Types "N" and "NW"

U. S. Patents Nos. 1,744,675 — 1,653,875 — 1,656,532 — 1,713,146 — other patents pending.

On instruments and equipment when permanency of calibration depends on the accuracy of the dial the NATIONAL Type N and NW are especially adapted.





Type "N" Dial—(Fig. 4)

The 4" instrument dial is equipped with the original and unexcelled NATIONAL *Velvet-Vernier* mechanism as used in our Type A dial, thereby assuring a smooth, positive and reliable drive while also securing the utmost precision of logging. Reading to 1/10 of a dial division. Ratio — 5 to 1. Dials attach to panel at three points. Standard size hub ¼".

Catalog Symbol			
Type VNB	(0–100)	180°	} *List Price*, each $6.75
Type VND	(100–0)	180°	} 4-inch diameter
Type VNE	(150–0)	270°	}
Type VNC	(200–0)	360°	}

Type "NW"—(Fig. 5)

The 6" instrument dial is equipped with a standard NATIONAL *Velvet-Vernier* mechanism similar to that used in our Type B dial that assures a firm and positive drive. It is capable of extreme precision. Flush *Vernier* eliminating parallax. Reads to one-tenth division and may be estimated to one-twentieth division. Equipped with a 3 point variable ratio. Dial attaches to face of panel at four points making accurate mounting exceedingly easy. Standard size hub. ⅛".

Catalog Symbol			
Type NWB	(0–100)	180°	} *List Price*, each $15.00
Type NWD	(100–0)	180°	}
Type NWE	(150–0)	270°	}
Type NWC	(200–0)	360°	}

Type "BX"—(similar Fig. 2)

Same as standard Type B dial except with etched silver markings on black background and with *Vernier* indicator for reading to 1/10 divisions.

Type BX (150–0) 270° *List Price*, each $3.50

NATIONAL Dial Lever Indicators

Designed for transmitter control panel use. They have well defined bronze pointers and insulated handles.

Available in three types as shown to fit both ¼" and ⅜" shafts.

Type	*List Price*
S	$2.75
M	3.00
J	3.75

Etched Scales (0–100) furnished free with J & M indicators.

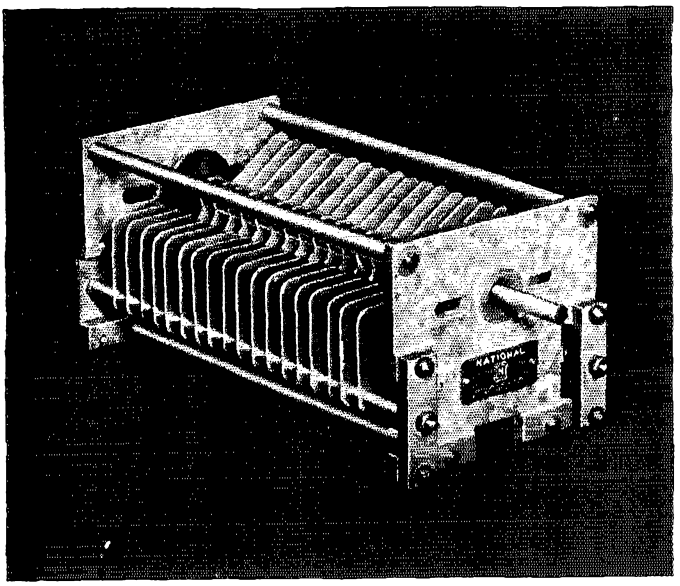
NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

Type TMU

Transmitting

CONDENSERS



NATIONAL TMU Condensers are designed for more high powered work than covered by our standard TM type. These units embody all the latest features for efficiency, steadiness of signal, and rigidity of construction.

Electrical Features: NATIONAL TMU Condensers. Both rotor and stator plates have fully rounded corners and edges, and are highly polished to remove all irregularities, resulting in uniform electrostatic field and minimum surface resistance.

Dielectric losses are exceedingly low. Only genuine Micalex (glass-bound mica) is employed to support the stator, and the insulators are placed in a position where the field intensity is very small.

Connection to the rotor is made through a non-inductive, laminated self-cleaning, rotary brush having a total surface contact ⅛" x ½" in area. A special rear contact plate is employed.

Mechanical Features: The use of four sturdy frame spacers, together with solid cast aluminum ends, results in a mechanical rigidity which insures permanence of electrical characteristics, plate spacing, etc., under the most adverse operating conditions of mechanical strain and temperature variation.

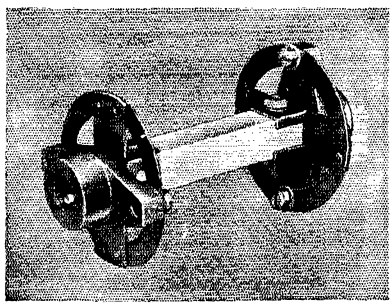
The rotor shaft is ⅜" in diameter, operating in self aligning conical and ball bearings.

The condenser may be supported entirely from the front panel if desired. No shelf is necessary.

LIST OF STANDARD SIZES OF STOCK CONDENSERS

Type	*Capacity*	*Peak Voltage Rating*	*No. of Plates*	*Spacing Between Adj. Rotor and Stator Plates*	*Overall Length Excluding Shaft Extensions*	*List Price Micalex*
TMU 500	0005	5000	57	.17"	14¾"	**$47.50**
TMU 400	0004	5000	45	.17"	14¾"	**46.00**
TMU 300	0003	5000	35	.17"	10 1/16"	**44.50**
TMU 200	0002	5000	23	.17"	10 1/16"	**42.50**
TMU 100	0001	5000	12	.17"	6¼"	**41.00**
TMU 50	00005	5000	7	.17"	6¼"	**40.00**
TMU 300A	0003	7500	45	.22"	14⅞"	**47.50**
TMU 250A	00025	7500	37	.22"	14⅞"	**46.00**
TMU 200A	0002	7500	31	.22"	11"	**44.50**
TMU 150A	00015	7500	23	.22"	11"	**43.00**
TMU 100A	0001	7500	15	.22"	6⅝"	**42.00**
TMU 50A	00005	7500	8	.22"	6⅝"	**41.00**

NOTE: End plates, 5 x 4½". Center of rotor shaft 3 1/16" above bottom of condenser. Overall lengths given in table above. Shaft diameter ⅜".



NATIONAL High Voltage Shaft Coupling

This new coupling was designed for use in high voltage devices. It consists of a shaft of glazed Isolantite ⅝" x ⅝" to which cadmium plated fittings are securely attached. Sufficient flexibility is provided in the two universal joints to eliminate all trouble due to improper alignment of driving shaft and apparatus to which the opposite fitting is attached. No motion is lost in the coupling.

Available in different lengths

List Price { With 2" Leakagepath Bar..... **$7.00**
With 3½" Leakagepath Bar..... **7.75**
With 6" Leakagepath Bar..... **8.50**

NATIONAL COMPANY, INC., MALDEN, MASS.

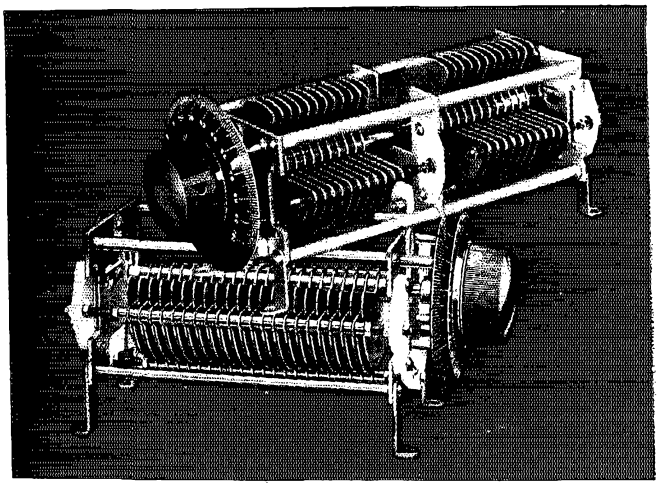
NATIONAL

Variable

Transmitting

CONDENSERS

The following types of NATIONAL *Transmitting* Condensers are designed for amateur, commercial and laboratory use. They have been adopted as standard equipment by all leading commercial communication companies, U. S. Navy, U. S. Signal Corps, etc., etc.



Type TM Condensers

Light weight but very strong and efficient condensers for low and medium power transmitters.

The front rotor bearing is the self centering conical type while the rear is a steel ball with adjustable thrust.

Electrical efficiency at all frequencies is assured through the use of Isolantite insulation, rounded and polished plates (both rotor and stator) and a positive rotor contact brush. The construction of these condensers is such that there are no sharp edges or points in the high intensity areas of electrostatic field, with the result that maximum voltage may be applied with a minimum of dielectric losses.

Provision for either shelf or panel mounting is furnished. In many cases both methods may be employed to furnish support for the shelf or sub-panel.

Note: **— The ratings on all National Transmitting Condensers are conservative:**

TM 3000v. — Spacing between adjacent rotor and stator plate surfaces .077 inches. On the TM 6000v. .171 inches.

Type TMP Condensers

A split stator condenser for medium power push-pull transmitters. Especially suited for 5-meter work where extremely accurate balance between both sides of the tank coil is necessary for best efficiency. Isolantite stator insulators, polished plates, self-aligning conical bearings, rigid frame, construction, etc. Construction and spacing between plates is similar to type TM.

Standard Sizes

Type	*Capacity each section*	*Peak Voltage Rating*	*List Price*
TMP 100	100 mmf.	3000v.	**$10.00**
TMP 230	230 mmf.	3000v.	**15.00**
TMP 100A	100 mmf.	6000v.	**16.00**

Standard TM Condensers

The condensers listed below are standard sizes.

Type	*Capacity*	*Peak Voltage Rating*	*No. Plates*	*List Price*
TM 35A	.000035	6000v.	7	**$4.50**
TM 50A	.00005	6000v.	12	**6.00**
TM 100	.0001	3000v.	11	**4.50**
TM 100A	.0001	6000v.	23	**10.00**
TM 150	.00015	3000v.	17	**5.00**
TM 150A	.00015	6000v.	35	**14.00**
TM 230	.00023–5	3000v.	23	**9.00**
TM 230A	.0023–5	6000v.	51	**17.00**
TM 350	.00035	3000v.	35	**11.00**
TM 450	.00045	3000v.	43	**12.00**

These prices do not include NATIONAL Velvet-Vernier Dials. Condensers with dials, $2.50 extra.

Type EMP Condensers

A split stator condenser for receivers and low power push-pull transmitters. Special low-loss stator insulators are employed. 1200 volt breakdown. The spacing between adjacent rotor and stator plates is .023. Construction is similar to type TM.

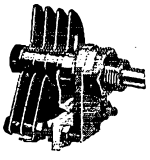
Standard Size EMP 100 mmf. per section. *List Price,* **$5.00**

Although we list only one size, these condensers are available in capacities up to 350 mmf. per section. Prices quoted upon request.

NATIONAL NEUTRALIZING CONDENSERS

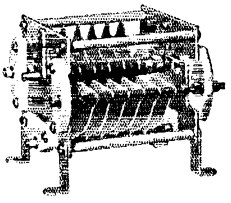
Type STN Condenser

A compact, rigid, and efficient condenser particularly suitable for neutralizing 245, 247, 210 and similar tubes in amplifier, buffer or doubler stages. Very low minimum capacity. Isolantite insulation and polished plates. Maximum capacity 18 mmf. Peak voltage breakdown — 3000v. *List Price,* **$2.00**



Type TMN Condenser

A heavy duty neutralizing condenser having a peak voltage rating of 6000 volts. Suitable for use with 203A, 852, 204A and similar tubes. Maximum capacity 50 mmf. *List Price,* **$6.00**



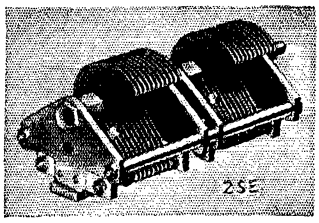
NATIONAL COMPANY, INC., MALDEN, MASS.

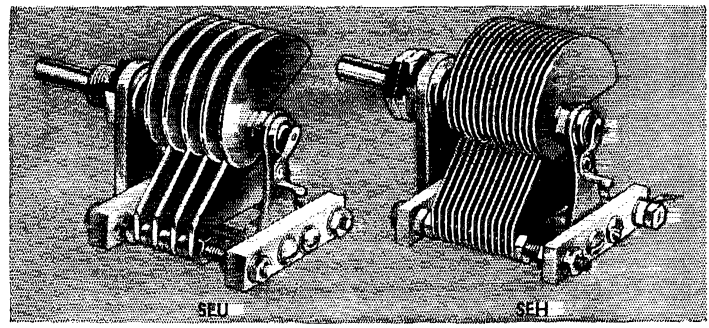
NATIONAL *Variable Receiving* CONDENSERS

Ultra High Frequency

The High Frequency Condensers described on this page were designed as a separate series, intended to meet the difficult requirements of Ultra-High Frequency Service. As such, they embody a number of unusual refinements. Thus, all stators have Isolantite insulation, shaped to reduce dielectric losses to a minimum, and special attention has been paid to making the series quiet. Constant impedance rotor connections eliminate crackle and thick, non-resonant aluminum plates prevent any possibility of microphonic feed-back from this source. And, all two-bearing condensers have insulated front bearings to eliminate shorted turns through the frame. In addition, the Two-Gang 2 SE Condenser also has isolated rotors, electrically independent, to prevent interstage coupling through common rotor and frame circuits. Mechanical rigidity, so necessary for permanence in electrical characteristics and for freedom from backlash in tuning, is assured by careful mechanical design and precise workmanship.

