

QST



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amateur radio

May, 1934
25 cents



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Be,
If
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Your
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Today
for

. . . to find words to tell you how really good the Handbook is! How nothing else can compare with it as an indispensable adjunct to every amateur station in the world! How it has sold itself to a total of 115,000 copies. How the opening chapters on amateur radio, fundamentals and getting started, will give you precisely the information you need to break into the game. We'd like to be able to tell you how hot the receiver chapter is, with its dope on all sorts of receiving apparatus, from a simple two-tuber to a superhet converter; we'd like to tell you about a peachy chapter on transmitters, from a lowly one-lunger up to the most modern crystal rigs and high-power amplifiers. We'd like to be able to describe, adequately, the additional chapters chock full of the latest dope on antennas of all kinds, radiotelephony, speech amplifiers and modulators, keying and trouble shooting, operating procedure and traffic handling. In short, we'd like to tell you that the Handbook is the most helpful publication ever made available to anyone interested in amateur radio—a peerless guide to anything in, around and about the ham game. We'd like to do it—yet all we seem to be able to accomplish is to chew the ends off numberless lead pencils and use up reams of paper. Which brings forth our original observation: We're stuck!

The Radio Amateur's Handbook

By the Headquarters Staff of the A.R.R.L.

EIGHTH EDITION

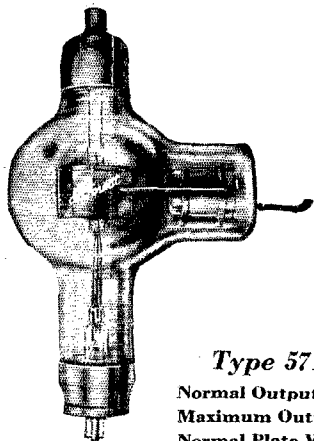
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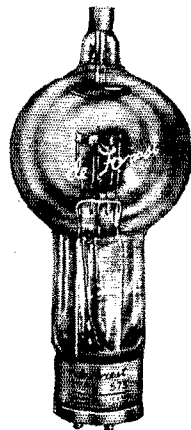
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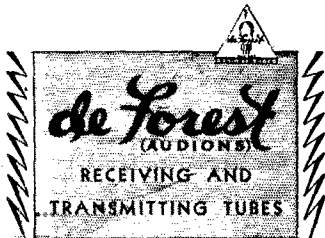
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devoted entirely to AMATEUR RADIO

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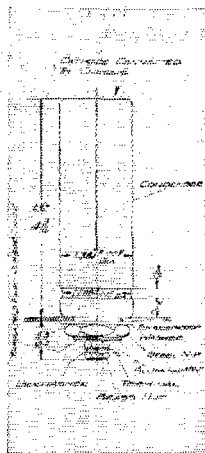
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***** It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the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

AT our home station we've spent the winter on the 7000 band. Just for the fun of it we have used almost nothing but apparatus constructed in 1928 during the League's technical development program preparing for "1929 conditions." Our receiver has been that old four-tube peaked-audio one, our monitor the heavy copper contraption described in the Handbook. Most of the time our transmitter was the High-C 250-watter of the program; later we modified it to be an oscillator-amplifier job; some of the time we used only a single 210 and sometimes 600 watts of crystal-control; but all of it was of this 1928 vintage.

We had plenty of fun and the old program gear fully proved its mettle. This has been a winter of great activity. The tests brought out the foreigners in profusion and DX has been great, both international and domestic. And the daylight work! We remember with a smile how hard QST used to plug, in the early years after the war, to encourage daylight work with what we then called the "Home-to-Luncheon Club." But it was no go, because the old sparks simply wouldn't get out in daylight. Now one can hear several hundred stations almost any noon hour. We've had very satisfactory operating, too, for despite the popular impression of those who stick close to the 3500 band, there are plenty of good fists on 7000. Of course QRM has been pretty tough at times, but this old 1928 receiver, strictly by virtue of its peaked audio and band spreading, has got us through in a way that leaves a very pleasant impression. We think peaked audio perhaps the greatest single requirement of the satisfactory 1931 receiver. We hear fellows talking about the QRM being so fierce that they can peel off the signals in layers, so that when one station stops sending it reveals three unsuspected ones battling along underneath. Flat audio, of course, acts that way, but a good peaked audio rig will go a very long way towards separating them. We think every station ought to use it. It's true it's hard on unstable signals, but we're afraid they haven't much of a chance nowadays anyway. There's a new kind of note on the air these days, too — a signal that plainly has d.c. in the station, in the effort to comply with regulations, but which doesn't give a d.c. note. The trouble seems generally to be wobulation, sometimes vibration, sometimes both. Many of these stations seem to be without monitors. That is too bad, for a monitor will tell an amateur more about his signal in three minutes than a week of report-

collecting, and the monitor will be of an altogether higher order of veracity. A monitor can be made so easily and cheaply that we are moved to assert again that no station should ever be without one.

In our observation by far the worst current offense in the 7000 band is the a.c. supplies which are still in evidence, despite a year of d.c. regulations. Great as the improvement has been it is not yet enough, for the broad a.c. signal cuts great selfish swaths through the most crowded band in the spectrum. We've had a great deal more QRM from a.c. supply on self-excited transmitters, sometimes rectified but never filtered, than from everything else combined. Such a signal, of course, doesn't have to be right on your man; let it be anywhere within spitting distance and it erases him quite neatly as it wobbles along using the space of fifteen stations. Channel-hogs, that's what those signals are. Won't the fellows still without adequate rectifiers and filters please fix up their stations? It would be a tremendous help. The other night we heard a lad with r.a.c., calling cq on a bug about fifty words a minute, and with a signal so broad that it was chewing great hunks out of the ether. Fortunately he kept it up long enough for us to get his call despite the dizzy speed. Asked about it, he said the idea of the speed was to keep out the butcher boys; that way he wasn't annoyed by answers from fellows who couldn't read fast. Novel, wot? About the note, he had a filter, but some correspondent had reported him louder without it, so he had left it off. He put it on to demonstrate to us. Immediately he had a reasonably nice d.c. signal, fully as loud as before, much more pleasant to copy, and the animal had shrunk down to the proportions of a decent signal.

We spoke of good fists on "40." There are certainly plenty of bum ones, too. Even calling is often done most sloppily. The habit of failing to separate the last letter of the call from the initial W of its next transmission is very confusing, particularly to pre-1929 amateurs who remember when calls started with a digit instead of a letter. But we think the ultimate curse of the 7000 band at present is the peculiar inarticulateness of its average inhabitant. For him life has resolved itself into a remorseless formula. A fleeting contact, the hurried outpouring of the ritual, and then nothing to do but more of the same. You've all heard it. It rarely varies; we can hear it in our sleep: R GE OB TNX FR CL OB UR PDC SIGS QSA5 R7 HR IN LALAPALOOZA NEB OB QRE? AND QRA?

WL OB GESS NIL HR OB SO 73 OB ES HPE CU AGN SN AR TUTTLEDY-DAHDEDAH. A useful method, perhaps, if the idea is to pick up a lot of reports quickly on a new transmitter. But that isn't it. This is the ordinary radio life of an unbelievably great number of the fellows in the 7000 band. Over and over they do it. Listen to one for a while. He finishes one good QSO, in another minute perhaps raises a fine station, only to drop him the same way. It is, we submit, genuinely pathetic. HPE CU AGN SN! Why not talk a little now, OM, while you are together? Amateur radio is all things to all men, our servant, not our master. Other "hams" are fellow amateurs, anxious to be talked to, seeking contacts and friendships. Let's not be afraid of each other; instead, let's learn to know each other better, let's learn how to talk and visit with each other over the air. The hot-potato stuff is not born of impoliteness but only of embarrassment and uncertainty; we know that. Here's a chance for old-timers to help.

May we be pardoned for asking who started this OB business anyway? We've held ourselves back the last couple of years, listening and wondering if we could learn to hear it without wincing and experiencing an upset tummy, but ND. We don't quite know why OB affects us that way when it is such a slight change from the traditional OM, but it definitely does. It smacks somehow of children playing grown-up and it simply isn't radio. We rise to express our anguish in much the same fashion that we would if somebody started a vogue of saying 74 instead of 73

to mean the same thing. We suppose it's too late to put the kibosh on OB, but all friendly efforts would certainly be appreciated.

Answering a CQ one night recently, we encountered OM Handy's bad boy of amateur radio in person. This lad did everything wrong that's in the book. It happened that he was in the exact city where an event had occurred that day that we wanted to ask somebody about, so we asked our question. He acknowledged and informed us that we were QSA5 R8 QRK? but no answer. We repeated and learned: R R OK WL GESS QRU HR SO VY 73. Again we repeated, with this result: SORRI OB QRN BAD THAT TIME OB. Thinking we saw that we had been sending too fast, and regretting that our correspondent had been too proud to ask QRS instead of hatching a mysterious cloud of static suddenly to blot out one transmission, we went back slowly and put forth our question in the very swellest Continental. Weren't we right in our judgment, too, as he came back with his R OK! Yes, we were not, for he said: R OK OB WL GESS NIL HR PSE QSL VY 73 OB SK, and was gone like a ship in the night, while we yearned for T.O.M.'s kitty. No paragon ourselves, and admitting to plenty of stumbling, we hold that it is easy to withhold the R OK except as a receipt, and to tell the other chap truthfully what is the matter. Care in these respects may save a brother amateur's sanity and prevent him from throwing a B-battery through his 852.

Anyway, it's been a great winter!

K. B. W.

Hudson Division Convention

At New York City, May 8th and 9th

THE Sixth Annual Convention and Banquet of the Hudson Division will be held at the Hotel Pennsylvania, New York City, on May 8th and 9th, and it gives promise of being the biggest and best yet.

There will be interesting speakers of repute who will have really valuable messages for the ham operator in plain every-day language. There will be contests galore, and very valuable prizes for the fortunate ones, thanks to the manufacturers who have very heartily cooperated.

The banquet will be a real bang-up affair — the climax of the affair. Just imagine a multi-course dinner, interspersed with renditions by the best Broadway talent, and last, but not least, music for dancing by Ed. Berlin's Society Orchestra — and all for \$5.00. YL or OW tickets, \$3.00.

Tickets are available through Mr. Frank Lester, by mail at 4305 Broadway or at Wholesale Radio Company, 38 Vesey St., New York City, at any time during the business day.

Make good, fellows, with that promise to the YL and the OW — bring them along and help make this affair a high success.

Renew Promptly and Avoid Delay

According to the Constitution of the League each member is advised 45 days in advance of actual date of expiration of membership-subscription. In other words, if your membership-subscription expires on May 31, 1931, the May issue of *QST* is the last one received until renewed, and notice of such expiration is sent to you on or about April 15th. The above information is given to emphasize the ample time we allow to record renewals before the next issue of *QST* appears. Many members, however, wait until the last moment to send in their renewal and quite a few expect to receive their next issue on the usual date. Reasonable time should be allowed for the recording of the renewal, the preparation of membership certificate and actual mailing of the magazine. If, by necessity, you have to delay your renewal kindly allow for this delay, but if you can promptly renew it will work to your advantage and also help us.

Amateur Radio As an Aid to Terrestrial-Magnetic Research

By S. L. Seaton, W3BWL*

IN May, 1928, the *Carnegie* sailed from Washington, D. C., on what proved to be her last cruise and amateur high-frequency radio began to play a definite part in the program of the Department of Terrestrial Magnetism, of the Carnegie Institution of Washington.

Reference to the radio log of the *Carnegie* (WSBS) from her departure in May, 1928, until her destruction in Apia on November 29, 1929, shows that nearly 25,000 words of official and personal traffic were handled through amateur stations—the majority of which were in the United States and represented all districts. This service, rendered without thought of material compensation, was instrumental in making available to the world more immediate knowledge of the physical and chemical characteristics of the oceans, of the bottom-contours, of atmospheric electricity and terrestrial magnetism, and, in short, of all the many branches of research represented in the program aboard the *Carnegie*.

The high-frequency equipment was furnished through the courtesy of the United States Naval Research Laboratory in Washington and consisted of a Marshall type high-frequency receiver having a frequency-range of 3000 to 60,000 kc. and employing a tuned push-pull radio-frequency amplifier, push-pull detector, and two audio-amplifier stages. The transmitter was a crystal-controlled oscillator-amplifier type using a W.E. 211-D master-oscillator and two Type '04-A amplifier tubes. Direct current was obtained from grid-bias and master-oscillator plate-power from a rectified and filtered 500-cycle supply. The power-amplifiers were supplied with 500-cycle alternating current at 3000 volts.

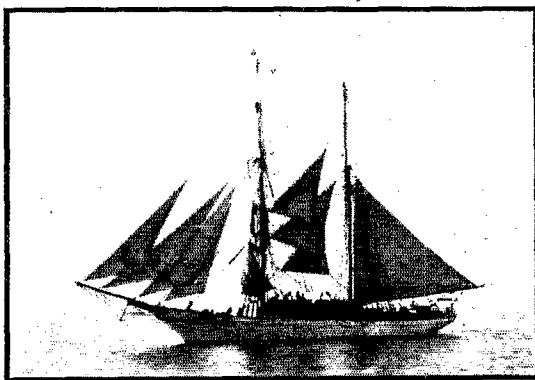
The antenna rose from the radio cabin 130

feet to the main-truck and from there went forward some 30 feet horizontally to the fore-truck. A ground-connection to the brass sheathing of the hull was used on all but the highest frequencies.

The stand-by frequency was 9045 kc., but higher and lower frequencies were employed, the former experimentally and the latter near ports. Communication was had several times with NKF in Washington while the vessel was

in the Hawaiian Islands. For this work 18,000 and 20,000 kc. were used and the time was about 3.00 to 4.00 p.m., E. S. T.

In addition to the set on the *Carnegie* the Department of Terrestrial Magnetism authorized in 1930 the installation of a 250-watt high-frequency transmitter at its Observatory near Watheroo, Western Australia. The transmitter and receiver have been constructed and are now in operation



THE CARNEGIE, WSBS, AT SEA

She was destroyed by an explosion at Apia, Samoa, in November, 1929.

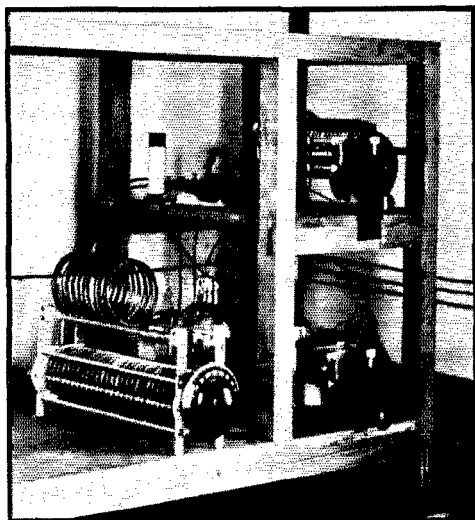
under the call VK6MO. Traffic from VK6MO pertains to magnetic character-numbers and other essential research data for transmission from NAA in the cosmic-data broadcast sponsored by Science Service. The traffic from VK6MO is being handled through United States amateur stations. At present 7000 kc. is the main frequency.

The transmitter at VK6MO is also a crystal-controlled oscillator-amplifier set, but uses direct current supply throughout. The receiver is of the conventional type, having one stage of radio-frequency amplification, detector, and two audio-frequency amplifiers, and seems to be quite satisfactory.

At Huancayo, Peru, high up in the Andes Mountains, is still another observatory maintained by the Department of Terrestrial Magnetism. Until a few months ago about forty days were required to exchange communications between the office in Washington and this observatory. However, the opening of air-mail

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routes has now cut the time to some fourteen days. If amateur radio could be utilized here the valuable results of extended researches could be communicated in a few hours. With this in mind,



THE TRANSMITTER AT VK6MO

negotiations are now being carried on with the Peruvian Government to establish an amateur station at this observatory. The equipment is almost ready and is being tested at W3BWL.

The receiver is a National type SW-5 and covers from 3000 to 30,000 kc. The transmitter is a crystal-controlled oscillator-amplifier utilizing a W.E. 211-D master-oscillator followed by Type



THE RADIO CABIN AND ANTENNAS AT VK6MO, WATHEROO (AUSTRALIA) OBSERVATORY

'60 screen-grid amplifiers.¹ The frequencies available are at present 7100, 14,200, and 28,400 kc.

When completed this installation will enable both the observatory at Watheroo and the one at Huancayo to obtain data on the changes in high-frequency signal-strengths which occur at the

¹Designed by C. Huff and the author, and constructed by B. J. Haase in the Department's instrument shop.

same time that terrestrial-magnetic and atmospheric-electric variations take place. These data together with the ability to exchange results of observations between observatories and the United States will make amateur radio almost an indispensable part of the future observatory-program.

Contrary to general belief the addition of an amateur radio station has been found to increase the volume of commercial cable and mail between the points involved.

Thus we find that amateur radio is of great service to an organization devoted to the most exacting of scientific researches and appears to be gaining in usefulness as the respective fields of investigation broaden.

Midwest Division Convention

Ames, Iowa, May 8th and 9th

The Campus Radio Club extends a cordial invitation to all amateurs to attend the A.R.R.L. Convention which it is sponsoring at Iowa State College.

~~73~~ Strays ~~73~~

The Morse abbreviation "73" is often misused by radio men. By itself "73" means "Best regards." The addition of a superfluous "s" makes it "Best regards" — whatever that means. If a "best" is placed before "73" it becomes "Best best regards," and "Best 73's" will give "Best best regards," which looks like a kindergarten effort to express a simple good wish. Stick to a plain "73" and you will not go wrong.

— CQ

The call letters of the author of "A Homemade Sub-Standard of Frequency" in the March issue were erroneously shown as W8CU. The correct call is W8GU.

A list of volunteer stations broadcasting code practice for beginners and their schedules is available to anyone on request. Address the Communications Department, A.R.R.L., 38 LaSalle Road, West Hartford, Conn.

W8ECN wants to know where to get those thin corset springs used in the homemade "bug" key described in the March Experimenters' Section. They're as extinct as rotaries out his way.

W3BW finds that the r.f. coils from an old BCL set make good r.f. chokes for the short-wave transmitter.

The Romeike Crystal Oscillator

A Method of Controlling the Frequency of a High-Power Oscillator With a Low-Power Tube

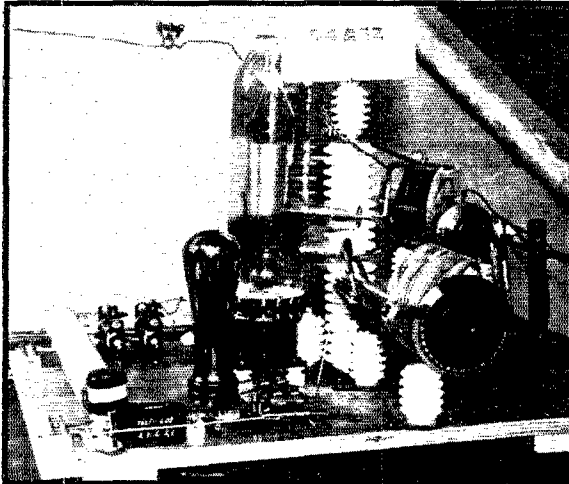
By Marshall P. Wilder, D4CJ-WIAWK* and Rudolf Romeike, D4AU**

OVER a period of years some of us have used spare valves as grid leaks and the use of another valve in the circuit suggested to D4AU many extraordinary applications, chief among them the idea of modulating a high

this circuit may be separately excited and that it may be used as an excellent telephone is obvious.

Fig. 1 may be said to be the fundamental diagram. The large tube V_2 is connected in the three-point circuit (Hartley) such as $L-C$ with the variable grid condenser C_g so proportioned that one is able to reduce the circuit from one of self-oscillation to one of maximum regeneration (without self-oscillation) over the frequency range of the $L-C$ circuit. The grid direct current for the tube V_2 is obtained through the helping tube V_1 which lies with its cathode on the grid of V_2 and with its anode connected to the cathode of V_2 , and hence to the negative side of the H.T. The grid current of V_1 is produced by the quartz which lies between the grid and cathode of V_1 and the drop across a resistance of about 10,000 ohms placed across the quartz plate terminals.

The effect of this arrangement is explained in the following manner. With the quartz plate removed from the circuit, by properly adjusting the grid condenser C_g the tube V_2 is tuned so that it does not oscillate. A readjustment is effected so that the oscillator is brought to the edge of oscillation; that is to say, to the point of maximum regeneration without oscillations occurring. This point is not critical and need not be found with a



AN EXPERIMENTAL ROMEIKE OSCILLATOR OF 250-WATT OUTPUT

The large tube is a Valvo having an output rating of 500 watts and the control tube is a German type similar to a Type '10. The tuning condenser in the foreground is the grid condenser of the large tube, the tank condenser being above and to the right. The long inductance at the left is the filament choke. The frequency at which this set operates is in the 14-mc. band, controlled by the 14-mc. crystal mounted at the left.

frequency with another radio frequency so as to obtain secret telegraphy or telephony.¹ Close on the heels of this experiment came the idea of working both valves at the same frequency, the larger valve under control of the smaller. Then it was only a short step to the insertion of a quartz plate in the grid circuit of the smaller valve, the result being a method of crystal control of high frequencies in which the crystal may be used in conjunction with a low-power tube as a grid-leak to control the grid of a high-power valve.² That

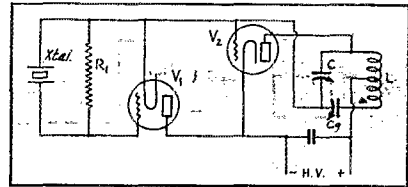


FIG. 1 — THE BASIC CIRCUIT

The tube V_1 is connected as a grid-leak for V_2 and has a quartz crystal in its grid circuit. With the crystal removed from the circuit, the grid condenser C_g is adjusted so that the circuit of V_2 is regenerative but not self-oscillating. When the crystal is inserted and the $L-C$ circuit is tuned to the crystal frequency, oscillation at this frequency results. Excessive regeneration must be avoided to obtain stability and to prevent over-excitation of the crystal circuit with the possibility of shattering the crystal. Controlling low-power tube circuit. They are usually critical and demand cautious adjustment to prevent the fracturing of perfectly good crystals. — ERROR.

*420 Memorial Drive, Cambridge, Mass.

**Technische Hochschule, Berlin, Germany.

¹ Reminiscent of the "double modulation system," described by Howard J. Tyzzer in *QST*, October, 1923. — ERROR.

² Such arrangements are generally classified as "controlled oscillators." The high-power stage furnishes most of its excitation and is "triggered" by the frequency con-

high degree of precision. With some tubes this point will be found to lag somewhat. This presents no difficulty as an optimum value will be found to produce sufficient regeneration to set the crystal off into oscillation. The *L-C* circuit is now tuned to the frequency of the quartz plate and the condenser reset for maximum practical regeneration without oscillating. The quartz plate is now inserted, and the regeneration already present in the circuit will be sufficient to set the quartz off into manifesting its piezoelectric effect and add it to the circuit, this addition being sufficient to set the entire circuit off at the frequency of the quartz plate. This may be said to occur by the aid of the quartz plate and the amplification factor of the tube *V*₁.