The complete specifications of the stock sizes and models are listed in the table on the right. The standard direction of rotation is clockwise, but counter-clockwise rotation is available on special order. Also, on special order, any of the condensers listed may be obtained with the shaft extending through the rear bearing, for ganging purposes.

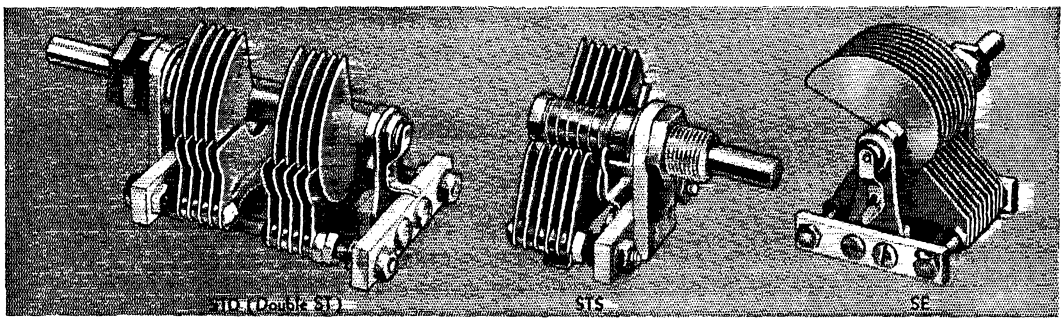




STANDARD NATIONAL H.F. and ULTRA H.F. MIDGET CONDENSERS

Catalog Type No.	Capacity in Mmf.	Air Gap	Plate Shape	Rotor Plates	Stator Plates	Depth behind Panel	List Price
ST-35	35	.026		5	4	2¼"	$1.50
ST-50	50	.026		6	5	2¼"	1.80
ST-75	75	.026		8	7	"	2.00
ST-100	100	.026		10	10	"	2.25
ST-140	140	.026		14	14	2¾"	2.50
ST-150	150	.026		15	14	2¾"	2.50
STH-200	200	.0175		14	13	2¼"	2.75
STH-250	250	.0175		16	16	2¾"	3.00
STH-300	300	.0175	180°	20	19	2¾"	3.25
STH-335	335	.0175	SLW	22	21	2¾"	3.50
STN-18	18†	.065		4	3	1⅝"	2.00
STHS-15	15	.0175		2	1	1 3/16"	1.40
25	25	.0175		2	2	"	1.50
50	50	.0175		4	3	"	1.60
STD-50	50*	.026		6*	5*	2¾"	3.50
STHD-100	100*	.0175		7*	7*	"	4.50
SS-50	50	.026		5	4	2¼"	$1.80
75	75	.026		7	6	"	2.00
100	100	.026		9	8	"	2.25
150	150	.026		12	12	2¾"	2.50
SSH-200	200	.0175		11	10	2¼"	2.75
250	250	.0175		13	13	"	3.00
300	300	.0175		16	15	2¾"	3.25
350	350	.0175	180°	18	18	2¾"	3.50
SSN-18	18†	.065	SLC	3	3	1 3/16"	2.00
SSS-20	20	.0175		1	2	"	1.40
30	30	.0175		2	2	"	1.50
50	50	.0175		3	3	"	1.60
SSD-50	50*	.026		5*	4*	2¾"	3.50
SSHD-100	100*	.0175		5*	5*	2¾"	4.50
150	150*	.0175		8*	8*	"	5.00
SE-50	50	.026		6	5	2¼"	$3.00
75	75	.026		8	7	"	3.25
100	100	.026		10	10	"	3.50
150	150	.026		15	14	2¾"	3.75
SEH-200	200	.0175		14	13	2¼"	3.75
250	250	.0175		16	16	2¾"	4.00
300	300	.0175	270°	20	19	2¾"	4.00
335	335	.0175	SFL	22	21	2¼"	4.25
SEU-15	15	.055		3	3	"	2.50
20	20	.055		4	4	"	2.75
25	25	.055		5	4	"	2.75
2SE-100	100*	.026		10	10	5"	5.50
2SEH-200	200*	.0175		14	13	"	6.50

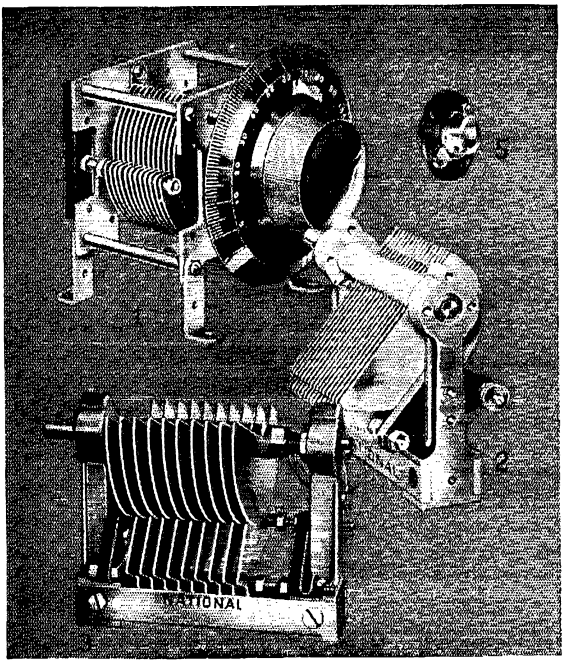
*Per Section †3000 Volt Rating



NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

Variable CONDENSERS



NATIONAL Equimeter Condenser *(Fig. 1)*

(Straight Wave Line)

The NATIONAL EM Condensers are of a straight wave line type. The mechanical construction is similar to that of the Type TM Condensers described on page 5. While originally designed for use in receivers, the EM Condenser has proven eminently suitable for low power transmitters and oscillators employing 245, 247 or 210 tubes where the peak voltages encountered are not over 1000. Isolantite insulation is employed throughout.

Spacing between adjacent rotor and stator plate surfaces = .023.

Type	*Size*	*No. Plates*	*List Price*
EM 50	50 mmf.	3	**$2.50**
EM 100	100 mmf.	6	**2.50**
EM 150	150 mmf.	9	**3.00**
EM 200	200 mmf.	11	**3.50**
EM 250	250 mmf.	14	**3.50**
EM 350	350 mmf.	18	**3.75**
EM 500	500 mmf.	26	**4.00**
EM 1000	1000 mmf.	46	**5.50**

These condensers are also available with a wider spacing of .062 between adjacent rotor and stator plates. When ordering this type specify the letter A after the size desired in each section.

EMA-150 150 mmf. *List Price*, **$5.00**

Prices on other sizes will be quoted upon request.

NATIONAL Equitune Condenser *(Fig. 2)*

(Modified Straight Frequency Line)

NATIONAL Equitune Condensers are of the 180° rotation type. The lower half of the scale is straight frequency line and the upper half straight wave length line, so as to permit crowding of stations on lower dial reading. Girder Frame construction same as the EC type. Spacing between adjacent rotor and stator plates is .023.

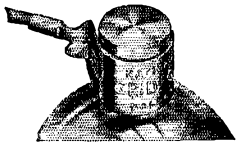
Type	*Size*	*No. Plates*	*List Price*
ET 150	150 mmf.	7	**$4.25**
ET 250	250 mmf.	15	**4.50**
ET 350	350 mmf.	17	**4.75**
ET 500	500 mmf.	25	**5.00**

NATIONAL Coupling Unit *(Fig. 5)*

A small insulated universal joint of the flexible disc type for use in coupling shafts of tuning condensers. Made to fit ¼" shafts. *List Price*, **$.55**

NATIONAL Grid-Grips

This remarkably convenient little Grid-Grip is the most simple method of attaching a wire to the screen-grid terminal of AC or DC screen-grid tubes. Easy to operate, never works loose, makes continuous electrical contact. Eliminates possibility of loosening cap on tube when removing lead.



Made in Two Sizes

TYPE 24 — To Fit Broadcast Set Tubes **$.05**

TYPE 12 — To Fit Large Type Tubes such as 872..... **$.10**

NATIONAL Equicycle Condenser *(Fig. 3)*

The NATIONAL EC Condensers are of a straight line frequency type, 270° rotation, built into our Girder Frame. On the smaller capacities up to 125 mmf. the spacing between adjacent rotor and stator plates is .062, and a non-inductive pigtail added to insure positive and silent operation without detuning.

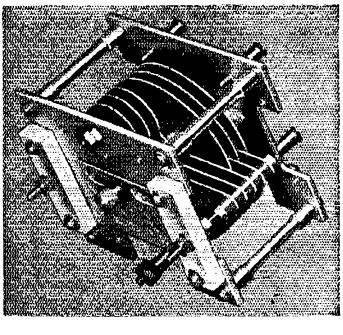
On the larger sizes the spacing between adjacent rotor and stator plates is .023.

Type	*Size*	*No. Plates*	*List Price*
EC 15	15 mmf.	3	**$4.00**
EC 50	50 mmf.	9	**4.25**
EC 75	75 mmf.	11	**4.25**
EC 100	100 mmf.	15	**4.50**
EC 125	125 mmf.	19	**4.50**
EC 150	150 mmf.	9	**4.00**
EC 250	250 mmf.	17	**4.50**
EC 350	350 mmf.	23	**4.75**
EC 500	500 mmf.	31	**5.00**

Frequency Meter Condenser

A special purpose condenser designed for use in amateur frequency meters and monitors. The three circular rotor plates make possible the use of a High C circuit which is necessary in order to avoid changes in calibration due to differences in tube characteristics, temperature variation, etc.

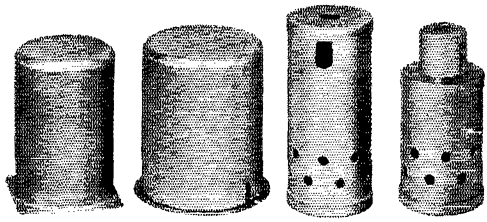
When used with a 100 division dial, the spread of the 160 or 80 meter bands is over 80 divisions.



Type 40–75
Min. Capacity 40 mmf.
Max. Capacity 75 mmf.
List Price, **$5.50**

NATIONAL COMPANY, INC., MALDEN, MASS.

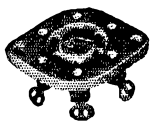
NATIONAL
TUBE and COIL SHIELDS



Aluminum shields for experimental and custom set work.

Catalog Symbol	*List Price*
J30 Coil Shield, 2¼" dia., 3¾" high — square flange at bottom 2¾"	$.35
B30 Coil Shield, 3" dia., 3¾" high	.35
B30 Coil Shield, as above with mounting base	.50
TS Tube Shie d with Top Cap and Bottom Mounting Plate	.40
T58 Tube Shield with Top Cap and Bottom Mounting Plate	.40

Note: The type T58 National Tube Shield is specially designed for use with the type 57 and 58 tubes now on the market.

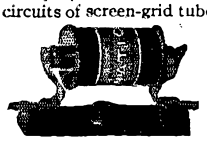


NATIONAL SOCKETS

A point which is often overlooked in ultra high-frequency receiver and transmitter design is the inefficiency of coil and tube sockets. These new Isolantite sockets will reduce such losses to a minimum. Suitable for either standard sub-panel or base-board mounting. Made in standard 4-, 5-, 6-, and 7-prong styles as well as in special 6-prong for NATIONAL coils. List Price ..... $.60

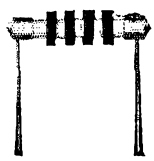
NATIONAL R.F. CHOKE Type 90

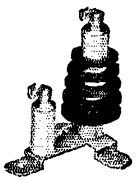
Has proper value for all by-passing work on screen-grid or plate circuits of screen-grid tubes and between detector and first audio, in accordance with best practise. Multi-section winding adapts this choke for short-wave as well as broadcast work. D.C. resistance, 350 ohms. Inductance 90 millihenries. Fits standard grid-leak mount. List Price without mounting $1.25



NATIONAL R.F. CHOKE Type 100

Isolantite mounting, continuous universal winding in four sections. For pigtail connections or standard resistor mountings. Ind. 2½ m.h.; distributed cap., 1 mmf.; D.C. resistance 50 ohms; Current rating, 125 M.A. For low powered transmitters and all types of high frequency receivers. List Price ..... $.75