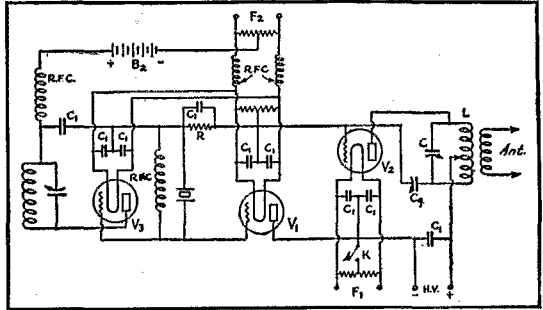
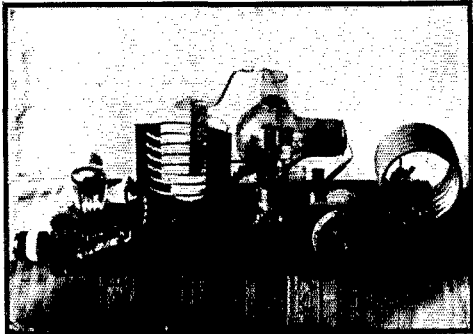


FIG 3.— AN ADDITIONAL TUBE IS NECESSARY FOR SATISFACTORY KEYING

*V*₃ maintains the crystal in oscillation when the key is open. It should block when *V*₁ and *V*₂ go into action. *B*₂ is the plate supply for the auxiliary tube.



ANOTHER EXPERIMENTAL OSCILLATOR USING A TYPE '52 TUBE

The control tube is a receiving tube of German make. The 75-watt is connected in a T.N.T. circuit, the grid coil being at the left of the Type '52 and the tank circuit at the right. This oscillator also operates in the 14-mc. band, being controlled by the 14-mc. crystal beside the baseboard, at the left.

The plate current of tube *V*₁ is produced by the grid current of *V*₂. It is possible but not necessary to aid this by the insertion of a plate battery between the anode of *V*₁ and the cathode of *V*₂ with the positive side going to the anode of *V*₁.

In order to insure the safety of the crystal the rating of tube *V*₁ should not exceed twenty watts and should have as high an amplification factor as possible. Some interesting results also have been obtained using screen-grid tubes.

Through the kindness of the Air Radio School at the Zeppelin Landing Field in Staaken, Berlin, Germany, D4AU was able to obtain the use of equipment for experiments on both low and high power. Due to the further kindness and help of Mr. Otto Schmolinske, chief of the laboratory, many data were compiled and many DX contacts were made under the call signs of DOO7 and D4AEZ. The photographs illustrate two experimental transmitters.

Fig. 2 shows the complete working diagram of the circuit in the simplest form. It should be noted that the grid bias battery for the tube *V*₁ may be eliminated and a resistance of about 10,000 ohms substituted. It should be further noted that radio frequency chokes are absolutely necessary in the filament leads of tube *V*₁. Tube *V*₁ must have its own filament winding with excellent insulation from any other part of the circuit.

Fig. 3 is a suggested method of keying which has the advantage that the quartz is kept alive by a third tube during the time when the key is up. Should this method not be used the quartz would stop oscillating when the center tap connection of tube *V*₂ was broken, due to the lack of regeneration, and the chirping resulting from the quartz going in and out of oscillation each time a character was formed would result in poor keying. As the key is pressed it is obvious that tube *V*₃ should be blocked and remain so as long as the key is closed.

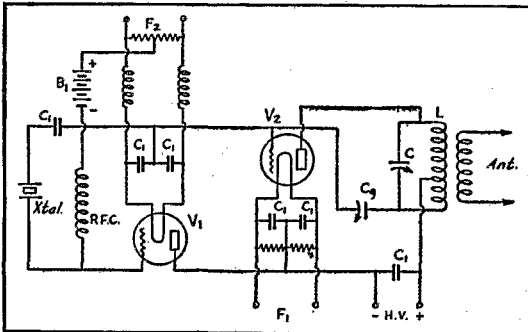


FIG. 2— THE PRACTICAL CIRCUIT OF AN EXPERIMENTAL OSCILLATOR

*V*₁ might be a small receiving tube and *V*₂ a medium-power transmitting tube. The filament supplies *F*₁ and *F*₂ must be entirely separate and well insulated from each other. The constants of the circuit will depend on the frequency and the voltages used. The condensers marked *C*₁ are by-pass condensers which may be .001 mfd. or another usual size. The bias battery *B*₁ may be supplied by a 10,000-ohm leak, as explained in the text. In this case it would be advisable to leave out the grid r.f. choke.

The Variable-Mu Tetrode

A Modified Screen-Grid Receiving Tube of Improved Performance

By George Grammer, Assistant Technical Editor

A TRITE but true expression is that old one about necessity being the mother of invention. It is nowhere more aptly illustrated than in the case of present-day vacuum tubes. Starting out a decade or so with a few "standard" types, the family has grown until tubes for almost every practical radio purpose are available. The demand for broadcast receivers which would work direct from the electric light line brought about a series of tubes designed for that work; the need for "quality" reproduction caused the development of the audio-frequency power tube; the necessity for high-gain r.f. amplifiers brought about the screen-grid tube; while in the transmitting field the development of short waves resulted in tubes designed for high-frequency work. Endless examples could be cited.

The latest addition to the ever-increasing line is the variable-mu tube. It is not a fundamentally new tube; more properly it should be considered as a design which overcomes certain defects of the older types. Since it is highly probable that there will be a great deal of talk about these tubes during the coming season it is well to go over some of the features of the variable-mu tetrode and see just what advantages it possesses over the Type '24, the tube it resembles and is designed to replace — or at least supplement — in broadcast receivers, and to look into its advantages for amateur work as well.

The outstanding features of the new tube are first: A much wider range of volume control is attainable than with the Type '24; and second, "cross-talk" is greatly reduced. From an amateur point of view these features may not seem to be greatly important; however, most of us have broadcast receivers, and a consideration of the technical features of the tube is interesting.

The new tube was developed by Stuart Ballantine and H. A. Snow of the Boonton Research Corporation, and was described in a paper presented at a meeting of the Institute of Radio Engineers in Rochester, N. Y., in November, 1930.¹ Much of the material here has been taken from that paper.

THE VARIABLE-MU PRINCIPLE

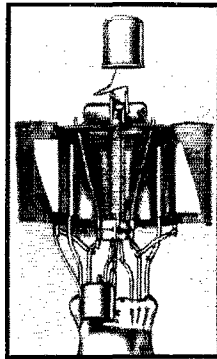
The name given the tube may have given some readers the impression that there is some sort of thumb-screw adjustment to allow changing the amplification factor to suit circuit conditions. Nothing of the sort. The amplification factor can be actually changed, but the change is brought about by variation of the grid bias. An example used by Ballantine and Snow¹ well illustrates the operation of the tube.

Suppose, as in Fig. 1, we have two tubes connected in parallel, one of them being a high-mu and the other a low-mu tube. The grid bias is variable between a lower limit set by the lowest operating grid bias of the high-mu tube and an upper limit set by the highest operating bias of the low-mu tube. Each tube is connected to a transformer winding of suitable impedance so arranged that the secondary voltages will be in proper phase relationship.

Let us assume that the grid voltage-plate current curves of the two tubes are the dotted lines in Fig. 2, *A* being the curve for the low-mu tube and *B* the curve for the high-mu tube. As the grid voltage is increased negatively it will be seen that at a comparatively low value the plate current of the high-mu tube, *B*, is completely cut off.

A much higher value of bias is required to reach *A*'s cut-off point. The combination of the two in parallel would give a curve like the solid line. At low values of grid bias tube *B* would produce most of the amplification in the stage; at higher values, however, *A* would become more and more effective, until beyond *B*'s cut-off point all the amplification would be produced by *A*.

In the variable-mu tube a curve similar to that of the solid line in Fig. 2 is obtained in one envelope by suitably designing the tube elements. Innumerable types of structures could be worked out to give this effect. The photograph of an exploded screen-grid tube of this type shows one method which has been adopted in an experimental



THE CONSTRUCTION OF THE 235

Note the odd shape of the inner screen grid. The spacing of the control grid wires, not visible in the photograph, is narrow at the outer ends and wide in the center. In other respects the tube is about the same as the '24.

¹"Reduction of Distortion and Cross-Talk in Radio Receivers by Means of Variable-Mu Tetrodes," Ballantine and Snow, *Proceedings of The Institute of Radio Engineers*, Vol. 18, No. 12, December, 1930. Figs. 1, 2, 5, 6, 8, 9, and 10 are reproduced by courtesy of the Institute.

tube. The inner portion of the screen grid has the approximate shape of an inverted truncated cone, the plate and outer screen being the normal type of construction. The control grid is not visible in the photo, but the pitch of the wires is rather fine at both ends for a short distance and is coarse in the central portion.

Two varieties of this class of tube, known as the 551 and 235, have been produced at the time this is being written. Both are indirectly-heated cathode tubes, designed to be used in the r.f. amplifier stages of a receiver. The 551 is similar in

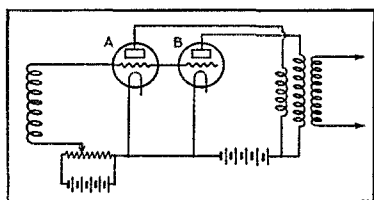


FIG. 1

many respects to the present Type '24 except that the normal operating plate current is slightly higher (5.3 ma. for the 551 as against 4.0 ma. for the '24) and the range of control grid bias over which it may be worked is nearly double that of the '24, or about 30 volts. Provision for the proper grid bias is about the only change that need be made to substitute the tube for the '24 in a receiver. Grid bias may be obtained either from a potentiometer or by the cathode resistor method. The following table gives the average characteristics of the 551:

Filament voltage	2.5 (a.c.)
Filament current	1.75
Plate voltage	180
Screen voltage	90
Grid voltage	-3.0
Plate current	5.3 ma.
Screen current	$\frac{1}{2}$ of plate current
Plate resistance	400,000 ohms
Mutual conductance	1050 μ hos

Approximate Inter-Electrode Capacitances

Grid to plate	0.01 μ fd. max.
Input	5 μ fd.
Output	10 μ fd.

The second type, the 235, is not generally interchangeable with the Type '24 in broadcast receivers. The plate current is more than double that of the '24 and the plate resistance about half. The lower plate resistance permits more effective amplification per stage than is possible with the '24, with the result that careful shielding between stages is necessary to prevent oscillation. The full volume control range of the tube is secured only when the available grid bias voltage is of the order of 75 volts, which should preferably be obtained independently from a potentiometer. In cases where a 45-volt range gives sufficient volume control, however, the cathode resistor

method may be employed. The average characteristics of the 235 are as follows:

Filament voltage	2.5 (a.c.)
Filament current	1.75
Plate voltage	180
Screen voltage	75
Grid voltage	-1.5
Plate current	9.0 ma.
Screen current	Not over $\frac{1}{2}$ of plate current
Plate resistance	200,000 ohms
Mutual conductance	1100 μ hos

The approximate interelectrode capacitances are the same as those given above for the 551.

The grid voltage-plate current and grid voltage-mutual conductance curves for the 235 are shown in Figs. 3 and 4.

THE REASON FOR THE VARIABLE-MU TUBE

The new tube overcomes some difficulties attendant upon the use of the Type '24 in high-gain r.f. amplifiers, chiefly the distortion encountered with high grid bias on the tubes. A common method of controlling volume in broadcast receivers is that of control of amplification by variation of grid bias. As the grid bias on a tube is increased negatively the mutual conductance, which is a measure of the amplification produced, decreases also, until a point is finally reached where the plate current is completely cut off and the mutual conductance becomes zero. As the grid bias on the '24 tube is increased beyond a certain point, however, the relation between the signal voltage on the grid and the r.f. output voltage is not linear for some values of signal voltages; in other words, distortion is introduced. In Fig. 5 is a series of curves showing the relation between r.f. output voltage and r.f. input voltage for a single '24 stage for various values of grid bias, plotted to a logarithmic scale.