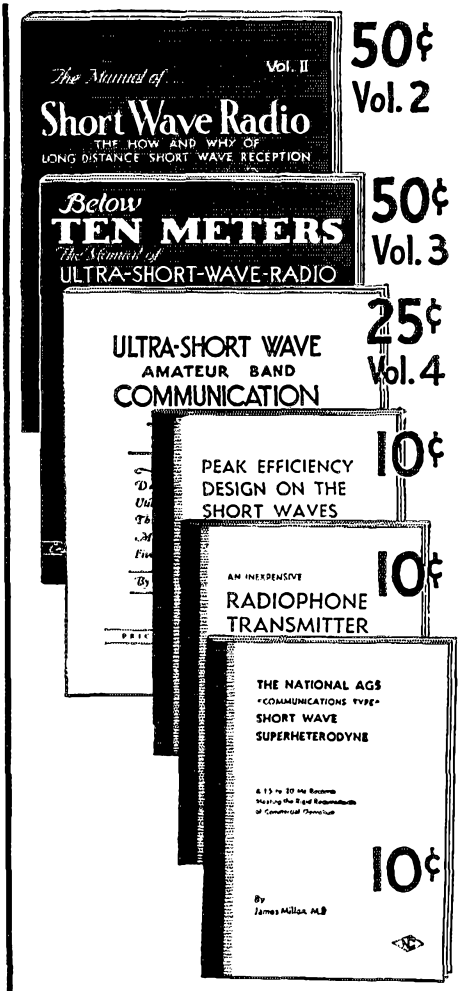


NATIONAL R.F. CHOKE Type R-152

Isolantite insulation on metal base — 10,000 v. insulation; continuous universal winding in 5 tapered sections; inductance 4 m.h.; distrib. cap, 1 mmf.; DC resistance 10 ohms; current ratings: — continuous 0.6 amp.; intermittent 0.8 amp. For both high and low powered transmitters and laboratory oscillators. List Price $2.25

NATIONAL R.F. CHOKE Type R-200

High impedance choke for output circuit of second detector. Same as used in AGS and FB-7, 90 millihenries, inductance, mounted in R-39 case. List Price $1.25

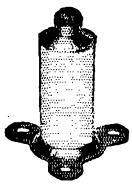


THE MANUALS

Vol. 2 — The Manual of Short Wave Radio — by Zeh Bouck 50c
Vol. 3 — The Manual of Ultra Short Wave Radio — by James Millen and R. S. Kruse 50c
Vol. 4 — Ultra Short Wave Amateur Band Communication — by James Millen 25c

The ENGINEERING BULLETINS 10c each

1. The Stenode
2. A Low Cost Push Pull C.W. Transmitter
4. World Wide Short Wave Reception
5. An Inexpensive Radiophone Transmitter
6. Engineering a Universal A.C. & D.C. Receiver, Especially Designed for Amateur Band Reception
7. The "AGS", a DeLuxe High Frequency Communication Receiver



STAND-OFF INSULATOR

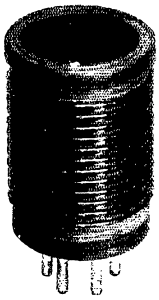
Handy stand-off insulator of Isolantite with 3-point mounting. 6/32 screw on top. Particularly useful in mounting transmitter inductances.

Type WGS. List, each ..... $.25

NATIONAL

Plug-in Type Inductances

FOR SHORT-WAVE USE



TYPE R-39 INDUCTANCES
"10" Series

For NATIONAL Original AC and DC 3-tube amateur receivers — AC-SW-5, AC-SW-45, DC-SW-34, Short-Wave Thrill Boxes, and the new DC-SW-3.

NOTE: See below for list of "60" series coils for use in AC-SW-58, and new revised AC-SW-3.

General Coverage Coils

Catalog Symbol	*Color*	*Range*	*List Price Per Pair*
No. 10	Brown	9. to 15. meters	$5.00
No. 11	Black	13.5 to 25. meters	5.00
No. 12	Red	23. to 41. meters	5.00
No. 13	White	40. to 70. meters	5.00
No. 14	Green	65. to 115. meters	5.00
No. 15	Blue	115. to 200. meters	5.00
No. 16	Orange	200. to 360. meters	5.50
No. 17	Yellow	350. to 550. meters	5.50
No. 18	Purple	500. to 850. meters	6.50
No. 19		850. to 1200. meters	8.00
No. 20		1200. to 1500. meters	8.00
No. 21		1500. to 2000. meters	8.00

Band Spread Coils

permit 50 dial division spread on 20, 40, 80 and 160 meter bands with standard NATIONAL SW Thrill Boxes.

No. 10A — 10 meter band (per set of 2) $5.00
No. 11A — 20 meter band (per set of 2) 5.00
No. 13A — 40 meter band (per set of 2) 5.00
No. 14A — 80 meter band (per set of 2) 5.00
No. 15A — 160 meter band (per set of 2) 5.00

Type R-39, "60" Series

For NATIONAL AC-SW-58, and AC-SW-3 Thrill Boxes.

General Coverage Coils

Catalog Symbol	*Range*	*List Price Per Pair*
No. 60	9. to 15. meters	$5.00
No. 61	13.5 to 25. meters	5.00
No. 62	23. to 41. meters	5.00
No. 63	40. to 70. meters	5.00
No. 64	65. to 115. meters	5.00
No. 65	115. to 200. meters	5.00
No. 66	200. to 360. meters	5.50
No. 67	350. to 550. meters	5.50
No. 68	500. to 850. meters	6.50

Band Spread Coils

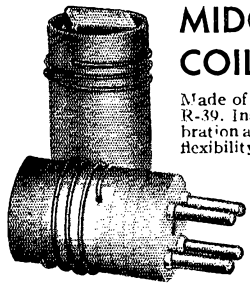
No. 60A — 10 meter band (per set of 2) $5.00
No. 61A — 20 meter band (per set of 2) 5.00
No. 63A — 40 meter band (per set of 2) 5.00
No. 64A — 80 meter band (per set of 2) 5.00
No. 65A — 160 meter band (per set of 2) 5.00

Forms only —

4-prong UX base ..... ea. $.75
5-prong UY base ..... ea. .75
6-prong Special ..... ea. .75

Socket only —

6-prong Special with mountings ..... ea. $.75



MIDGET R-39 COIL FORMS

Made of ultra low-loss form material R-39. Insure stability, maintain calibration and give highest efficiency and flexibility to ultra H.F. circuits. Have best form factor and lowest R.F. resistance. 1" diameter, 1½" long, 1-16" wall. In standard 4-prong type only. Unwound and ungrooved, list price 50c each.

Shielded Low Frequency Oscillator Coils

Two separate inductances closely coupled. Same as used in type SRR 56 m.c. super-regenerative receiver.

Type OSR ..... List price $1.50

NATIONAL *Regular and Band Spread* FB-7 COILS

These new front-of-panel change coils, with grounded and shielded cast metal end-handles and R-39 forms, are for use with the new NATIONAL FB-7 and FB-X Short-Wave Receivers. See pages 12 and 13 for full specifications, tuning curves and prices.

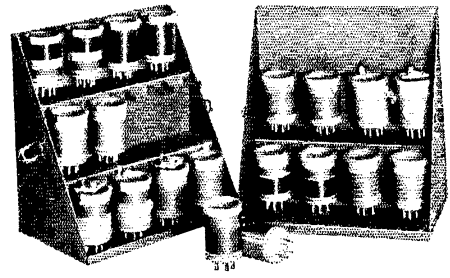
Unwound "R 39" forms, complete with handle, padding condenser, and protective sleeve.

Type XR 39. List price ..... ea. $3.65

Special six prong socket mounted in aluminum shield — same as used in FB 7 receivers.

Type XCS. List price $1.75

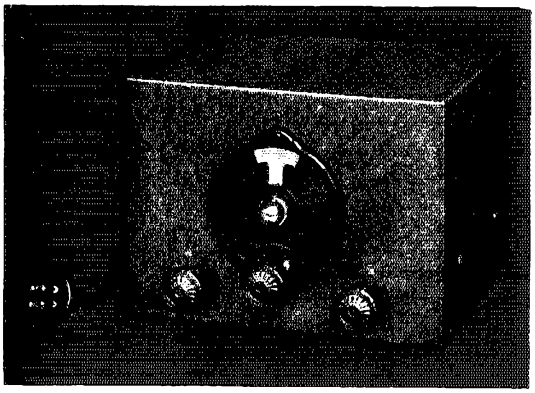
NATIONAL COIL CABINETS



Designed for the protection and storage of coils for NATIONAL Short-Wave Receivers, when not in use. When open all coils are in full view, making ready selection of the desired pair very simple. Made of heavy gauge steel in two sections, fitting together to form a compact unit, approximately 9" x 8" x 5" when closed. Finished in attractive brown moiré, and fitted with receptacle on front for calibration curves.

No. NCC-10 for NATIONAL coils, list price, $3.75

NATIONAL COMPANY, INC., MALDEN, MASS.



New and Improved

NATIONAL SW-3

Amateur Receiver

AC and Battery Models

The SW-3 Receivers employ a circuit consisting of one R.F. stage transformer coupled to a regenerative detector and one stage of impedance coupled audio. This circuit, as incorporated in the SW-3, with thorough shielding, grooved R-39 coil forms, Isolantite insulated condensers and tube sockets, etc., provides maximum sensitivity and flexibility with the smallest number of tubes and the least auxiliary equipment. The single tuning dial operates a precisely adjusted two gang condenser; the regeneration control is smooth and noiseless, with no backlash or fringe howl; the volume control is calibrated from one to nine in steps corresponding to the R scale, and is connected in the antenna input circuit; — the features all contribute to the efficiency and ease of operation so essential to equipment of this type.

The cabinet dimensions are 9¾" x 9" x 7" and the weight with tubes and coils is 12½ pounds making the receiver especially suitable for installations where space is limited as in semi-portable or mobile stations, on yachts, etc.

COMPLETE PARTS

Catalog Symbol	*Name of Parts*	*List Price*
ACSW3	NATIONAL complete set of parts for 3-tube Short Wave Thrill Box — less coils and tubes — wired by the Jackson Research Laboratories	**$29.50**

Note: The above price is for either AC or DC models. (Either 2 or 6v.)

AC uses 2–58s and 1–27. 6v DC use 2–36s and 1–37. 2v DC uses 2–32s and 1–30.

When DC Battery model is desired, specify Catalog Symbol as DCSW3 and whether for 2 or 6 volt tubes.

Band spread coils for either the 20, 40, 80, or 160 meter bands, list at $5.00 per pair See complete listings of coils on page 9. *Federal tax paid*

Five Tube SW-58 and SW-34 Receivers

These popular five tube S.W. Broadcast Receivers employ essentially the same circuits as the three tube amateur receivers described above, but with the addition of a second or push-pull audio output stage. Also many additional mechanical features such as full vision tuning dial, etc. Fully described in separate catalog sheet.

NATIONAL Power Units for AC Short Wave Reception

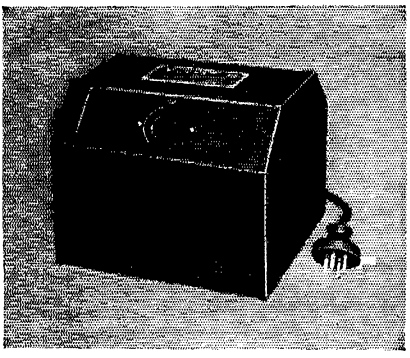
One of the essentials for humless AC Short Wave reception is the use of a power unit designed especially for that purpose.

NATIONAL power packs have an exceedingly low inherent hum, employing a double section filter using good quality chokes and plenty of condenser capacity. The power transformer has an electrostatic shield between the primary and other windings in order to prevent line disturbances from getting into the power unit and thus into the receiver.

A special R.F. filter, located between the 280 rectifier tube and the hum filter is a feature of all NATIONAL power packs designed for short wave use and is one of several important factors contributing to the complete elimination of so-called "tunable hums," frequently encountered in short wave reception.

Catalog Symbol	*Description*	*List Price*
5880-AB	Completely wired power supply for use with the ACSW3 Thrill Box using the '27 tubes in the output stage on 105–120 volts, 50–60 cycle current supply. Less tube	**$26.50**
5880-AB-25	Completely wired power supply for use with the ACSW3 Thrill Box using the '27 tubes in the output stage on 105–120 volts, 25–40 cycle current supply. Less tube	**39.50**
5880-AB-220	Completely wired power supply for use with the ACSW3 Thrill Box using the '27 tubes in the output stage on 220–230 volts, 50–60 cycle current supply. Less tube	**37.00**
5880-AB-S	Completely wired power supply for use with the ACSW58 Thrill Box using the '45 tubes in the output stage on 105–120 volts, 50–60 cycle current supply. Less tube	**39.50**
5880-AB-S25	Completely wired power supply for use with the ACSW58 Thrill Box using the '45 tubes in the output stage on 105–120 volts, 25–40 cycle current supply. Less tube	**42.50**

All prices on this page include Federal Excise Tax

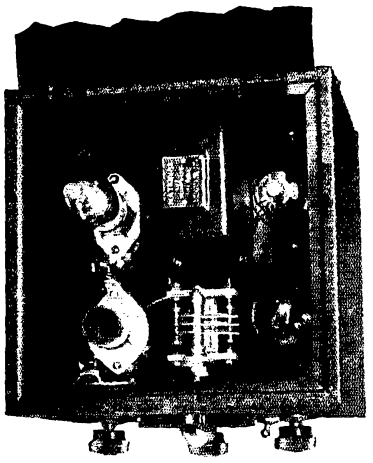


NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

Ultra High Frequency Super-Regenerative RECEIVER

Type SRR



A compact, efficient three-tube receiver employing a 36 screen grid regenerative detector, 37 interruption frequency oscillator, and an 89 pentode audio amplifier.

Exceptionally high sensitivity is obtained through the use of a special electron-coupled detector circuit which has several unique features. Primarily designed for 5-meter work, the 56 and 60 MC band is spread over 50 dial divisions and regeneration is constant over the entire scale. The interruption frequency oscillator is coupled to the screen grid of the detector, effectively isolating it from the audio circuits, and giving the optimum super-regenerative action. A phone jack is connected to the detector output by means of an impedance matching transformer, the audio output tube being automatically disconnected by insertion of the phone plug. The 89 pentode gives ample power for loud speaker operation, and a potentiometer connected in the grid circuit furnishes smooth and full range control of volume.

PLUG IN COILS

An important feature is the use of plug-in inductance coils, enabling the receiver to be operated on the 10, 20, 40, 80 and 160 meter bands as a conventional "detector and one stage" with the interruption frequency tube removed. Regeneration is smooth throughout the range and each band is adequately spread over a large portion of the dial. The flexibility of this arrangement makes the Type SRR an ideal receiver for the experimenter.

Low-loss R-39 and Isolantite insulation is used in all H.F. circuits.

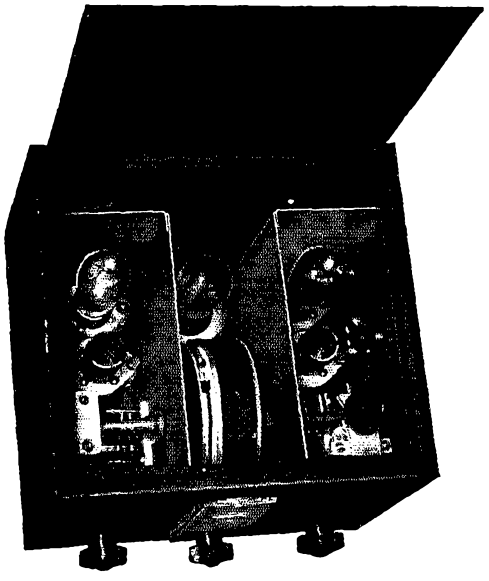
The receiver requires a six volt (D.C. or A.C.) A-supply, and a 135 volt B-supply which may be taken either from B batteries or from an A.C. operated power pack. The NATIONAL No. 5886 AB pack will supply all voltages, both A and B. List Price 5886 AB $34.50.

Cabinet dimensions 7¾" x 7¾" x 7" high.
Weight with tubes 8¼ pounds.

TYPE SRR Receiver, completely wired, with 56-60 MC coil, less tubes	**$29.50**
10 Meter Coil	**1.25**
20 Meter Coil	**1.25**
40 Meter Coil	**1.25**
80 Meter Coil	**1.75**
160 Meter Coil	**1.75**

Federal tax paid

NATIONAL *Ultra High Frequency*



CONVERTER

Type HFC

Designed particularly for operation in the 56 & 28 MC amateur bands, which is spread over approximately 90 dial divisions. The use of regeneration in the first detector, together with a new and extremely efficient circuit, results in high gain and high conversion efficiency. These features give an exceptional weak signal sensitivity, greatly improve the signal to noise ratio, and definitely eliminate image frequency reception. Isolantite insulation is used throughout the high frequency detector and oscillator circuits, the coil forms being molded of R-39. An adjustable padding condenser insures close tracking and correct frequency coverage, while in addition, a small vernier trimmer is provided for precise adjustment.

The output of the first detector is coupled through a high gain I.F. transformer to a low impedance output coupling tube which insures efficient signal transfer to the antenna circuit of the B.C. receiver. Receivers of the TRF type are recommended as being the most suitable I.F. amplifiers. The SW-3, SW-58, etc., are excellent for this purpose.

Dimensions of cabinet — 9" x 10" x 7"
Tubes — 2 — 224 or 2 — 236
1 — 227 or 1 — 237

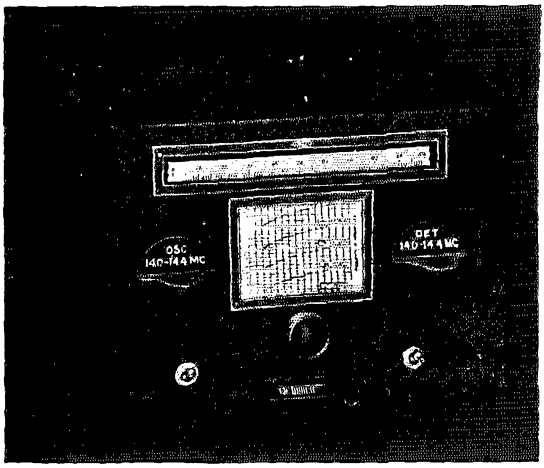
Type HFC Converter. With both 28 and 56 MC Coils, less tubes **$39.50**

NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

"FB-7" *Amateur Type*

Short Wave Receiver



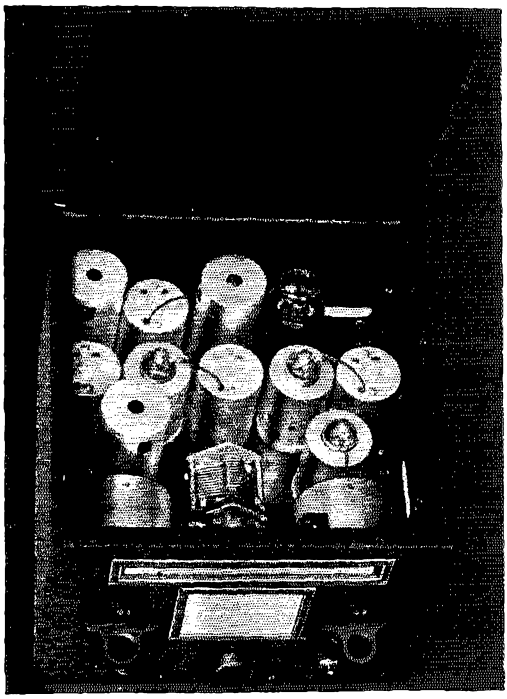
The "FB-7", designed primarily for the experienced amateur operator, is a seven tube receiver having exceptional sensitivity, selectivity, stability, and other characteristics essential in order to contend with the crowded conditions of the amateur C. W. and phone bands. Ample sensitivity and selectivity are assured through the use of a circuit employing two stages of high gain I. F. amplification (six tuned circuits) while individual filtering of all circuits, including the oscillators, together with thorough shielding, results in unusual stability. There is no pulling-in or blocking by strong local signals, and frequency drift in both high frequency and beat oscillators has been eliminated. Variation of the volume control has no appreciable effect on the pitch of C. W. signals, even at 14. mc.

The receiver is compact, being only 11½" x 12", and is shaped to conserve space on the operating table as much as possible.

The full vision dial, plug in coils, send and receive switch, beat oscillator switch, calibration chart, etc., *all on the front panel*, result in an ease and convenience of operation that is possessed by no other receiver.

FB 7A, with air Dielectric condensers in "I. F." amplifier, completely wired less coils, less tubes..... List price, $57

TUBES: one 56, one 57, two 58's, one 59, two 24's



OUTSTANDING FEATURES:

- High Selectivity and Sensitivity
- Electron Coupled Oscillators — No Frequency Drift
- Uniform Gain over Entire Frequency Range
- Double Shielding
- Absolute Single Control Tuning — No Trimmer
- Two I. F. (High Gain) Stages
- New NATIONAL Type AGS air tuned, Litz-wound I. F. Transformers with trimmer adjustments *on top*
- Tuning Curves on Front Panel
- Gain Control Calibrated in "R" Units
- High Signal to Noise Ratio
- One-Hand Tuning
- Front of Panel Coil Change
- Shielded "R39" Coils Changed from Front of Panel
- S. F. L. 270° Tuning with Full Vision Velvet Vernier Dial
- Seven Tubes not including Rectifier
- Panel Switch for Cutting B Voltage During Transmission
- Band Spread and Full Range Coils
- Amateur Bands Spread over 100 Dial Divisions
- Full Range 34 m.c. to 1500 k.c.
- "Offset" c.w. Beat Tuning
- Beat Oscillator Switch on Panel
- Phone Jack in 2nd Detector Output Circuit
- Speaker Driven by '59 as Class "A" Pentode
- Mechanical Filter (Quartz Crystal) Available for Full Single Signal Reception
- "Doublet" or Standard Type Antenna System

FBX-A SINGLE-SIGNAL RECEPTION

Fully realizing the tremendous advantages of so-called "single signal" reception in connection with c.w. reception on some of the more congested bands the "FB-7," like the "AGS," has been designed so as to be readily adaptable to this new type operation. High inherent circuit stability, high I. F. gain, special shielding and proper chassis space, directly adjacent to the 1st I. F. transformer and tube, make possible the ready addition at any time of a mechanical filter (quartz crystal) with its associated "selectivity control" condenser and multi-point switch.

Contrary to the widespread impression on the part of many amateurs, single signal reception is primarily for c.w. work, and not for 'phone band use.

The "FB-7" I. F. amplifier is so designed as to have the maximum selectivity possible for phone band use without serious sacrifice of intelligibility.

If desired, the single signal version of the "FB-7" may be obtained as a complete unit by specifying the Catalog Symbol "FBXA" at an additional list price of $22.50 above that of the "FB7A."

"FBXA" completely wired, with crystal and air dielectric tuned I. F.—less coils and less tubes—list price $79.50.

All prices on this page include Federal Excise Tax

NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

Regular and Bandspread

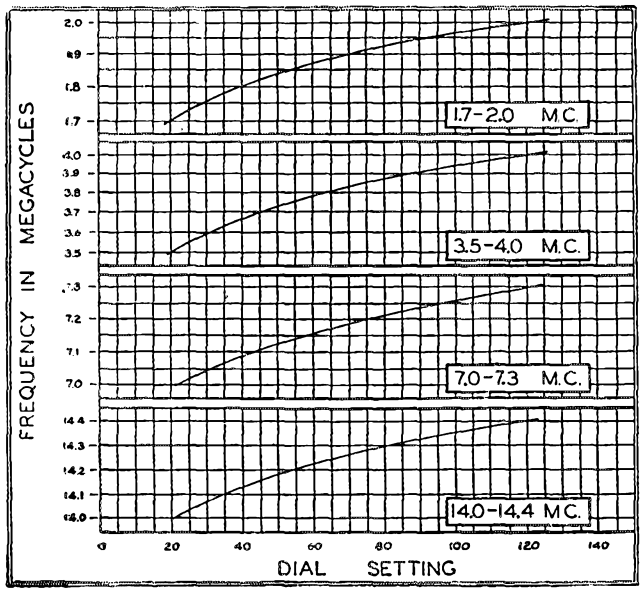
"FB-7" COILS

The plug-in coils employed in the "FB-7" are essentially the same as those developed originally for the "AGS" receiver. The windings are on accurately threaded forms of R-39, the low-loss dielectric, and are protected from damage by an outside sleeve of special bakelite. This bakelite sleeve does not come in contact with the windings themselves and consequently does not detract from the low-loss features contributed by the R-39 coil forms.

The metal handle at the end of the form not only serves as a convenient grip for inserting and removing the coils from the sockets, but also completes the coil shield. When a coil is plugged in, it is, therefore, completely shielded without the inconvenience of replacing a shield-can.

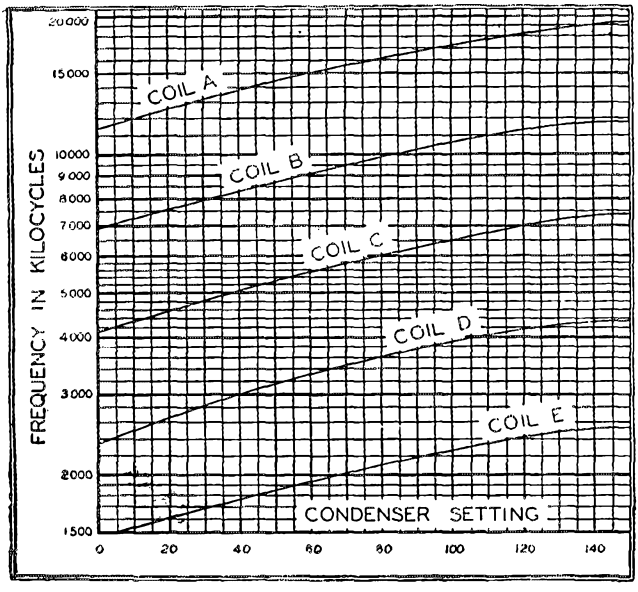
The coil forms are supplied with the standard NATIONAL 6-prong coil base, which makes possible the interchangeable use of band spread and regular type coils.

The two charts on this page show the range of all standard coils of both the band spread and general coverage types. When used with the band spread coils, the "FB-7" makes an ideal amateur type receiver. Used with the general coverage coils, it makes a splendid short wave broadcast receiver, which, due to its 59 output tube, high sensitivity and high selectivity, gives fine performance in the reception of foreign programs.



Catalog No.		*Range*
AB 20	(air padded osc.)	20 Meter Band Spread
AB 40	(air padded osc.)	40 Meter Band Spread
AB 80	(air padded osc.)	80 Meter Band Spread
AB 160	(air padded osc.)	160 Meter Band Spread
FB AA	(air padded osc.)	34000 to 18000Kc
FB A	(air padded osc.)	19500 to 11400Kc
FB B	(air padded osc.)	11700 to 7000 Kc
FB C	(air padded osc.)	7300 to 4000 Kc
FB D	(air padded osc.)	4200 to 2400 Kc
FB E	(air padded osc.)	2500 to 1500 Kc
FB F	(air padded osc.)	1500 to 900 Kc

The list price of coils for all ranges is $10.00 per pair. Unwound coil forms, complete with trimmer and coil handle are available at a list price of $3.65 each, and designated by the Catalog Symbol XR-39.