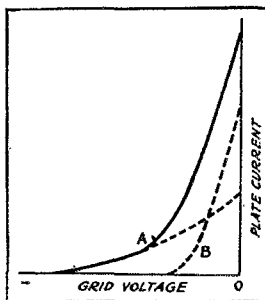


FIG. 2

It will be seen that the relationship between input and output voltages is linear for low values of grid bias with inputs as high as one volt r.m.s.; the 10-volt curve, however, shows distinct curvature at the upper end. As the bias is further increased the curvature becomes more and more pronounced, especially at the higher values of signal voltage.

The effect produced by the non-linearity of these characteristics is that of increasing the percentage of modulation on the incoming signal. There is no simple relationship between the modulation rise and the audio-frequency distortion produced, but as the depth of modulation increases from this cause the distortion becomes greater. The distortion does not become objectionable when the modulation rise is below 20%, and this figure has been arbitrarily selected as the allowable upper limit. The dotted curve in Fig. 5 indicates the operating limits of the tube from this standpoint. For example, if the desired audio output is secured with one volt r.f. output from this particular stage, the r.f. input voltage could not exceed about 0.7 volts before distortion occurs. If the incoming signal were larger than this, as might easily happen if this were the second or third r.f. stage in the receiver and the signal came from a nearby broadcasting station, either the bias would have to be increased beyond the 20% line to keep the volume at the desired level, thus introducing noticeable distortion, or an increase in the volume level would have to be tolerated in order to preserve the quality of reproduction. Thus this characteristic of the tube is particularly important when the volume control is to work satisfactorily on a strong signal. Complaints about poor control of volume on local broadcast stations are common.

The variable-mu feature overcomes this difficulty quite satisfactorily. The new tube gives about the same performance as the '24 at low

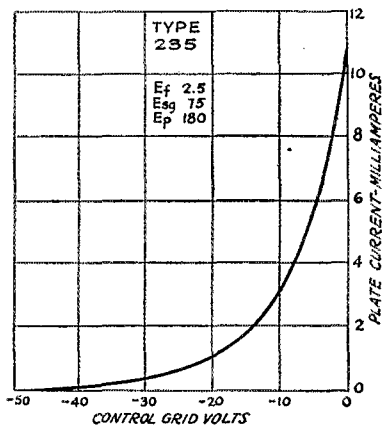


FIG. 3.—THE MUTUAL CHARACTERISTIC OF THE 235

Note the "tailing" of the curve at the higher negative grid voltages. With ordinary tubes the curve would have a shape more like that of the dotted curve B in Fig. 2.

bias, so that there is no appreciable loss of amplification on weak signals. As the bias is increased to handle strong signals, however, the mu of the tube decreases, so that with high bias values the

amplification is low. It is characteristic of a low-mu tube that large signal inputs can be handled without distortion; thus when the bias is increased and the mu of the tube decreases, the distortion encountered with the '24 type, as illustrated in Fig. 5, is eliminated. The difference in performance in this respect between the '24

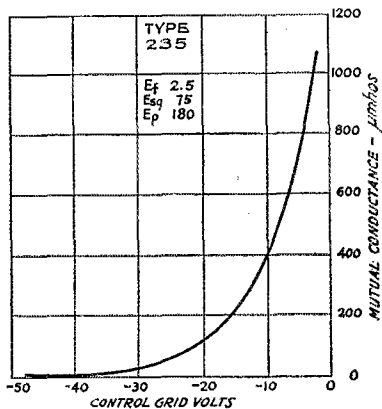


FIG. 4.—THIS GRAPH SHOWS MUTUAL CONDUCTANCE (TRANSCONDUCTANCE) PLOTTED AGAINST GRID VOLTAGE FOR THE 235

This curve is very nearly logarithmic in character. If plotted on semi-log paper an approximately straight line would result.

and the 551 is illustrated in Fig. 6. In this figure the r.f. input voltage is plotted against transconductance,² which is determined by the operating bias and is a measure of the amplification. The scale is again logarithmic, and the curves represent a 20% modulation rise for each of the two tubes. It will be seen that at low bias (high transconductance) the performance of the two tubes is similar; as the transconductance is decreased, however, there is a wide difference between the points at which distortion becomes noticeable. For example, if the transconductance is 10 μmhos the '24 will handle a signal of only about 0.3 volt, while an 8-volt signal is permissible with the 551. As the region of low transconductance is the important one from the standpoint of volume control, the superior performance of the new tube in this respect is obvious.

The curves in Fig. 6 are reproduced from the paper mentioned above,¹ although in commercial production the characteristic of the 551 may vary somewhat from that shown. A technical bulletin on the tube recently released by the Arcturus

² The report of the Committee on Standardization for 1930, Institute of Radio Engineers, defines "transconductance" as the "ratio of the change in the current in the circuit of one electrode to the change in voltage on another electrode, all other voltages remaining unchanged." Transconductance is the general case of "mutual conductance" applied to tubes with any number of electrodes; strictly speaking, mutual conductance is a special case applying only to triodes.

Radio Tube Company³ shows somewhat better comparative performance; the voltage which the 551 will handle at low transconductance is about 20 times that of the '24 type.

THE QUESTION OF CROSS-TALK

The cause of most "cross-talk" in a receiver is the same as the cause of the type of distortion described above, namely the bending of the input voltage-output curves illustrated in Fig. 5. Cross-talk is easily distinguished from simple interference because it occurs only in the presence of a desired carrier. That is, assuming the receiver is tuned to the carrier of a station on say 800 kc.; another station whose frequency is perhaps 1000 kc. may be heard in the background so long as the 800-kc. carrier is on. If the 800-kc. carrier is cut off and the 1000-kc. station can still be heard, the case is one of simple interference and is chargeable to lack of selectivity in the receiver. On the other hand, if the inter-

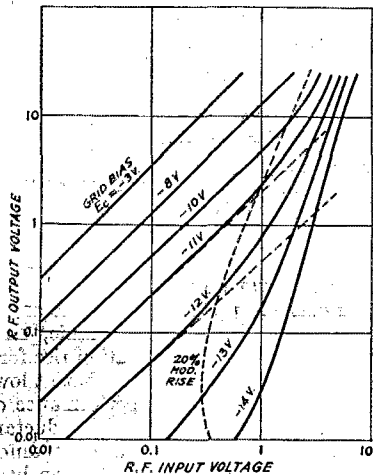


FIG. 5.—INPUT VOLTAGE-OUTPUT VOLTAGE CURVES FOR A TYPE '24 TUBE

The bending of the curves for the higher values of grid bias and large input signals limits the range over which volume may be controlled because of the distortion introduced.

ference disappears when the 800-kc. carrier is cut off, the interference is attributable to cross-talk.

Two principal classes of cross-talk are described by Ballantine and Snow. The first type is that caused by beats between two signals on differing frequencies, both of which are different from the frequency to which the receiver is tuned. For instance, if two strong stations are operating on, say, 1400 and 600 kc., a difference frequency of 800 kc. will be set up, and if the receiver is tuned

³ This bulletin and another on the Arcturus Type PZ power output pentode may be obtained by writing the Arcturus Radio Tube Company, Newark, N. J.

to a carrier on 800 kc. cross-talk may be present. A common example of this occurs along the east coast, and probably in other places as well, where marine transmitters can be heard on the carriers

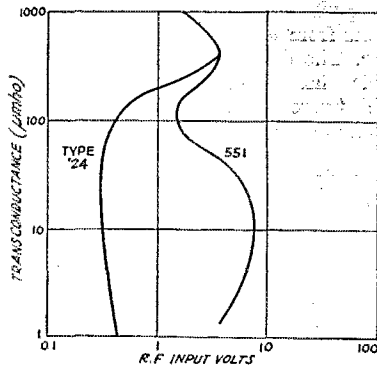


FIG. 6.—INPUT VOLTAGE AGAINST TRANS-CONDUCTANCE WITH 20% MODULATION RISE

At low transconductance the 551 will handle many times the voltage that the '24 will. The distortion introduced is the same in both cases.

of certain stations, disappearing as the carrier is tuned out. In Hartford such telegraph signals are occasionally heard on WEAF's carrier, and are presumably caused by beats between WTIC on 1060 kc. and marine transmitters on 400 kc. (750 meters). Although this type of cross-talk is not a function of distortion of the type described above, it has been found that the characteristics of the variable-mu tube are such as to reduce it.

The second class of cross-talk is that encountered when a strong local signal is on a frequency near that of the desired station. The selectivity of the receiver may be such that the interfering signal may not be heard when the desired carrier is not present, yet cross-talk can very easily exist when there is a carrier on the desired frequency. Fig. 7 illustrates possible selectivity curves for a receiver with three tuned stages; the curves may

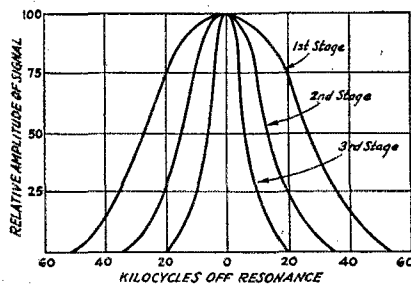


FIG. 7

or may not be representative of actual conditions, but will do for purposes of illustration. Each of the stages alone may have a selectivity curve like

that marked "1st Stage," but the cumulative effect of the series of stages gives a progressively higher degree of selectivity, so that by the time the third stage is reached a signal 20 kc. away from the desired one will produce practically no response in the receiver *in the absence of the desired carrier*. Now suppose there is a carrier 30 kc. away from the desired one, and that both are of equal strength. In the *first* tuned stage the extra carrier will have an amplitude approximately 40% of that of the desired carrier, so that there is an appreciable signal on the grid of the first tube from the unwanted signal. The effect of this unwanted signal is explained by reference to Fig. 8.

The solid curve of Fig. 8 represents the a.c. output from the desired signal at various values of grid bias voltage. The bias is assumed to be set at the operating point shown, and the incoming voltage from the undesired signal is shown below the line. This signal, which is assumed to be modulated, in effect swings the operating point over the range indicated by the diagram. For ordinary tubes the grid voltage-a.c. plate current curve is not straight in the region of high grid bias, as explained above and indicated by Fig. 5, so that the amplitude of the desired carrier will increase more when the operating point swings to the right than it decreases when the

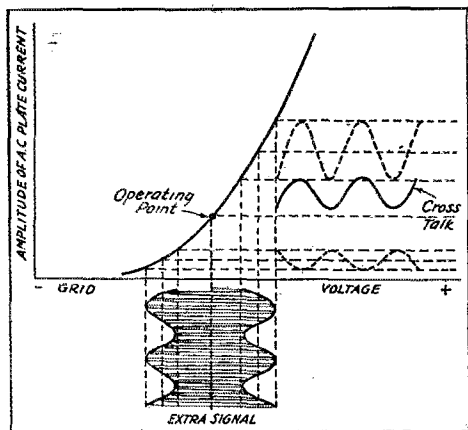


FIG. 8 — THIS DRAWING EXPLAINS THE REASON FOR ONE TYPE OF CROSS-TALK

The solid curve represents a.c. output from the desired signal plotted against grid bias voltage. The unwanted (extra) signal swings the operating point back and forth and actually modulates the desired signal.

operating point swings to the left. In other words, rectification takes place. The effect of such rectification, as mentioned previously, is, in the case of the desired signal, to increase the percentage of modulation; with the undesired signal, however, actual modulation of the desired carrier at the modulation frequency of the undesired signal takes place, and the undesired signal rides through the remaining stages of the amplifier on

the desired carrier in spite of the fact that the selectivity of the receiver may be great enough to preclude simple interference.