NATIONAL Power Units

The "FB-7" is designed so that it may be operated directly from any one of several NATIONAL power units, or, if desired, from filament transformer and B-batteries. Using 180 volts B, the total drain is 40 milliamperes. The Heater circuit requires 9.5 amperes at 2.5 volts.

The B-voltage employed may be of any value between 180 and 250 volts without affecting the performance of the receiver in any way whatever except for the amount of undistorted power output. For this reason the use of the No. 5887 power unit is recommended, for amateur communication, or, if already available, the No. 5880 power unit may be used. The 5880 differs from the 5887 in that it employs a much higher degree of hum filtration, necessary because of its original design for use with the SW-3 regenerative detector type receiver. The circuit of the "FB-7" does not require such complete power supply filtration and the lower priced No. 5887 is quite adequate.

For short wave broadcast reception, where a high degree of undistorted power output is desirable, a higher plate voltage is recommended than that supplied by either the No. 5887 or the No. 5880. Such a power unit is available in the No. 5897, which furnishes voltages sufficient to drive the type 59 power output pentode in the "FB-7" at full rating.

All of the power units employ, of course, R. F. filters for the elimination of tunable hum, and embody the other exclusive features that are well known to users of NATIONAL power equipment.

Catalog No.	*Description*	*List Price*
5887 AB	Special for "FB-7" 115V. — 60 Cycles (less tube)	$24.50
5897 AB	High voltage for operation of '59 tube at full rating. 115V. — 60 Cycles (less tube)	$26.50

Above Packs available for other voltage and frequency inputs on special order. Write for prices

R C A LICENSED

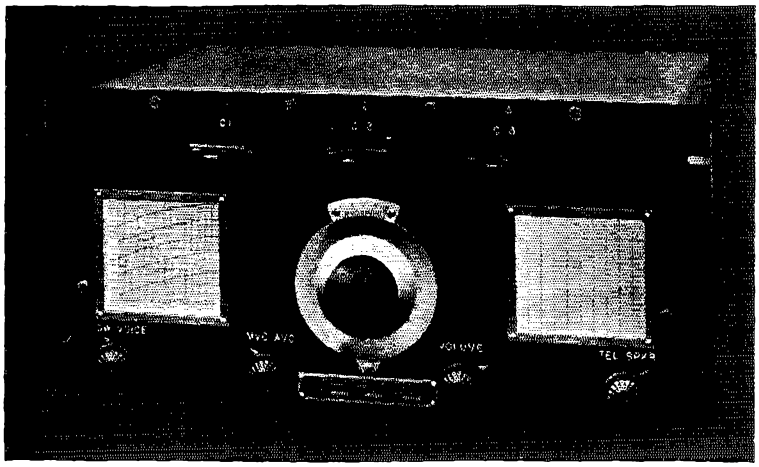
NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL

"AGS" and "AGS-X"

Communication Type

Short Wave Receivers



The use of short waves for military and commercial purposes has produced a demand for a professional receiver in which considerations of price are entirely subordinate to those of performance and reliability. The AGS, designed in co-operation with the Airways Division of the U. S. Department of Commerce, is such a receiver. Its universal acceptance by commercial operators and government departments indicates how fully it meets the severe requirements of high *usable* sensitivity and selectivity with thorough image suppression, easy operation, permanent frequency calibration and dependability of performance.

Particularly important is its unusual preselector circuit, which is largely responsible for the exceptionally high signal-to-noise ratio, which is so vital to the reception of weak signals. To this preselector may also be credited an efficient gain in sensitivity and almost complete image suppression.

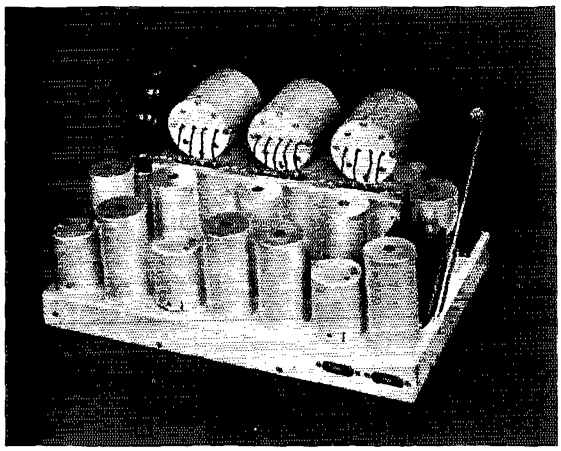
The AGS-X offers a still further refinement in the use of a single signal (mechanical quartz filter) circuit preceding the I. F. amplifier. With this device selectivity is measured in cycles rather than kilocycles, resulting in an almost complete elimination of interference from unwanted signals, and a marked reduction in static. Front-of-panel controls provide for smooth variation of single-signal selectivity, as well as rejection of the filter for phone reception.

Both AGS and AGS-X employ nine tubes in a superheterodyne circuit, comprising a preselector stage of tuned R. F. amplification and first detector employing screen grid tubes; a high frequency oscillator; two stages of air-tuned high-gain screen-grid I. F. amplification; I. F. power detector; automatic volume control, working in conjunction with both R. F. and I. F. amplifiers; beat frequency oscillator, and Pentode output with provision for either phones or loudspeaker.

Tubes..... { 7—*236*'s / 1—*237* / 1—*89*

Outstanding Features:

1. Tuned R. F. stage preceding first detector. (Image suppression — improved signal-to-noise ratio — improved "weak signal" response.)
2. Electron coupled oscillators.
3. No frequency drift — air padded oscillators.
4. Air dielectric tuning condensers in I. F. amplifier.
5. Single dial straight frequency line tuning (270°).
6. Calibration curves and station chart on panel.
7. Coil change from front of panel.
8. Automatic volume control or manual volume control, by throw of switch.
9. Extremely rigid mechanical construction from very heavy aluminum plate.
10. Relay rack or table mounting (panel size 8¾" x 19").
11. Frequency range 1500 to 20,000 k.c. band spread coils available.
12. Heterodyne oscillator for c.w. reception.
13. A.C. or battery operation.
14. Panel switch for phones or speaker.
15. Mechanical filter for single signal reception (in AGS-X).



Band Spread Coils

The special band spread coils are interchangeable with the standard types, thus making the AGS and AGS-X receivers entirely adaptable for full band spread operation on any of the amateur bands. Each band is spread over 100 divisions (180°) of the 150 division (270°) tuning dial.

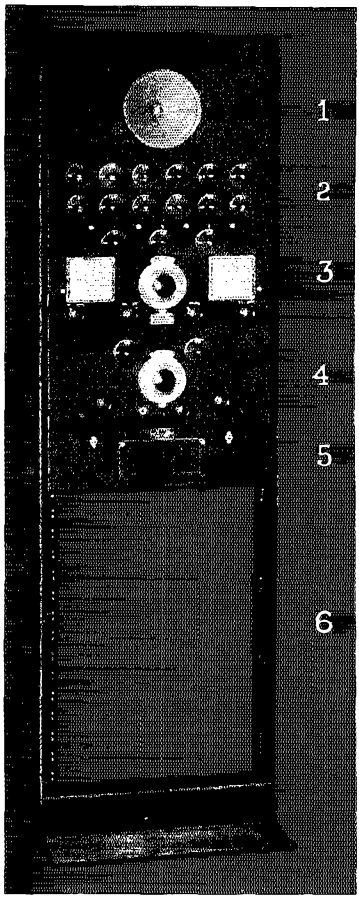
Catalog Symbol — *Description* — *List Price*

AGS — National Type AGS Short Wave Receiver completely wired and Laboratory tested, with coils to cover Frequency Range 1500 to 20,000 k.c. (less tubes)..... **$265.00**

AGS-X — Same as above but with Single Signal feature. Complete with crystal..... **$295.00**

Band Spread Coils for the 20, 40, 80 and 160 meter bands may be substituted for standard coils at same price.

NATIONAL COMPANY, INC., MALDEN, MASS.



NATIONAL
Relay Rack Units

NATIONAL Rack-Panel Units permit the assembly of complete equipment to suit individual requirements. In the illustration at the left, a set-up is shown which is frequently used in Airport Installations. Units 3 and 5 are the Type AGS Receiver and GRDPU 26 Power Supply, respectively, and are described completely in special AGS Bulletin, see page 8. A brief description of the other units follows.

1. This Monitor Speaker Panel employs a dynamic speaker of the permanent magnet type, requiring no power supply. The speaker is mounted on a standard panel (8¾" x 19") and is provided with an impedance matching transformer and connecting cord.

NATIONAL Monitor Speaker Panel, Type RFS. List Price..**$30.00**

2. This small panel (5¼" x 19") carries receptacles for the twelve idle coils of the set of fifteen required for the National AGS Receiver.

NATIONAL Coil Rack, Type CRP. List Price.....**$15.00**

4. This Type 58C Receiver is the well-known National SW58 arranged for rack-panel mounting, with front of panel coil changing. Circuit details are essentially the same as for the Standard SW58, described in special catalog. Briefly, the receiver has two tuned circuits, using type 58 tubes as R.F. and Detector, a 227 as first audio, and a pair of 245's as final audio stage. Because of the definitely superior signal-to-noise ratio, many hundred receivers of this type are in use by the principal American Continent Air Lines.

NATIONAL Type 58C Receiver, with four sets of coils (13½ to 115 Meters). List Price.....**$120.00**

Additional coils available to 2000 Meters

5. Rack mounted packs either single or double and for either 2½ volt or 6 volt tubes

Type GRSPU. Single. List Price.....**$49.50**
Type GRDPU. Double. List Price.....**$79.50**

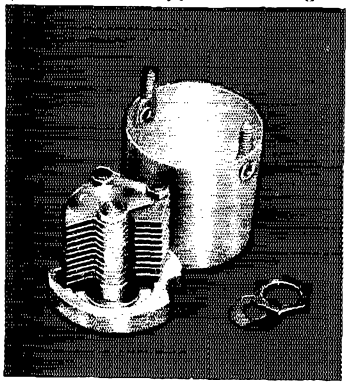
6. This rack, built to Government Specifications and drilled and tapped to receive standard panels of all sizes, is of steel, finished in black gloss Duco.

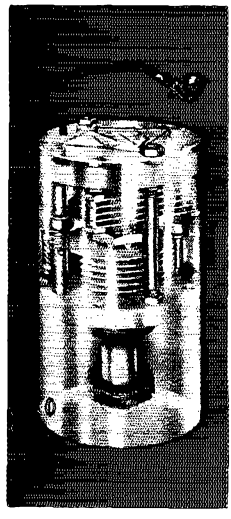
NATIONAL Relay Rack, Type RR. List Price.....**$65.00**

Knock down lightweight rack designed especially for amateur station use. Can be "cut down" for bench mounting if desired. List Price.....**$22.50**

Air Dielectric Condenser Tuned "I.F." Transformers

In the better types of high frequency receivers, it is rapidly becoming standard practice to employ air condenser rather than compression mica condenser tuned I. F. transformers. National, co-operating with James J. Lamb and *QST*, pioneered in this important advancement and now offers a new and improved unit surpassing even the outstanding performance of the original model. *Special Features:* Micrometer Tuning—Velvet Vernier Type, All Peaking Adjustments at Top of Shield, Double Bearing Precision Condensers, Self Locking Rotors, Isolantite Insulation, New Type of Litz Wound Coils, 450 to 550 KC Tuning Range (Also 175 KC model), Non-resonant Aluminum Rotor and Stator Plates, Electron Coupled Beat Frequency Oscillator Units with Genuine Velvet Vernier Knob Tuning, Standard Mounting. *List Price,* either transformers or oscillators, each.....**$5.00**





Air Dielectric Padding Condensers

Shielded air dielectric padding condenser on isolantite base that is essentially no larger than the older mica types. Two sizes — 75 and 100 mmfd. max. capacities. Case, 1¼" diameter by 1¼" and 1½" high, respectively.

Type W75, list price.....**$2.00**
Type W100, list price.....**$2.25**

NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL
B and AB
POWER UNITS

In addition to the special power units for National High Frequency receivers described on page 10, the following Universal type power packs and component parts are available for the amateur and experimenter.

Velvet-B Type 3580 — Fig. 1

A NATIONAL B-Eliminator designed for reliable service.

This rugged unit has been designed with liberal factors of safety in all component parts.

Provided with Protective Voltage Adjustments

Adjustable Taps give the following voltages:

22–45 V. for detector. 45–90 V. for R.F. 90–135 V. for A.F.

Full 180 V. at 35 M.A. for power tube, non-adjustable.

This unit uses a 280 full-wave rectifier tube.

Silent, Hum-free Output

List price, less tube.....**$16.50**

7180B for AC Tubes — Fig. 2

A strictly heavy duty unit with output of 70 MA at 180 volts. Insulated terminals are conveniently located at the top on a sloping panel. Uses the UX-280 full-wave rectifying tube.

Provided with four completely adjustable voltages.

List price, with cord, switch and plug, less tube **$39.50**

Audio Transformers — Screen Grid Detector Coupling, Type S101

Similar in appearance to Fig. 3

The impedance coupling unit used in the SW3, SW5 and the new SW58. This unit, when employed to couple the output of a screen grid detector to an audio amplifier tube, will give from two to three times as much amplification as resistance coupling.

A regenerative detector will operate with maximum efficiency, and trouble from fringe howl and "sticky" oscillation control will be minimized when using correctly designed impedance coupling.

The response characteristic is uniform between 75 and 5000 cycles.

Inductance of plate choke — 700 Henrys.

Capacity of coupling condenser — .01 mfd.

Resistance of grid leak — 250,000 ohms.

List Price, **$5.50**

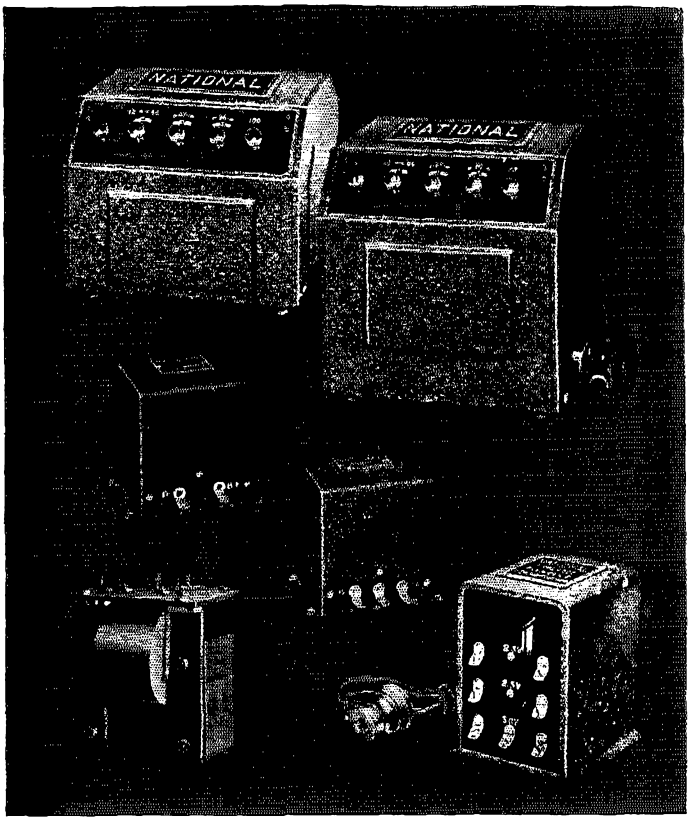
Class B Transformers

Type BI Input Transformers for coupling 245's in push-pull to a Class B amplifier employing 2–210 tubes in push-pull.

Primary Inductance 20 Henrys
Primary Resistance (total) 150 ohms
Secondary Resistance (total) 200 ohms
List Price, **$6.50**

Type BO Output Transformer for coupling a Class B Amplifier employing 2–210's (operating at a plate voltage of 500 V. and a bias of 57 V.) to a loud speaker or Class C RF Amplifier. Six terminals are available for various loads. The secondary is not designed to carry the RF Amplifier plate current. Insulated for 5000 volts. Tested at 10,000 volts.

Primary Inductance 20 Henrys
Primary Resistance (total) 115 ohms
List Price, **$8.50**



Audio Transformer Type A100 — Fig. 3

Incorporating the latest advantages in audio-transformer design, this superior unit employs a special nickel-steel high permeability core and a split-secondary winding of new design. The result is a transformer of small size with unusually fine frequency characteristics. Turn-ratio is 4–1. *List Price*, **$9.50**

Push-Pull Transformers — Fig. 4

These NATIONAL Push-Pull Audio Transformers are built with the same special nickel-steel alloy cores and method of coil winding employed in the Type A100.

List Price, Input, Type P50.....**$9.50**
List Price, Output, Type P10....**$5.50**

Scratch Filter

The design suppresses the greatest possible amount of needle-scratch with as little effect as possible on the upper musical notes. *List Price*, **$5.00**

Filament Transformers Type F-227 — Fig. 5

Provides filament windings as follows: 2.5 volts at 10 amps, 2.5 volts at 3 amps, 5.0 volts at 1 amp.

List Price, with cord and plug....**$10.00**

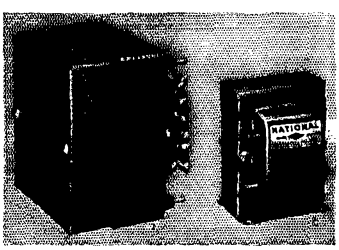
Type 227-U — Fig. 6

Uncased transformer, mounted, without cord and plug, but soldering terminals provided for two 2½ volt windings.

List Price,.**$6.50**

Type CFL — Fig. 8

A compact, easily mounted filament transformer having excellent regulation with a single secondary winding 2½ Volts at 10 Amperes. *List Price*, **$3.00**



VSA Power Transformer — Fig. 7

A general purpose transformer conservatively rated at 100 watts suitable for use in broadcast receivers, low power transmitters employing 245 and 247 tubes, separate power supply units for speech amplifier, master oscillator, doubler stages, etc.

Center tapped High Voltage Secondary
400 volts per side 125 MA
Center tapped Heater Voltage Secondary
2½ volts at 10 amps.
Center tapped 245 or 247 Secondary
2½ volts at 3 amps.
Rectifier Filament Secondary
5 volts at 2 amps. *List Price*, **$10.00**

NATIONAL COMPANY, INC., MALDEN, MASS.

The Atlantic Division Convention

(Continued from page 68)

delight to sit down Saturday night to a real banquet and food that reached a man's heart. With Doc. Simpson, W8CPC, Toastmaster, the guest speakers for the banquet were properly introduced. Real ovations were given to Mr. C. B. Jolliffe, Chief Engineer, Federal Radio Commission, whose words of wisdom should be remembered by all, and Radio Inspector Grinnell, who no doubt is a favorite around his district. Mr. John W. Van Allen, an attorney, familiar with commercial radio gave an instructive chronological history of that phase of radio. The last speakers were Director Woodruff and A. A. Hebert, Treasurer, A.R.R.L.

With seemingly endless prizes for distribution the convention came to a close after midnight but with the different groups loath to separate. The lectures were made comprehensible by the wonderful public address system installed by W8IH, Barton, of "Buffalo Radio Shack" and we are indebted to him for his courtesy. Look forward for 1934 convention wherever it may be held.

— *A.A.H.*

Silent Keys

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

George Bolin, W9CPX, Omaha, Nebr.
D. G. Campbell, VK2DG, Kyogle, N.S.W.
John P. Cowin, W1ABZ, Waban, Mass.
Angelo A. DeMarchi, W8DIP, Rillton, Pa.
Homer L. Ferry, W9KXO, Alton, Iowa
John L. Frank, W8GNA, Canton, Ohio
Ross F. Greer, W8ITP, Niles, Mich.
Earl B. Huning, W3DKF, Collingswood, N. J.
Lt. Col. Wm. F. McFarland, W9EVT, Topeka, Kans.
Arthur C. Olsen, W2UZ, New York City
W. S. Purinton, Jr., W9CZT, Danville, Ill.
J. L. Stewart, VE4EF, Winnipeg, Man.
Stanley Sidelsky, W6GHV, Los Angeles, Cal.
Arden Van Loon, ex-W8AOQ, Bath, N. Y.
C. W. White, VE4SL, Regina, Sask.
Bennett F. Wing, W7DDE, Idaho Falls, Idaho

The Ultra-High-Frequency World

(Continued from page 20)

Sugar Loaf Mountain, about 12 miles from Braddock Heights. The third outfit, provided by Miss Elizabeth M. Zandonini, was operated

on the top of South Mountain by a group headed by W3AWS. Nothing startling in the way of DX was attempted, but beautifully strong signals were made available at the three points of the triangle and everyone had a swell time.

* * *

Finally, there is a note from Bill Gunston, W7AAE-W7ADD, telling briefly of a 56-mc. expedition to the top of Mt. Tacoma-Ranier (14,408 — don't forget the eight — feet). Gunston didn't have time to enlarge on his experience, but he mentions in passing that "only seven of the fourteen in the party reached the top. I got lip-fever, sunburned beyond recognition, snow-blinded, 'mountainitis,' fell in a crevice and darned near killed myself a dozen times." Upon completing this delightful trip it appears that Gunston and his associates caught their breath, put the station on the air, and pushed out solid signals to their home station, 50 miles distant.

* * *

Now we've burned up our space and a dozen other stories will have to go untold. We must realize, of course, that the 56-mc. band, recently a field for original work, is no longer virgin territory. So intense has the routine activity on this band become that it takes more than a mere 100-mile contact or a field-day to contribute much to the history of the game. We at Headquarters are always delighted to hear of meritorious work on any band. We will continue to give a particular welcome to reports of activity on the ultra-high frequencies. But we must all aim to *make* history instead of duplicating it. The possibilities in the development of new and different ultra-high frequency apparatus and in its application to our communication problems are without limit. Let's get to work.

— *R. A. H.*

ELECTION NOTICES

To all A.R.R.L. Members residing in the ATLANTIC, DAKOTA, DELTA, MIDWEST, PACIFIC and SOUTHEASTERN Divisions of A.R.R.L.:

1. You are hereby notified that an election for an A.R.R.L. Director, for the 1934–1935 term, is about to be held in each of the above divisions, in accordance with the constitution. 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, defining their eligibility; and By-Laws 10 to 19, providing for their nomination and election. Copy of the constitution and by-laws will be mailed any member upon request.

2. Voting will take place between November 1 and December 20, 1933, on ballots which will be mailed from the headquarters office in the first week of November. The ballots for each division will list the names of all eligible candidates nominated by A.R.R.L. members residing in that division.

3. Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one division have the right to nominate any member of the League in that division as a candidate for director therefrom. The following form for nomination is suggested:

(Place and date)

Executive Committee,
American Radio Relay League,
West Hartford, Conn.
Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the ..... Division, hereby nominate ....., of ....., as a candidate for director from this division for the 1934–1935 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the first day of November, 1933. There is no limit on the number of petitions that may be filed but no member shall append his signature to more than one petition.

4. Present directors from these divisions are as follows: *Atlantic*, Prof. Eugene C. Woodruff, W8CMP, State College, Pa.; *Dakota*, Mr. Lawrence E. Lindesmith, W9GKO, Duluth, Minn.; *Delta*, Mr. M. M. Hill, W5EB, Natchitoches, La.; *Midwest*, Mr. H. W. Kerr, W9DZW-W9GP, Little Sioux, Ia.; *Pacific*, Mr. S. G. Culver, W6AN, Oakland, Calif.; *Southeastern*, Mr. J. C. Hagler, Jr., W4SS, Augusta, Ga.

5. These elections are the constitutional opportunity for members to put the man of their choice in office as the representative of their division. Members are urged to take the initiative and file nominations immediately.

For the Board of Directors:
K. B. WARNER, *Secretary.*

West Hartford, Conn., August 1, 1933.

To all A.R.R.L. Members residing in the DOMINION OF CANADA:

1. You are hereby notified that an election for an A.R.R.L. Canadian General Manager, for the term 1934–1935, is about to be held, in accordance with the constitution. Your attention is invited to By-Law 29, defining the policy of the League in Canada; Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a board of directors, of which the Canadian General Manager is a member; Sec. 2 of Article IV, defining the eligibility of directors; By-Laws 26 and 27, specifying the duties and authority of the Canadian General Manager; and By-Laws 23, 24, 25 and 28, providing for his nomination and election. Copy of the constitution and by-laws will be mailed any member upon request.

2. Voting will take place between November 1 and December 20, 1933, on ballots which will be mailed from the headquarters office in the first week of November. The ballot will list the names of all eligible candidates nominated for the position by League members residing in Canada.

3. Nomination is by petition. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in the Dominion of Canada have the privilege of nominating any Canadian member of the League as a candidate for Canadian General Manager. The following form for nomination is suggested:

(Place and date)

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

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Dominion of Canada, hereby nominate ....., of ....., as a candidate for A.R.R.L. Canadian General Manager for the 1934–1935 term.

(Signatures and addresses)

The signers must be Canadian members of the League in good standing. The nominee must be a Canadian member of the League in good standing, and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the first day of November, 1933. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one petition.

4. Mr. Alex Reid, VE2BE, of St. Lambert, P. Q., is the present Canadian General Manager.

5. This election is the constitutional opportunity for members to put the man of their choice in office as the Canadian member of the A.R.R.L. Board of Directors. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:
K. B. WARNER, *Secretary.*

West Hartford, Conn., August 1, 1933.

Annual Navy Day Receiving Competition

(Continued from page 26)

the several Naval Districts in proportion to the number of reports submitted from each district. In the interest of accuracy it is better to send in original copies than to transcribe them. All who take part will be cited in a Navy Day Honor Roll to appear in *QST*.

We suggest that receiver dial settings and which of the frequencies indicated can be received best at the time shown, be experimentally worked out in advance tests. All operators should take part; it is an opportunity to test skill in receiving and copying under actual operating conditions, at the same time we consider the traditions and importance of our U. S. Navy and the Communication Reserve. Let us then mark the calendar, adjust our receiver for the occasion, and send in

whatever we are able to copy from NAA, or NPG (or both), on this occasion. To make a "100%" copy takes sincere effort and high proficiency. Be ready when the time for this transmission comes. Mail results of your reception of NAA and/or NPG on the above schedule promptly to A.R.R.L. Communications Department, West Hartford, Conn. —*F. E. H.*

Club Directory Available

A directory of the local amateur radio societies affiliated with the League, showing their times and places of meetings, is available to members upon request, enclosing three cent stamp, please. Address the Communications Manager. Traveling amateurs will find this list helpful in visiting other clubs.