The curvature of the characteristic shown in Fig. 8 has led to the use of two or more tuned circuits in cascade between the antenna and the

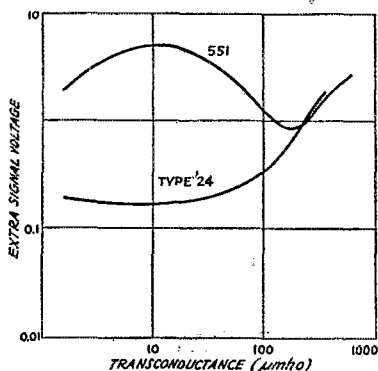


FIG. 9. — AT LOW TRANSCONDUCTANCE THE 551 PRODUCES MUCH LESS CROSS-TALK THAN THE '24

The extra signal voltage required to produce a given amount of cross-talk is much higher with the 551 than the '24. Cross-talk is reduced by a factor of several hundred to one with the variable-mu tube.

grid of the first r.f. tube, the object being to cut out the unwanted signal before it has a chance to modulate the desired carrier. This has naturally increased the cost of receivers so designed, and led to another difficulty in that the attenuation of the desired signal was so great before the first tube was reached that the strength of the signal in relation to tube noises, hum, etc., was considerably below that obtainable when the first tube was coupled to the antenna through a single tuned circuit.

The straightening out of this characteristic in the variable-mu tube has resulted in so much improvement in this respect that it is claimed that no "pre-selection" — the use of several tuned circuits before the first tube — is necessary, with a resulting improvement in the signal noise ratio. An idea of the superiority of the new tube in this respect can be gained by reference to Fig. 9, which shows the amplitude of extra (undesired) signal voltage necessary to produce cross-talk of 10% (based on audio output power) with both types of tubes. In the region of low transconductance the ratio is higher than 20 to 1 in favor of the 551 tube, which, since power varies with the square of the voltage, means an improvement of 400 to 1 and more with the new tube. This is more strikingly illustrated in Fig. 10, which shows the cross-talk produced by the two types of tubes in a typical r.f. amplifier, expressed as a percentage of the audio output from the desired signal. These curves were taken with constant audio output from the desired signal,

the grid bias being adjusted to give this result as the desired signal voltage was varied. Cross-talk amplitudes with five different values of interfering signal voltage are shown.

A further advantage resulting from the use of the new tube is reduction in hum in the r.f. stages. Most of us have listened to broadcast receivers on which little or no hum was present when no carrier was tuned in, but in which a definite hum appeared with the carrier. This type of hum is similar to cross-talk in that it is an actual modulation of the carrier caused by curvature of the characteristic illustrated in Fig. 8. The hum voltage cannot reach the detector so long as there is no carrier for it to modulate; with the variable-mu tube the undesired modulation is greatly reduced and consequently the hum is less.

Since the decrease in distortion and cross-talk has been achieved in the new tube by minimizing its rectifying tendencies, a loss of efficiency in detecting properties is to be expected. The 551 is only about half as good as a '24 as a "linear" detector; that is, as a high-bias plate rectifier.

THE VARIABLE-MU TUBE IN THE AMATEUR RECEIVER

The points discussed above, while of interest in a technical sense, do not, at first thought, seem to offer anything particularly helpful from an amateur point of view. Excepting possibly the superheterodyne, most amateur receivers do not use a volume control operating on the r.f. tubes, and plain lack of selectivity rather than cross-talk is the cause of most of the interference troubles. However, a few experimental tubes of the 235 type furnished us by the RCA Radiotron Company have shown some interesting points of advantage over the ordinary '24 type.

It will be remembered that the plate resistance of the 235 is about half that of the '24, and the effect of this reduction, at least in a few tests made on short-wave tuned r.f. receivers, has been to noticeably increase the amplification when the tube was used to replace the '24 in the r.f. stage — this in spite of the fact that no change was made in the bias resistor to bring the operating point to the optimum.

As a grid-leak detector with regeneration, the arrangement most common in amateur receivers, the tube is at least the equal and possibly a little better than the average '24 in sensitivity, and is noticeably more quiet in operation. The small filament hum in one typical set was reduced to the vanishing point when the 235 was substituted for the '24 detector. This, however, may be the result of improved cathode construction rather than any virtue of the variable-mu feature.

AS A DYNATRON OSCILLATOR

The experimental tubes tried were found to be much superior to the '24 as dynatron oscillators. Substituted for the '24 in an a.c. dynatron fre-

quency meter, the 235 was a more vigorous oscillator, so much so that instead of the 90 and 45 volts required on the screen and plate of the '24, the voltages could be dropped to 45 and 22, respectively, with equal strength on all harmonics. The space current necessary for oscillation

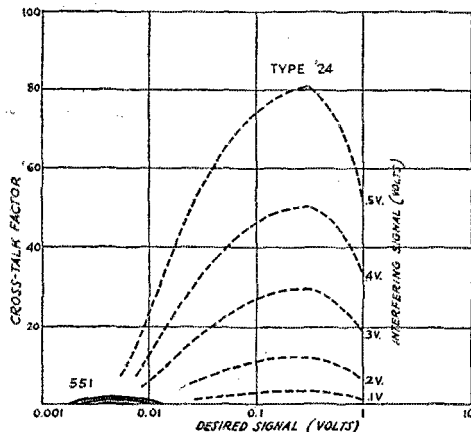


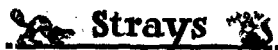
FIG. 10. — CROSS-TALK COMPARISON IN A TYPICAL RECEIVER

A striking illustration of the superiority of the new tube with respect to cross-talk. In obtaining the points for these curves the transconductance and desired signal voltage were varied simultaneously to maintain the audio output from the desired signal constant. Curves for five different values of interfering signal voltage are shown.

also was considerably lower — 2.5 ma. for the 235 as against 6 ma. for the '24.

At the time of this writing no 551 tubes have been received for test.

Few changes will be necessary to substitute these tubes for '24's in ordinary receivers using a '24 r.f. and '24 detector. It might be advisable to reduce somewhat the value of the bias resistor in the r.f. stage when the 235 is substituted for the '24. For instance, if the bias resistor is such as to give a 3-volt drop at 4 ma., the normal plate current for the '24, or approximately 800 ohms, it should be decreased to give a 1.5-volt drop at 9 ma., or about 175 ohms. No changes need be made in the detector circuit. With the 551 no alterations should be necessary in either r.f. or detector stages. As both types of these tubes are more or less experimental in nature it is possible that the design finally adopted for commercial production may have somewhat different characteristics.



W6AZL puts half a dollar across the terminals of his amateur ammeter as a shunt. The half dollar comes in handy, too, in case pay-day looks too far away.

W8DMA is owned by O. H. Mills, who has some high-resistance initials.

A Combined Dynatron Frequency Meter and Monitor

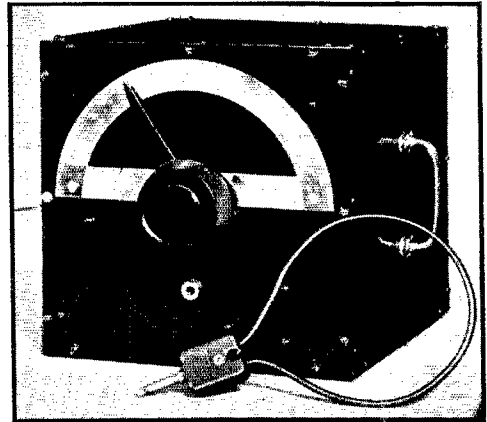
By John J. Long, Jr., W8ABX*

SEVERAL excellent articles describing dynatron oscillators have appeared in past issues of *QST*,¹ and to them I owe the necessary incentive for constructing the oscillator described in this article. This oscillator is primarily for the use of amateurs, the range of the oscillator at its fundamental frequency being from approximately 3450 kc. to 4200 kc.

The scale used to read the settings of the condenser consists of a 6" German silver protractor calibrated in $\frac{1}{2}$ degrees from 0 to 180, and a large General Radio knob with a 3" brass pointer painted black to contrast with the shiny scale. The whole oscillator unit, including the necessary batteries, is mounted on a $\frac{1}{16}$ " thick brass sheet measuring 9" \times 9". The batteries necessary are three small size 22 $\frac{1}{2}$ -volt blocks, and one 4 $\frac{1}{2}$ -volt C battery to light the filament of the Type '32 screen-grid tube. The brass cabinet is made from the 9" \times 9" brass sheets $\frac{1}{16}$ " thick. One-quarter inch square brass rods are used in the corners of the cabinet and are threaded with 6-32 holes, three holes for each sheet. It is not

may be used. The cabinet should not be made of iron or steel, of course.

A Cardwell tapered-plate condenser is used in the meter described, and is very satisfactory from an amateur standpoint because it consists



ALL THE COMPONENTS ARE MOUNTED ON THE METAL PANEL

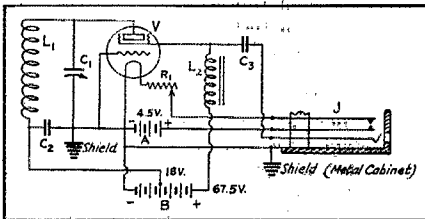


FIG. 1. — CIRCUIT OF THE MONITOR-FREQUENCY METER

- L_1 — 28 turns No. 16 d.s.c., 3-inch diameter; spacing between turns equal to diameter of wire.
- L_2 — Audio-frequency choke, 3 henries or more.
- C_1 — Cardwell Type E 2-plate variable condenser; spacing between plates adjustable.
- C_2, C_3 — .01- μ fd. mica fixed condensers.
- V — Type '32 screen-grid tube.
- R_1 — 60-ohm adjustable filament resistor (see text).
- J — Single-circuit filament-control telephone jack.
- A — 4.5-volt C battery.
- B — Three 22.5-volt batteries, small size.

necessary to adhere to this method of constructing the cabinet, however; aluminum instead of brass and any method of construction that suits

of only two plates, and the range of the meter may be adjusted without difficulty to cover the amateur bands only. With the condenser plates set at minimum capacity, the inductance L_1 is cut down until the frequency of the oscillator is below NAA (4015 kc.) and then with the plates set at maximum the spacing between the plates is adjusted until the frequency is slightly lower than 3500 kc.

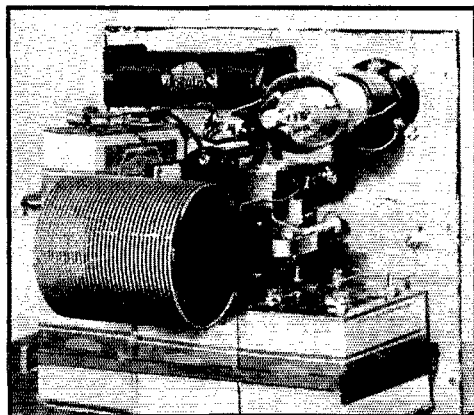
The circuit diagram is almost self-explanatory. C_2 and C_3 are .01- μ fd. Sangamo fixed condensers, although C_3 may be any size from .01- μ fd. up to 1- μ fd.; C_2 preferably should be a mica condenser, because it is in the tuned circuit, and must be constant in its capacity value. Otherwise the calibration of the meter may change a few hundred cycles, due to changes in temperature or moisture affecting its capacity. L_2 is a 3-henry choke but may be any higher value. In conjunction with the condenser C_3 , it provides impedance coupling to the phones. R_1 is a 60-ohm resistor with a center tap contact which is moveable and is adjusted to give 2 volts on the filament of the '32 tube. The filament control jack is mounted on top of the panel. When setting the

* 63 Sonora Parkway, Brighton, N. Y.

¹ Bringing Frequency Measurement Up to Date, and Experiments With Dynatron Oscillator, Sept., 1930; The Dynatron Frequency Meter, Oct., 1930; W1MK's Dynatron Frequency Meter, Feb., 1931.

frequency of a transmitter a pair of headphones is plugged in and the transmitter adjusted to zero beat with the fundamental or proper harmonic of the dynatron oscillator.

The coil L_1 in the present meter is a section of space-wound Hammarlund coil and has 28 turns.