Financial Statement

BY ORDER of the Board of Directors the following statement of the income and expenses of the American Radio Relay League, Inc., for the second quarter of 1933 is published for the information of the membership.

K. B. WARNER, *Secretary*

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED JUNE 30, 1933

REVENUE		
Advertising sales, *QST*	$8,379.04	
Newsdealer sales, *QST*	9,714.62	
Handbook sales	6,220.01	
Booklet sales	1,068.41	
Membership dues	7,129.18	
Membership supplies sales	1,530.89	
Interest earned	261.52	
Cash discounts earned	129.87	
Bad debts recovered	30.00	
		$34,463.54
Deduct:		
Returns and allowances	$3,578.54	
Cash discounts on sales	195.05	
Exchange and collection charges	10.08	
	$3,783.67	
Less reduction of provision for newsstand returns of *QST*.	1,147.68	
		2,635.99
Net Revenue		$31,827.55
EXPENSES		
Publication expenses, *QST*	$8,584.23	
Publication expenses, Handbook	2,493.52	
Publication expenses, Booklets	508.68	
Membership supplies expenses	746.56	
Salaries	15,179.78	
QST forwarding expenses	545.36	
Telephone and telegraph	378.85	
Postage	951.19	
Office supplies and general expenses	954.89	
Rent, light and heat, net	610.72	
Traveling expenses	1,163.15	
Depreciation of fixed assets	277.42	
Communications Dept. field expenses	199.35	
Headquarters station expenses	35.35	
Bad debts charged off	480.65	
Federal tax on bank checks	6.08	
Total Expenses		$33,115.78
Net Loss from Operations		$1,288.23

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 15c 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 7c 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 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15c rate. Provisions of paragraph (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.

OVER six pounds radio data, circuits, bulletins, 50¢ postpaid. Beyond Rockies 75¢. Kladag, Kent, Ohio.

MICROPHONE and meter repairs. Low prices. Quick service. Sound Engineering Corp., 416 N. Leavitt St., Chicago, Ill.

QUARTZ — Direct importers from Brazil of best quality pure quartz suitable for making piezoelectric crystals. Diamond Drill Carbon Co., 719 World Building, New York.

HEY Hams! Radio Bill has some real specials this month! Everything tested! Conservative Ratings! Everything fully guaranteed! Order Now, — Complete Heavy duty power supply. Delivers 625 Volts DC at 150 MA (600 V. at 200 MA). Separate transformer delivering 7½ CT, 7½ CT, 2½ CT for MOPA, modulators, etc., 9 mfd condenser block and large double choke insures perfect filtering! All in metal case 10x10x10. 240 Watts (manufacturers rating) 46 pounds, each one brand New. Special — $8.75, 25 cycle — $12.45; 2½ Volt, 10 Amp, CT Filament transformers, 2000 Volt insulation. metal cased, Binding post terminals on Bakelite panel, with AC cord and plug — 95¢; Porcelain Beehive stand-off insulators 29¢ dozen, hardware 16¢; Genuine RCA Radiotron Tubes, 57, 58, 83, — 86¢, 210 — $2.75, 56, 35, 47, — 69¢; Old type RCA 210s, with White Plate — $3.50; DeForest X99s — 33¢; Heavy Duty 866s — $1.25; 15 Watt 210s, large plate, heavy filament, crown bulb — $1.40; 1½ Volt keying relays — 38¢; Faradon Filter Condensers. Fibre Cased. 2 mfd 1000 Volt DC working — 55¢, 1 mfd 1500 Volt DC working — 65¢; Heavy Duty Power Chokes, 20 Henry, 250 MA, 8 lbs. — $2.85; 20 Henry, 150 MA — $1.20; Brunswick impregnated 15 Henry 100 MA Chokes, 1½ lbs. — 33¢. Pilot heavy duty transformers, deliver 540 CT at 100 MA, 2½ at 8 Amps, 2½ at 4 Amps, 5 Volts. Wax-dipped. Worth more for filament taps alone! 5 lbs. — 79¢; Jefferson 700 Henry plate coupling impedances — 85¢; Hardwick-Hindle 20,000 Ohm 60 Watt resistors with 4 taps — 45¢; ¼" copper tubing — 4¢ ft. per turn — 1⅝" diameter — 4¢, 2⅝" — 5¢, 3⅛" — 8"; American Double button microphones, Model EL, special — $4.95. See previous 'Ham-Ads' for more bargains. Complete line of Ham equipment at lowest prices. Shoot your orders in to — Bill Green, 698 West End Ave., NYC.

CRYSTALS: 1", approximate frequency, prompt service, guaranteed, $1.35. W9HWE.

QSLs of distinction. Samples, prices on request. W2AEY, 338 Elmora, Elizabeth, N. J.

TRADE — 560 for 204A. W8BAX.

TRANSMITTING and receiving equipment manufactured to order. Holmes C. Miller, Radio Engineer, Box 105. Palo Alto, California.

QSL cards, two color, cartoons, message blanks, stationery, snappy service. Write for free samples to-day, W1BEF, 16 Stockbridge Ave., Lowell, Mass.

DIRECTOR candidates: free or cheap political advertising. R/9, 1455 Glenville, Los Angeles.

QSLs! QSLs! Be proud of your QSL! No cheap, trashy stuff! Free samples! W8DED, Holland, Mich.

MAINE amateurs, we have only complete stock amateur equipment in Maine. We wish to serve you. Communication Labs., North New Portland, Maine.

TWO color QSLs, 50 cents up. W9GOF, Mishawaka, Ind.

STAMPS wanted. Will swap radio gear for stamps. What apparatus do you need? What stamps have you? R. W. Cotton, Newtonville, Mass.

M.G. set. Motor 110V a.c. 60 cycles, 1/3 h.p. 3600 rpm. Output 750V at 290 mils. Excellent condition, $20. L. Fenton, W9COQ, 8231 Dorchester Ave., Chicago, Ill.

BUM QSLs? You are the judge. Samples. W9DYL Exchange, P. O. Box 607, El Monte, Calif.

CRYSTALS: $1.35 Hipower oscillators, close to your specified frequency, 35–1700 bands, 1 inch square. Round $1.60. Exact calibration furnished. 7000-kc. band, $4.25. 1" blanks, 65¢. Dust-proof plug-in holder with mountings, $1. S. S. I. F. crystals 525–460-kc. your desired frequency set tested, mounted in air-gap holder, $5.25. We have specialized in crystals for broadcast station use for five years. Our frequency standard is accurate to 1 cycle in five million. Immediate shipment, no delays, no waiting. Hipower Crystal Co., 3607 N. Luna Ave., Chicago, Ill.

SELLING meters cheap. W9ANZ.

CRYSTALS: Unconditionally guaranteed. One sixty eighty meter bands three fifty. Forty meter four dollars. Finished oscillating blanks one fifty. Rough cuts one inch square perfect oscillators if finished correctly sixty five cents. Lots of ten or more fifty cents each. Bellefonte Radio Eng. Lab., Bellefonte, Penna.

NATIONAL FB7, 20M, 80M, 7000–11000-kc coils. Want cash, $37.50. W9KJF, 1115 DeQuincy St., Indianapolis, Ind.

SWAP 13 recent electrical engineering texts for Vibroplex or what have you. W1CBT.

DELTA AD21, AD31, AD41, AD15, 2-AD51, $25. Acme 30H 150MA, 2-1.5H 500MA chokes, $8. Esco 1000V 200W double commutator four bearing $30. Cine-kodak 8 mod. 20, case $15. Graflex Ser. D, 3¼x4¼ Kodak, 4.5 lens focusing panel pack adapter 1 yr. old, new condition, $60. Thompson, 1301 Findlay Ave., New York City.

TRANSFORMERS, chokes, rewound or built to order. Low prices, quick service, guaranteed. Boston Transformer Co., 886 Main St., Cambridge, Mass.

WESTINGHOUSE condensers oil-filled, 3 mfd. 5000. Original seals. Perfect condition. W9IMG.

2 volt tube xmitter for sale. W9IVU, Princeton, Ill.

CODE machines, tapes and complete instructions for beginners or advanced students — both codes — for sale or rent reasonable. Rental may apply on purchase price. Extra tapes for all machines. Instructograph, 912 Lakeside Place, Chicago.

SELL 1921 *QST* complete, 1920 and 1922 nearly complete. Make offer. Charles Alvord, 7 Summer St., Worcester, Mass.

QSLs by Maleco. Most popular cards in country. Free samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

SELL, trade for tools or Delta woodworking machines, xmtr and receiving apparatus, Jowett body building course with bells. John Olsen, 1046 Summit Ave., New York City.

KEYING relays, shielded, 1/8" contacts, also break contact. 9 volts, 25 mils. Use C bats. 90¢ postpaid. Socket hole die punch, clean 1¼" hole thru 1/16" sheet metal, $1.15 postpaid. Stoughton Mfg. Co., Oak St., Portland, Maine.

SELL rack and panel class B phone and CW transmitter. National ACSW3 and power supply. *QST*s 1916, October, November; 1917, May, June, July, August; 1919, June, July; 1920 except January, March; 1921, except December. Complete from February 1933. W. Brecht, Jr., Glenside, Pa.

CRYSTALS: 1" square 525-kc filter crystals at 95¢. 80 or 160 meter crystals same price. 40 meter crystals, $2. Blanks, 3 for $1. Guaranteed satisfactory. White Radio Lab., (of Peru, Ill.) Sandpoint, Idaho.

QSLs, 75¢ a 100. Two colors. W9DGH, 1816 5th Ave., N. Minneapolis, Minn.

R9 sigs! Get loud reports with low power! The trick is in the antenna! Full constructional details and valuable information described in new book. New 3-wire feeder system described! This information the result of research into angle radiation! Book $1.00, postpaid. W6BY, Arthur L. Munzig, Redlands, Calif.

OMNIGRAPHS, Teleplexes, Vibroplexes, meters, receivers, converters. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

TELEPLEX — four tapes, oscillator code practice set, $10. Coleman, Gillette, N. J.

QSLs two colors, postpaid, 70¢ 100; $1.00 160; $2.50 500. W6ATG.

KENNEDY Universal with amplifier. Sale, cash. Schoebel, 642 E. 236th, New York.

SELL, transmitter complete, meters, C", crystal, 852PP, final mounted steel screened frame. Photo if interested. Must sell. Offer? W9CTW.

TRADE Buescher melody saxophone, Remington model 29 twelve shotgun, Fischer trombone, need good phone receiver, microphone, 1000 volt or more power supply, meters. What have you? W9KQX, Potter, Nebr.

QSLs, two color $1. first hundred, 60¢ each additional. Postpaid. Samples. W9ECI, RR3, Clayton, Mo.

CRYSTALS, one inch $1.75, postpaid. Absolutely guaranteed. Blanks 60¢. W9ECI.

WILL exchange new 52 tube or 32 to 350 volt dynamotor for multirange voltmeter milliammeter or thermocouple milliammeter. KA1NA.

QUALITY QSLs. T. Vachovetz, Elmsford, N. Y.

GUARANTEED xtals, $1.50. W9EGK.

SMITH-PRECISION crystals. New prices effective October first: 1750–4000 kilocycles $2.51. 7000–7500 kilocycles $4.01. Single-signal filters $2.51. Closest frequency from large stock sent postpaid airmail. Exact frequency add one fourth. Accuracy 0.05%. Money-back guarantee on all work. 2300 sold since 1928. W6BCX, Santa Maria.

30 watt crystal control transmitter, $15. W9KQO, Topeka, Kansas.

QSLs, 200 two colors, $1. up. W6FZQ, Box 1804, Phoenix, Ariz.

CRYSTALS, guaranteed. 1750 to 2000, 3500 to 4000-kc., ⅞ to 1", x or y, within 10 kilocycles, $2, 1", within five kc. $2.50. Oscillating blanks, 1", $1.50. 7000 to 7300-kc. ⅞ to 1", $4.50. Plug-in holders, $1.25. Grinding instructions 25¢. Wm. Threm, W8FN, 4021 Davis Ave., Cheviot, Ohio.

SELL — trade: Motorola 5T-71 Mallory B. supply. Pilot a.c. superwasp, coils, tubes, A and B supply. York trumpet-silver gold bell — in case. Xtal grinders! Brown & Sharp 0-1" mikes, like new, wood case. Very nice monitor, well shielded. 40 and 80 meter coils. All articles A No. 1 condition. Want: National FB7, SW5, 203As, 211Es. Filament and plate trans. or what have you? Write M. H. Canfield, Perry, N. Y.

PHONE transmitters, 29 dollars to 531 dollars — special this month 26 dollars and 49 dollars. Ribbon microphones 18 dollars. Communication Labs., North New Portland, Maine.

CRYSTALS: Guaranteed excellent oscillators. Your approximate frequency, 160 or 80 meters, $1.35 postpaid. "Crystal Makers" blanks, 1", 65¢, dozen $6. ¾" 50¢, dozen $4.80. Irregular shapes, 25¢. Standard dust-proof plug-in holders, 75¢. Fisher Lab., 1200 E. Nevada, El Paso, Texas.

HARD rubber. See Sept. *QST*. W8BSR.