THE COMPLETELY SELF-CONTAINED FREQUENCY METER AND MONITOR

The effective shielding makes necessary the plug-and-loop arrangement when the signal from the meter must be picked up on the receiver.

No matter what type of coil is used, care should be taken to mount the coil on the back of the condenser with rugged supports. In this meter the coil was mounted between two bakelite strips $\frac{3}{4}$ " wide, and the strips are fastened to the back of the condenser with $\frac{1}{8}$ " brass strips $\frac{3}{8}$ " wide.

THE PICK-UP LOOP

Removing the oscillator from the shielding cabinet can change the calibration by as much as 30 kc., which has been demonstrated by actually doing that very thing. Experiments have shown that unless the tuned circuit is shielded against capacity effects there is very little gain in using a dynatron — or a regular monitor using a three element for that matter. Without the use of the pick-up loop it is impossible for enough energy from a receiver to get into the meter to give a beat note. In fact this method of using the pick-up loop was not premeditated. It was thought that enough energy would get through the brass shield to allow coupling to a receiver, and it was very disappointing to discover that it would not. Apparently the meter was so immune to all outside effects that it was of no use. A little experimenting brought forth the loop idea, and it certainly worked much better than had been expected. Harmonics up in the 56-mc. band can be heard loud enough to give excellent calibrations even in that "touchy" part of our private spectrum.

The hand capacity effects on this meter are

very small. When the pick-up loop is used to check incoming signals, the hand may be placed on the loop — which consists of one turn of $\frac{3}{16}$ " copper tubing mounted in a plug — without changing the frequency enough to cause a change in beat-note between the incoming signal and the dynatron. When using the headphones, there is a maximum variation of about 500 cycles due to the capacity of the phone cord. This change is an extreme, however, and was obtained by first holding both hands on the shielding cabinet and coiling the cord up on top of it; and then taking the hands away and walking away from the meter the full length of the cord, a distance of about four feet.

When checking the frequency of another station on the receiver the pick-up loop must be plugged into the jack. The received signal can then be checked by beating the dynatron against it directly until zero beat is reached. The method is as follows: First tune in the signal to be checked; then turn the regeneration control down until no beat is made against the signal by the oscillating detector; next swing the pointer around until an audio beat is heard in the receiver and then adjust the pointer (or dial if you choose) on the dynatron meter to zero beat or perfect resonance with the incoming signal. Read the scale and refer to the calibration curve for the correct frequency. When listening to standard frequency stations to make a curve for the meter, use this same method.

Taking the error of the standard frequency station at 500 cycles, the process of making the

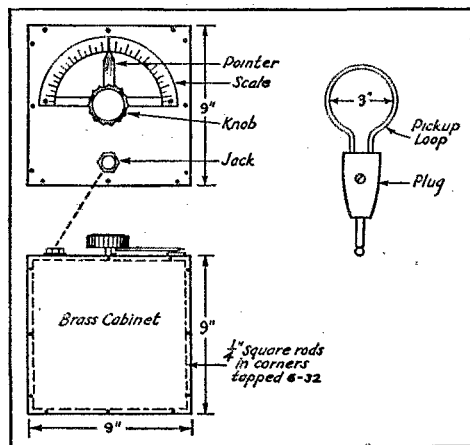


FIG. 2—CONSTRUCTIONAL DETAILS OF THE CABINET AND PICK-UP LOOP

Painting the metal black gives a nice contrast for the German silver scale.

calibration curve at 1000 cycles, and the error in checking an unknown frequency at 1000 cycles, gives a total error of 2500 cycles; which is

very conservative if care is taken in making the calibration curve and reading it thereafter.

A Type '32 tube could be made to oscillate as a dynatron on the 7000-kc. band, but it required 112 volts on the screen and 28 volts on the plate.

This particular oscillator works best in the 3500-kc. band, with 17 volts on the plate and $67\frac{1}{2}$ volts on the screen. The control grid is connected directly to the negative filament terminal on the socket. A negative plate current of about one milliamperes can be expected with the above plate and screen voltages. Three different '32 tubes were tried and they all oscillated very well although at 7000 kc. none of them was very stable.

A push-pull arrangement was tried to see whether the stability would be increased but it was not enough better to warrant its use in an amateur meter. Moreover, the push-pull arrangement will not allow the use of even harmonics since they are neutralized in the tuned circuit. Therefore it could not be used for amateur purposes since we use only the even harmonics in checking on bands of a higher frequency than the fundamental of the frequency meter. This particular meter covers the 14,000- to 14,400-kc. band in thirty scale divisions, which means that every half division mark represents about 7000 cycles. This precision can be improved upon by making the fundamental range shorter, say from 3480 kc. to 4020 kc. The 14,000-kc. phone men can use such a meter with perfect safety, and be pretty certain they are in the band. If they want to be very precise they can shorten the range so that the 14,000-kc. band covers the entire scale by making the fundamental range 3500 kc. to 3600 kc. Each division would then represent only about 2000 cycles.

This meter can be constructed in about 8 hours, and the material including the tube and batteries will not cost over twenty dollars — the price of an ordinary absorption type wave-meter. It is hoped that this information will be of some help to the gang in getting "frequency wise" — and according to those notices in the Communications Department, we must get that way.

Strays

W9AA uses a simple wave-trap to cut out the clicks from commercials at the low-frequency end of the 14-mc. band. The trap consists of a 23-plate midget condenser and seven turns of No. 12 antenna wire on a two-inch form. It works FB.

An excellent material for insulating parts from metal panels may be found in old drawing triangles. It is easy to drill, cut and file, does not

absorb moisture, and is good-looking, in addition to being an excellent insulator. — W9CH

AT THE KEY

A lid sat down to pound the key,
His signals blasted forth;
It was my luck that he got me —
That station in the North..

I asked him if 'twas raining there,
When he had had his say;
He said my signals were just fair
And folks were well to-day.

In mild uproar I sent this lid
The same thing once again,
And asked him if the sun was hid
Or was it going to rain?

He said, "RR, oh yes, old boy,
Just let me get my pen;
I'll take your traffic with much joy!"
And I replied, "Amen!"

So, sadly gazing into space,
My hopes for rag-chew gone,
I turned my dial another place —
And CQ'd grimly on.

— W6DHS

According to a recent newspaper story, there is a giant X-ray tube out in California which emits a stream of *radiotrons*. Could we use one of those tubes? MIM!

OUR MISTAKE!

On page 35 of March *QST* we called attention to the ease with which a station can get out of its assigned band when adjusted for 14-mc. work. We intended to say, "Interference with A. T. & T.'s 14,440-kc. channel (GBW) from off-frequency amateur operation will be decidedly out of order." But a misplaced "not" spoiled the thought!

And then there's the chap who wrote us for a pound of bird seed so he could get those nice peep-peep signals from his transmitter.

One of the ham catalogs lists some electrolytic condensers which can be used on fairly high voltages without *serious* connections. W3SE thinks the person who wrote the copy must have known his hams! This ties the one in another catalog, spotted by W1AQW, which advertised a Super-Wash!

A Full-Wave Mercury-Vapor Rectifier Tube

A New Rectifier for Low-Power Supplies

By Paul Schwerin*

THE development of a full-wave mercury-vapor rectifier tube of the 280 type has been brought about by the demand for a rectifier of low voltage drop and high efficiency for use in broadcast receiver power packs and in plate supply units for low power transmitters. Its application in the latter service should be particularly interesting to amateurs who use transmitting tubes requiring plate voltages up to 500 and plate currents as high as 300 ma. Although it is particularly intended to replace the Type '80 vacuum tube, in many rectifier units rated at 500 volts and less a single mercury-vapor type 280 can be used to replace a pair of half-wave Type '81 vacuum tubes. Reducing the filament voltage from 7.5 to 5.0 volts would be the only modification necessary, providing the plate

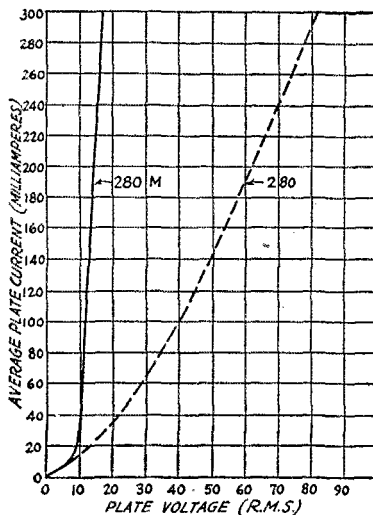


FIG. 1.—PLATE VOLTAGE-PLATE CURRENT CHARACTERISTICS OF TYPE '80 AND TYPE '80-M FULL-WAVE RECTIFIER TUBES

voltage to be rectified does not exceed the rating of the mercury-vapor tube.

In general it may be stated that the ideal rectifier would be one which would transform alternating current to direct current with perfect rectification and no loss of energy. In order to bring out the advantages of the 280-M mercury-vapor rectifier, let us examine and compare it with the vacuum type 280 rectifier.

*Perryman Electric Co., Inc., 4901 Hudson Blvd., North Bergen, N. J.

In a rectifier of the vacuum type we find that we are greatly limited and hampered by the space charge. To state this in a somewhat dif-

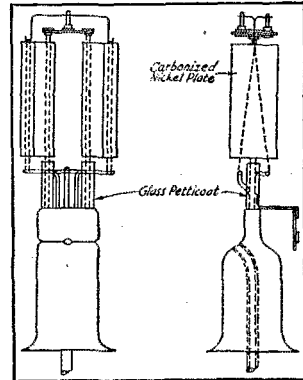


FIG. 2.—IN THE MERCURY-VAPOR TUBE SPECIAL PRECAUTIONS HAVE BEEN TAKEN TO ELIMINATE BREAK-DOWN AND ELECTROLYSIS

The plate leads are surrounded by glass "petticoats." Half of the filament is inside each plate, the two halves being connected in series.

ferent way, there is a concentrated cloud of electrons surrounding the filament. This dense accumulation of negative charges varies in depth with the plate voltage. Low plate voltages remove the charge slowly while higher values act on a greater number of electrons. The electron flow is a measure of the rectified current. The chart of Fig. 1 gives a visual conception of the current flow in relation to the applied voltage. In the vacuum type 280 tube considerable voltage is required to move the current to the plate, the broken curve showing this to be 50 volts at 140 ma.

In an atmosphere of ionized mercury vapor or other gas, there is present a considerable positive charge which neutralizes the negative space charge around the emitter. Because of this condition, the electron cloud is not as concentrated as in the vacuum type tube. Thus the emission from the filament is available without so great a loss of voltage. The volt-ampere characteristic of the mercury tube is shown by the solid curve and proves that the voltage is quite constant for large variations in load current, the average voltage drop through the tube being about 17 volts for all loads from 20 to 300 ma. The mercury vapor rectifier therefore can be looked upon as a device having a nearly constant voltage drop of 17

volts and through which all of the additional voltage supplied by the transformer can be made available for useful work in the external circuit.

The ratings of the mercury-vapor Type '80-M and the vacuum Type '80 are the same excepting

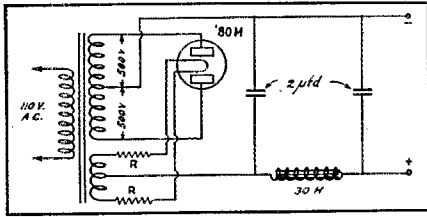


FIG. 3.—THE FULL-WAVE RECTIFIER CIRCUIT USED FOR AN AMATEUR TRANSMITTER

The resistors, *R*, are used to drop the filament voltage from 7.5 to 5.0 volts and are each 1.25 ohms.

plate voltages and currents. A side-by-side comparison of the two types shows the following:

	Type '80	Type '80-M
Filament voltage	5 volts	5 volts
Filament current	2 amps	2 amps
A.C. volts per plate (max. r.m.s.)	400	500
Total output current (max.)	110 ma.	300 ma.

The maximum inverse peak voltage rating of the Type '80-M is 2000 volts and the peak current rating for both plates is 1 ampere (500 ma. for each half of the filament). Since the tube is intended for use with a capacity input filter, the above output ratings may seem overly generous. Actual tests on sample tubes over an operating period well in excess of 1000 hours have shown that the tube is capable of withstanding

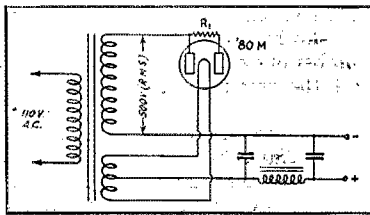


FIG. 4.—HALF-WAVE RECTIFIER USING THE TWO PLATES IN PARALLEL

The resistor *R*₁ is necessary to make equal the potential between the two plates and the two halves of the filament. The method of determining its proper value is explained in the test.

load currents and a.c. voltages even higher than those at which it is rated, however, even with the plate and filament power switched on simultaneously. But the above ratings should not be exceeded in general service if the maximum tube life is to be obtained.

The Type '80 rectifier is usually used at a load of about 0.125 amps. At this point the voltage drop through the tube is approximately 47 volts.

This means that under these conditions there is a power dissipation loss in the tube of 5.88 watts which is not usable in the external circuit. At higher current values the voltage drop becomes correspondingly greater.

In the mercury-vapor tube, with the same power dissipation in the bulb, the load current is 0.346 amp. Comparing the useful power available in each tube, we have for the '80 tube 0.125 amps × 450 volts equals 56.25 watts, less the power loss in the tube of 5.88 watts, or 50.37 watts; while in the mercury tube with the same loss in the tube we have 0.316 amps × 500 volts equals 158.0 watts, less power loss in tube of 5.88 watts, leaving 152.12 watts available for use in the load circuit. The voltage available with the 280 would be 450-47 or 403 volts, while the voltage available with the mercury-vapor tube would be 500-17 or 483 volts. This means that we have approximately three times as much power available with the mercury tube as compared to the vacuum tube, when the power dissipated in the tubes is the same.

The inverse peak voltage, which is destructive because of its magnitude during the non-current cycle of the rectifier, is on the order of three times the value of the average (d.c.) voltage. To overcome any tendency to break-down in the stem, the elements of this tube have been protected by means of small diameter tubing surrounding the plate leads as shown in Fig. 2. This breaks up the mercury film which is apt to form across the press, and introduces a long glass path to get the required insulation.

Tubes have been run in the laboratory for a considerable period of time at 550 volts; possibly 600 volts would not be injurious. However, we believe it is more practical to take out the power at high current rather than at high voltage.

The Type '80-M tube has been used for some time in the plate supply for an amateur transmitter, furnishing plate power to an oscillator-amplifier set using Type '10 tubes, the single mercury-vapor tube being substituted for a pair of Type '81 tubes around which the unit had been originally built. The circuit diagram of the unit is shown in Fig. 3. Using the two '81's, the filter terminal voltage was 450 volts at a load of 100 ma. With the '80-M replacing these, the d.c. voltage jumped to 550 at the same load current. Increasing the load current caused a drop from this voltage value, of course, because of the resistance of the filter. In this particular unit the rectifier filament supply was on the same transformer with the plate winding and it was necessary to switch on both supplies simultaneously. In spite of this rough treatment there has been no apparent damage inflicted on the tube, although it is recommended that a separate filament supply be provided so that the filament power may be switched on several seconds before the plate voltage is applied.

At the usual current values obtained in amateur transmitters, one '80-M rectifier could be used in a 500-volt plate supply for a transmitter using a Type '10 oscillator, a Type '10 buffer, two Type '10's in a push-pull class-C amplifier, and a pair of Type '50 modulators.

The rating of 150 watts useful power out of the tube is based on the same bulb radiation as is common in vacuum Type '80 tubes. If a more favorable position for heat radiation is utilized, the bulb and glass parts may be kept at a sufficiently low temperature to prevent electrolysis when greater power is taken from the tube. As long as the glass parts are kept sufficiently cool, no great danger will be experienced by taking out 300 ma. for useful work in the circuit. A special glass has been utilized in the construction of the stems in these tubes so as to cut down to a minimum trouble which might arise from electrolysis.

It will be readily seen from a study of the curves that the regulation in the circuit utilizing mercury-vapor tubes will be a great deal better than with vacuum tubes, because the voltage drop through the tube remains fairly constant with large variations in load.

PARALLEL OPERATION

It is possible to use this tube as a half-wave rectifier using both plates in parallel. However, in this case it will be necessary to place a resistance between the two plates, as shown in Fig. 4, since it has been found that when using the plates in parallel in most cases only one plate draws current. Obviously this would make the job too hard for one of the filaments. The introduction of the small series resistance will elimi-

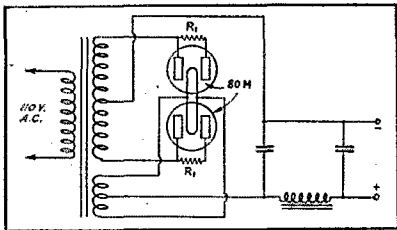


FIG. 5.—A FULL-WAVE CIRCUIT USING TWO TYPE '80-M RECTIFIER TUBES

The current rating is practically double that of a single tube but the voltage rating is the same. The resistance of each of the resistors R_1 should be 2.5 volts divided by one-fourth of the total load current.

nate this condition. The action is due to the drop in voltage through the filament, the plate to filament potential in one side being $2\frac{1}{2}$ volts higher than in the other. The value of resistance to be used in this case depends upon the current to be drawn. For example, if the load current is 250 ma. (125 ma. per plate) the resistance would be $\frac{2.5}{.125}$ or 20 ohms. This would cause both filaments to operate uniformly and give longer life.

The action of this resistance is to maintain the difference of potential between the filaments and their respective plates at the same value. In other words the resistance is placed in series with the plate which would normally have the greatest potential difference between it and its filament, thus bringing the voltage down to that between the other two elements. It must be borne in mind that these filaments are to be poled in a certain direction with regard to the filament transformer; otherwise the resistance will not cause both plates to function equally. This can be readily tested by

(Continued on page 44)

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF QST, published monthly at West Hartford, Conn., for April 1, 1931.

State of Connecticut }
County of Hartford) ss:

Before me, a Notary Public in and for the State and county aforesaid, personally appeared K. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of QST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The American Radio Relay League, Inc., West Hartford, Conn.; Editor, Kenneth B. Warner, West Hartford, Conn.; Managing Editor, Clark C. Rodimon, West Hartford, Conn.; Business Manager, Kenneth B. Warner, West Hartford, Conn.
2. That the owners are: (Give names and addresses of the individual owners, or if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.) The American Radio Relay League, Inc., an association without capital stock, incorporated under the laws of the State of Connecticut. President, Hiram Percy Maxim, Hartford, Conn.; Vice-President, Chas. H. Stewart, St. David's, Pa.; Treasurer, A. A. Hebert, West Hartford, Conn.; Communications Manager, F. E. Handy, West Hartford, Conn.; Secretary, K. B. Warner, West Hartford, Conn.
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (if there are none, so state.) None.
4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements, embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest, direct, or indirect in the said stock, bonds, or other securities, than as so stated by him.
5. That the average number of copies of each issue of this publication, sold or distributed, through the mails, or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

K. B. WARNER.

Sworn to and subscribed before me this 20th day of March, 1931.

Alice V. Scanlan.

(My commission expires February, 1934.)



New Zealand's Tragic Earthquake

Amateurs Make Brilliant Showing When All Wire Communications Fail

By Ivan O'Meara, ZL2AC

TRAGEDY swept New Zealand on February 3rd when two of its most prosperous towns, Napier and Hastings, were overwhelmed by earthquake and fire. More than 350 residents were killed and thousands of others injured by collapsing buildings. All telegraph and telephone wires were destroyed and communication with the outside world was completely cut off. Though the day will long be remembered as one of horror and suffering for the people of those cities it must be recorded as a highlight in the history of amateur radio in New Zealand. For radio amateurs, as in so many previous national emergencies, made a splendid job of rapidly reestablishing communication and maintaining it until the ordinary communication channels were restored.

Mr. C. E. Tyler, ZL2BE, was at his office in Hastings when the first wrecking blow had fallen. Escaping through falling walls and buildings by the merest chance, ZL2BE reached his home to find his equipment hopelessly wrecked. Rushing back into the town, Tyler recovered some "B" batteries and a storage battery from a ruined radio shop and with apparatus from his station soon assembled a workable low powered transmitter. Making contact with ZL2FF of Gisborne, ZL2BE gave the news of the disaster and made an urgent appeal for doctors, nurses and medical supplies which were rushed by planes to the stricken towns. ZL2FF was soon taken over by the local Post and Telegraph

From the daily press, amateurs the world over will have gained some conception of the magnitude of New Zealand's recent earthquake. A phase of the disaster about which little is known, even in amateur circles, is the extraordinary work performed by radio amateurs in and around the stricken towns. This story, transmitted by ZL2AC direct to WISZ, provides a suggestion of the noble work done by the "ZL" men. — EDITOR.

Department and contact was maintained with ZL2BE on both c.w. and 'phone without a break for two days. Hundreds of urgent messages were exchanged between the two stations during this time. The greatest credit is due to these stations. The work they performed was a bright spot in the gloom of the disaster.

In Napier, ZL2GE did yeoman service also with a low powered outfit. He managed to recover a few "B" batteries from one of the

radio stores before fire destroyed it and with these under his arm he bolted for home, where he reconstructed his transmitter and soon made contact with amateur stations in Christchurch and Wellington. His station was also taken over by the Post and Telegraph authorities and considerable traffic was handled with the post office at Wellington.

ZL2GQ rendered help when a small steamer was despatched from Gisborne with doctors, nurses, medical supplies and rescue parties. The steamer was not equipped with radio and ZL2GQ, at very short notice, erected a small transmitter on board and worked schedules with ZL2AC on the voyage. During his stay in Wellington ZL2GQ handled considerable traffic and enquiries from relatives of those in the stricken towns. ZL1FX of Auckland was also of great service in keeping schedules with ZL2BE and ZL2AC. He handled both press news and enquiries from anxious relatives in Auckland and was on the air continuously.

(Continued on page 27)

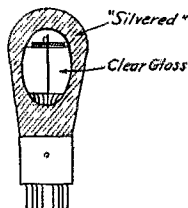
A Home-Made Photocell

By Harley Iams*

IN the last few years photocells have been used more and more frequently for commercial and experimental purposes. These cells have the property of passing an electric current which varies in proportion to the amount of light which falls upon them. Commercially they are used for such varied purposes as talking movies, picture transmission, recording density of smoke from a smokestack, counting articles, and grading them according to color. Those who have wanted to do some experimenting with things involving

FIG. 1. — THE "SILVERING" IS CLEARED FROM PART OF THE ENVELOPE BY CAREFULLY HEATING THE GLASS

The volatilized light-sensitive material deposits on the plate and forms the cathode of the photocell. The grid and filament connected together become the anode.



light-sensitive devices, as television and picture transmission do, have sometimes hesitated because of the cost or difficulty of obtaining the photocell. It has been found that one can be made easily from an old Type '01-A tube.