EASY money. Make a million. See September display advertisement. Appearance and performance enhancing equipment. Rectifier Engineering Service.

CLASS B transformers — for 46s, $4.95 pair. Universal transformers for 2 or 4 46s, 210s, etc. $7.75 pair. 70 Watts of audio from 46s. Write for details. W8UD, Douglas, Mich.

QSLs. Samples free. W8BTP, 1203 Stockbridge, Kalamazoo, Mich.

VIBROPLEXES. Bought, sold. Rebuilts, $6. up. Trade-ins accepted. Lydeard, 28 Circuit, Roxbury, Mass.

QSLs, 50¢ per 100. Samples. 2143 Indiana Ave., Columbia, Ohio.

CRYSTALS, finished quartz plates, 20-kc. requested frequency $2. 5-kc. $2.50. Ohiohm resistors less 40%. Scheufler Radio Service, Sandusky, Ohio.

SELL — pair new 866s, $4; 2 RCA fifty-watt sockets 95¢ each; transformer for 203A, $3.50; other parts. Stamp for lists. Howard (W9DWA), 5526 Lake St., Chicago. (Phone Austin 1188.)

VOLOVOX dynamic microphones — adopted by dozens of broadcast stations, $9.75 — $18.50. Baker Engineering Labs., Ft. Wayne, Ind.

TRANSFORMERS, reactors, custom built. Real quality at reasonable prices. Baker Engineering Labs., Fort Wayne, Indiana.

CUSTOM-built equipment to your or *QST*'s specifications. W1AQA.

NEW condition Cardwell 166Bs. $20. Heavy duty mesh filament 866s, $2.50. 872s, $5. New RCA UX250s, $1.50. Weston type 301 milliammeters, $3.75. 204As, $20. 212Ds, $15. Instructographs, etc. Want 110V 2kw. a.c. generator. E. Ewing, 1057 Pratt Blvd., Chicago.

FONE men! "Single sideband transmission" is answer to congestion. Complete dope starts September R/9. $1.50 yearly. 1455 Glenville, Los Angeles.

A. C. auto generator — Convert Ford Generator into 110-volt, 250-watt, dependable A. C. generator. Driven by fan belt on car. Adaptable for public address, radio, and home, camp or flood lighting. Simple instructions with complete drawings. Only $1. Autopower, 416 So. Hoyne, Chicago.

IN stock: The new Crystal Comet Pro $111.52 complete; FB-7s $26.46, FB-Xs $38.22, coils $5.88; SW3s $14.40, coils $2.79. Trade your set on the latest model. Hoyt meters $1.40, guaranteed 866s $1.95. All types RCA, WE transmitting tubes. 40–2% off all National, Hammarlund, Cardwell, Thordarson, Weston-Jewell, Johnson, Franklin, Universal. Immediate shipment. Write. Henry's Radio Shop, Butler, Mo.

15 watt factory built P.A. system. Cost $200. Sell or trade for ham equipment. W5CFM, Box 551, Corsicana, Texas.

TRADE: Conn Silver plated Eb Alto Saxophone with case for shortwave receiver. In excellent condition. Cost $125. Prefer National FB-7 or SW-5 complete. Will consider others. David B. Kellam, North Conway, N. H.

ANNOUNCING the opening of our new factory; most modern equipment, finest raw material stock, most excellent service in the business. Very reasonable prices. Ask your jobber, or write direct for Fall catalog of sixteen hundred items; transformers, chokes, condensers, racks, frames, steel towers. Most comprehensive line made by one manufacturer. A. C. Ross Co., Van Wert, Ohio.

SELL or swap spare transformers, meters, etc. Need 200 or 500 microampere meter. Walter Lehnert, Blakeley, Minn.

SELL few radio parts cheap. W9IFZ.

20 watt transmitter with power supply, $15. W9KQO.

QSLs, SWLs, wall cards, etc. Satisfaction guaranteed. W3BHG.

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Your nearest dealer is entitled to your patronage. You can trust him. He is equipped with a knowledge and understanding of amateur radio. He is your logical and safe 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.

Patronize the dealer nearest you — You can have confidence in him

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"Specialists" in supplies for the Amateur and Serviceman

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1515 Grand Avenue
Amateur Headquarters — Complete Stock — Quality Parts

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Quoted from *QST*'s advertising rate card.

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● **See Editorial April issue of QST**

For Your Convenience

QST'S INDEX OF ADVERTISERS IN THIS ISSUE

Never Again Will Such Remarkable Values Be Offered At These Unusual Prices

LEEDS' TRANSFORMERS

2½ v. C.T. 10 amp. 10,000 v. insulation... **$2.75**

10 v. C.T. 7 amp. with tap primary..... **$3.95**

Universal plate transformer 300 w. capacity; 750–1000–1500 v. each side C.T..... **$10.95**

SYLVANIA TUBES

Type 830 — described page 57 Sept. *QST*..... **$12.50**

Type 203-A with Graphite plate..... **$17.50**

DeFOREST

503-A, 511 and 545 tubes, now manufactured under R.C.A. supervision; each..... **$15**

Leeds 5 and 10 M. Super Regenerator, described in Aug. issue. Without cabinet, $9.85. With cabinet..... **$10.85**

R.C.A. 2 stage amplifier, uses 280 rectifier; 199 first stage; 171 second stage; housed in metal cabinet. The power transformer alone is worth the special price of.... **$1.50**

Bruno Microphone Kit

Ribbon or Velocity type...**$5.88**

Condenser head kit..... **2.94**

SUPER SPECIALS

DeForest 410 Oscillator amplifier....**95c**

DeForest 481 Half-wave rectifier.....**95c**

Quantity is limited — order now if you need any

LEEDS' precision crystal holder....**$1.25**

Y cut crystal 10 KC 80 or 160 meters. **2.50**

with crystal holder..... **3.50**

Y cut xtal .1 of 1% accuracy..... **3.00**

with crystal holder..... **4.00**

The Grammer low powered transmitter kits as supplied by us include all essential parts except tubes.

We have supplied several hundred hams with these kits. Why not join this gang with a signal well within the law? The cost is low and both higher power or phone can be added without junking any parts.

Oscillator doubler kit.....**$12.95**

Power supply kit..... **6.00**

Amplifier kit..... **7.75**

HAMMARLUND PRO

with Crystal Filter, described in Sept. *QST* on page 4. Our special price..... **$112.72**

Factory installation of crystal filter in air tuned I F model..... **$34**

Replacement of old styled I F transformers with air tuned type..... **$18**

JOHNSON INSULATORS

There is a Johnson insulator to fill every need.

Tinymite ¼" high..... **5c**

Micromite 1" high..... **5c**

Standard Midget 1½" high..... **8c**

Jack top to take G.R. 274-J jack..... **8c**

Glazed porcelain feeder separator, each, **15c**

Glazed porcelain antenna insulators.

1" dia. 7" long.....**40c**

1" dia. 12" long.....**50c**

1" dia. 18" long.....**70c**

Remember those $25 Amplion speaker units with adjustable diaphragm? We can supply them at a considerable reduction, 95c each to be exact. An ideal speaker for those with limited space.

JEWELL METERS

Special Offer While They Last

Metal case 2" Thermo Couple R.F. meters; 1-2-3-5 ampere ranges. Regularly sold for $9.25 net. Special.....**$4.95**

Those portable meters advertised last month. We still have some at the same prices. See Sept. for details.

LEEDS & NATIONAL

have been associated for many years. We are proud of our contribution to the development of the National line, from a few items, to the large variety of equipment depicted in this issue. We carry the complete line, from a standoff insulator to an A G S X, to insure prompt delivery. We have been the largest retail advertisers of National products, because of our belief that quality merchandise fairly priced secures the approval of the amateur who wants his money's worth. National quality products and Leeds speedy service are an unbeatable combination.

General Radio Specials

247-K .00025 var. condenser. **$.75**

247-M .00025 var. condenser with vernier.....**$.95**

374-N-S.L.F. .00035 metal end plates.....**$1.25**

277 coil forms 25c each. 3 for.....**$.65**

387-A Speaker filter suitable for use between 71–45–50–59 power tubes and magnetic speaker.....**$.49**

Western Electric Phones

Type P-11 Signal Corp phones. These would ordinarily sell at $7.50. All new — all perfect. Here's a genuine bargain at.....**$3.95**

Navy Type Telegraph Key

List $3.60. Navy knob — ⅛" tungsten contacts. Only a few left at..... **$1.25**

with Regular knob..... **1.10**

NEW FEDERAL

366-A. An improved shielded type 866 fil. 2½ v. — 5 amp. 10,000 v. inverse peak..... **$5.60**

108-A — 175 w. high frequency tube..... **$34.50**

The New Deal is with us. Prices are changing rapidly. Why order from an obsolete catalog? Our quotations by return mail will save you both time and money.

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CONFIDENCE

An increasing number of amateurs are sending us orders and money for considerably more than the merchandise desired when they are not sure of prices. We appreciate this confidence in our ability to supply the right thing at the lowest price. They appreciate the prompt refund of balances due them.

RUMFORD PRESS
CONCORD, N. H.

WINTER IS COMING. Cold starlit nights, when the air is crisp with early frost. • DX is coming, too. DX limited only by the equipment used. • To the men who can sit at their keys with the assurance of mastery of crowded channels, sure of their receivers, and confident of their art: to these the records will fall. • Far scattered, differing in race, creed, and color, these operators are bound together by a common interest as universal as the reliance they place in one familiar trade-mark. • In the genial solitude of their operating tables, these men are never alone, for ten thousand unmet friends are with them. The whole world is at their fingertips. • FB!

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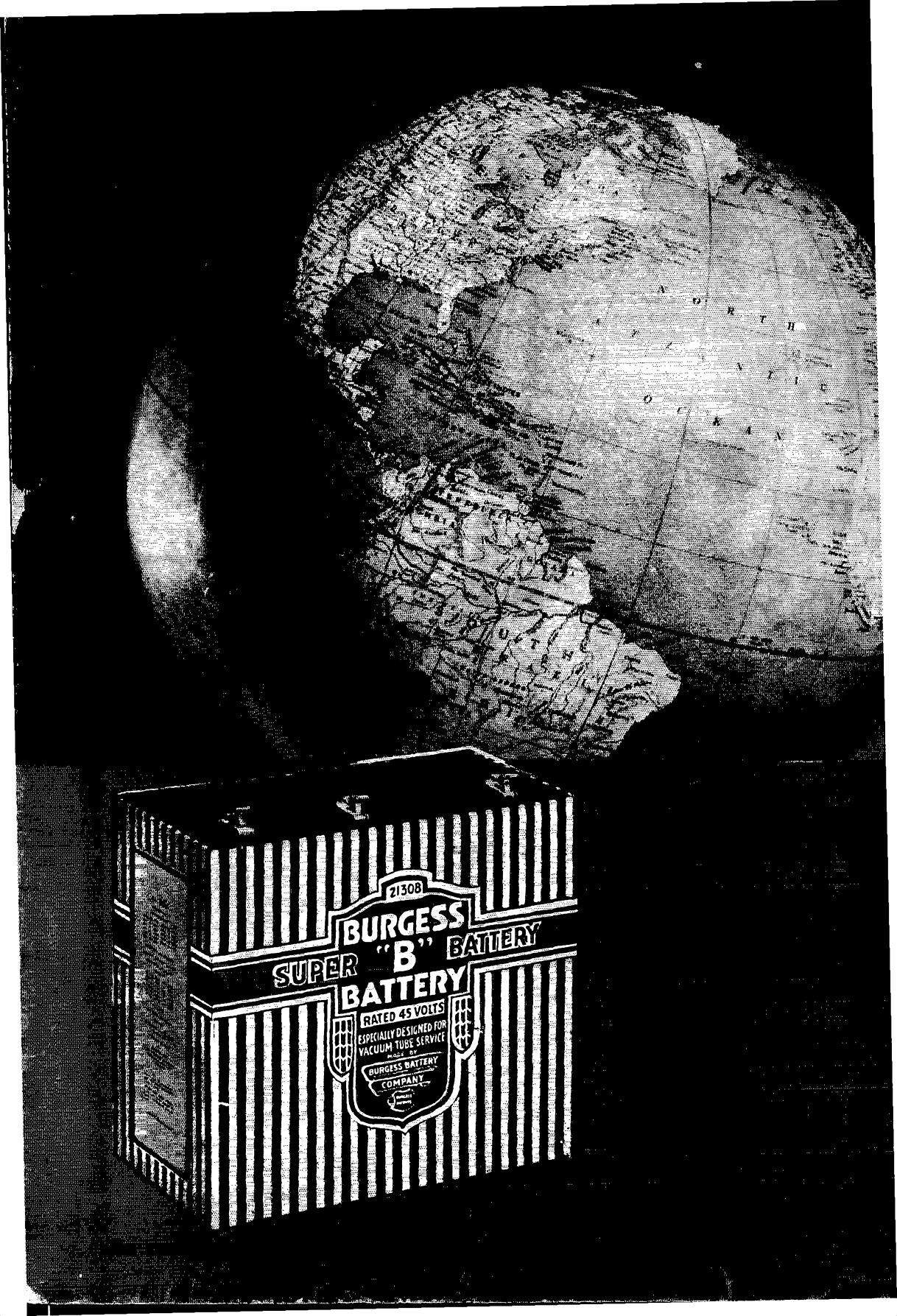
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