Before speaking of the way of making the conversion from the '01-A to the photocell, it would be well to have in mind the essential features of a photo-electric cell. It is ordinarily composed of two

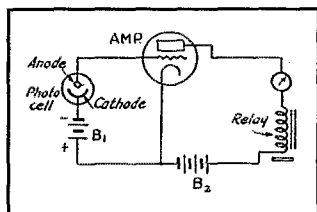


FIG. 2. — A SENSITIVE CIRCUIT ARRANGEMENT SUITABLE FOR SLOW OPERATIONS

electrodes in a vacuum or inert gas. One of these electrodes, the cathode, is made of or coated with a material which emits electrons when exposed to visible light. The other electrode, the anode, is given a positive charge by means of a battery; it attracts the electrons which have been freed by the light. The flow of electrons from the cathode to the anode constitutes the current through the photocell. Some of the materials sensitive to visible light are: sodium, potassium, rubidium,

caesium, together with certain of their alloys, oxides, hydrides, etc.¹

The '01-A tube can be made into a photocell because the silvery coating inside the glass, deposited there in the process of "getting" to improve the vacuum, happens to be light-sensitive and can be volatilized by heat. All that is necessary is to heat the glass slowly and carefully over a gas flame at a point opposite the filament support. The active material is driven from the glass, and it condenses on the plate which is still cool. When the glass has been cleared of all the silvering in a spot about an inch in diameter, the tube is allowed to cool slowly and the job is done. The finished photocell is shown in Fig. 1. The plate of the tube serves as the cathode, while the grid and filament connected together become the anode. The light which is to operate the cell is concentrated on the plate.

The following precautions are worth considering. Choose a tube which has a clear, silvery color. A smoky white color on the interior of the glass often indicates the presence of air, which spoils the tube as a photocell. Choose a tube which has

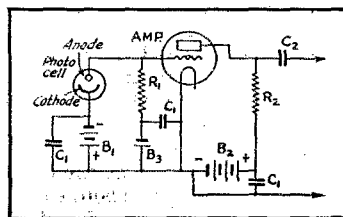


FIG. 3. — THIS TYPE OF CIRCUIT IS MORE SUITED TO ALTERNATING CURRENT AMPLIFICATION

Light-current variations occurring at audio frequencies can be amplified with little distortion.

a minimum of electrical leakage between the plate and the rest of the leads in parallel. The current due to the photo-electric action is, at best, only a few microamperes, and any appreciable leakage will mask the desired effect. Do not try to clear the "silver" from too big a spot on the glass. The volatilized material is deposited on everything cool inside the tube, including the press where the wires go through the glass. Any great amount left at this point will make a tube with too much leakage.

Of six Type '01-A tubes tried, four made good

¹ Two excellent books on photoelectric cells are *Photoelectric Cells*, by Campbell and Ritchie (price, \$4.50); and *Photocells and Their Application*, by Zworkin and Wilson (price, \$2.50). Both are obtainable from the QST Book Department. — EDITOR.

* 5105 Hawley Blvd., San Diego, Calif.

photocells. The best was an old Radiotron mounted on a metal base. One of the two poor tubes was a "bootleg" variety, in which the silvering looked a dirty grey, like old solder. The other had too much leakage at the press because of excessive "silvering."

SOME PRACTICAL CIRCUITS

The voltage to be used on this photocell is not critical. Any voltage from 3 to 150 will give good results. Probably saturation current is reached at about 20 volts, and little is to be gained by using more. If the filament of the tube has been burned out so that the filament support cannot be used as part of the anode, or if the other side of the plate is illuminated, higher voltages will be needed.

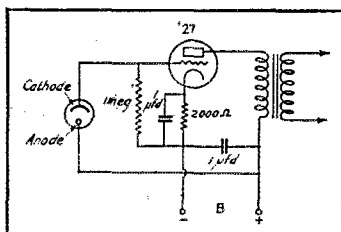


FIG. 4.—REVERSING THE PHOTOCELL AND BATTERY POLARITIES PERMITS USING THE AMPLIFIER B SUPPLY ON THE PHOTOCELL

If this photocell behaves like most of them, it is more sensitive to violet and blue light than to red. It is to be expected, then, that better results will be had when it is lighted with daylight or a Mazda lamp than with a carbon filament lamp or one red from undervoltage. No photocell is very sensitive, and the home-made ones are considerably less so than the better ones available on the market. The photo-electric current to be expected is of the order of two microamperes when the cell is lighted with a 100-watt lamp one foot away. In other words, there would be about a two-volt drop across a one megohm resistor in the circuit, for the illumination mentioned. It is evident that at least one stage of amplification will be needed to get any practical use out of the cell. For television uses, six stages after the photocell is common.

Three circuits for amplifying the output of the photocell are given. If it is to be used for a purpose in which there is a second or so in which to act, as in operating a relay, Fig. 2 will give the highest amplification. Since the grid of the amplifier tube is nearly free, hum may be troublesome when using an a.c. type of tube. It can be reduced by shielding the grid and photocell from a.c. and grounding the center tap of the heater. If the circuit must act quickly, a grid leak is necessary. Fig. 3 represents the first stage of a television amplifier. If it is desired that illumination increase the plate current of the amplifier

tube, rather than decrease it, the polarity of battery and photocell can be reversed as shown in Fig. 4.

The photocell made from an old Type '01-A tube is cheap and easily obtainable. A tube so converted is not spoiled for use in a radio set. While not particularly sensitive, a photocell so made will find many uses with a stage or more of amplification. It is well to remember that the photo-electric current is very small, that good insulation is needed, and that care and patience are essential when dealing with light-sensitive devices.

New Zealand's Tragic Earthquake

(Continued from page 25)

ZL2AC was on the air day and night with inquiry traffic to Hastings, Napier and their surrounding towns. He gave news of the disaster to the Christchurch aerodrome and medical supplies were rushed by plane. All communication lines from Gisborne to Napier had been destroyed by huge earth slides. A government plane service was established between these two towns and ZL2AC acted as local airport contact station with the call FP18.

ZL2XP of Wellington, went to Napier with a portable outfit and did splendid work with it on 7 mc. with ZL3AW, ZL3AD and other stations. He handled a vast amount of press and general traffic.

In Palmerston North, ZL2AX also contributed great assistance during the early period of the disaster. Another station which assisted was ZL1BG of Rotorua, from which constant contact was maintained with the affected areas. Among the stations which performed valuable work were ZL2BG, ZL2BO, ZL2CR, ZL2GD, ZL2GK, ZL2GP, and ZL2DN. Many other stations, of which there is no definite record, gave splendid cooperation and all showed the real amateur spirit in putting service to the community before all else. Both the press and the public voiced the appreciation in no uncertain terms. Because of the work accomplished in this crisis it is quite certain that amateur radio in New Zealand has been given a vigorous fillip.

Photographs courtesy New Zealand Illustrated Weekly.

IMPORTANT NOTICE

When sending in a change of address notice in connection with the delivery of your monthly copy of *QST* kindly give us ample notice. Wrappers for this issue, the May number, were prepared on April 10th. Each month they are prepared this far in advance. Most magazine publishers require such notice from four to six weeks in advance, and if they don't receive it the subscriber is apt to lose one or two issues. Our policy is a more flexible one, as we wish every member to receive each issue of *QST*. However, we solicit your cooperation.

Impedance Matching in Oscillator Circuits

Some Comments on a Common Fallacy

By George Grammer, Assistant Technical Editor

A QUESTION which is occasionally a cause of concern to some amateurs is that of matching the impedance of an oscillating tube to the impedance of the load into which it is working. The object of such matching is, of course, to obtain the maximum power output which the textbooks say results only when the tube and load impedances are equal. Impedance matching is, however, difficult in the case of an oscillating tube, and is actually something to be avoided if the greatest power output is to be obtained from a transmitter. The textbooks are correct so far as they go, but, as always, there are other factors to be considered.

RATED PLATE IMPEDANCE

The "rated" plate impedance of a tube that is to be used as an oscillator means little. It is usually calculated for static conditions, and the actual impedance when the tube is oscillating may be quite different. The rated impedance

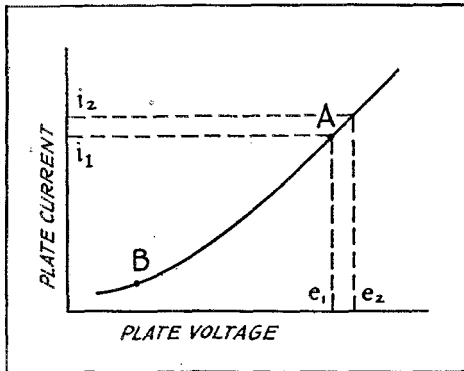


FIG. 1.—A TYPICAL PLATE VOLTAGE-PLATE CURRENT CURVE

The plate impedance of the tube is calculated as explained in the text.

value is somewhat useful, however, in that it indicates roughly whether the plate current of the tube can be expected to be high or low for a given plate voltage, especially at zero bias, but is otherwise of comparatively minor utility in forecasting the performance of the tube when it is oscillating.

When a tube is used to amplify with negligible

distortion a signal impressed upon the grid-filament circuit — as for audio-frequency amplification — the operating point, set by the plate

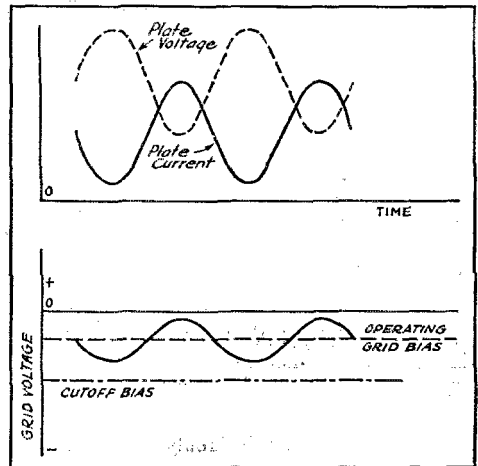


FIG. 2.—AN AUDIO AMPLIFIER OPERATES AS SHOWN IN THE DIAGRAM ABOVE

The peak of the positive half-cycle of input grid voltage is never great enough to completely cancel the fixed grid bias, and the negative half-cycle is not great enough to reduce the plate current to zero. The plate current has substantially the same form as the grid voltage.

voltage and grid bias, is definitely fixed, and so long as the signal voltage on the grid is kept within proper limits the plate impedance can be considered to be constant.¹ This is illustrated in Fig. 1, which represents a typical plate voltage-plate current curve of an amplifier tube for one value of grid bias. The plate impedance of the tube at the operating point A (e_1, i_1) is numerically equal to the slope of the curve at A, or

$$\frac{de_p}{di_p}$$

A sufficiently accurate practical measurement of plate impedance can be made by increasing e_1 a slight amount, to e_2 , noting the change in plate current from i_1 to i_2 . Then the increase in plate

¹This is not strictly true with output tubes worked near their limits, since with large grid swings there may be an appreciable change in plate impedance during the cycle — not, however, enough to be considered for the purposes of this discussion.

voltage divided by the increase in plate current, or

$$\frac{e_2 - e_1}{i_2 - i_1}$$

equals the plate impedance of the tube for that operating point. It is apparent that the plate impedance at *B* will be different from that at *A*, since the slope of the curve at *B* is different. To examine the operation of the tube with a load in

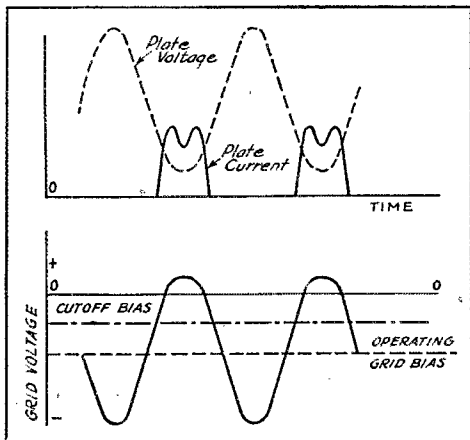


FIG. 3.— IN AN OSCILLATOR OR R.F. POWER AMPLIFIER THE APPLIED GRID voltage is much greater than is permissible with an audio amplifier, and the plate current does not have the same form as the grid voltage.

the plate circuit, a whole family of such curves for different values of grid voltage within the operating range is necessary, but is not required for the present discussion. To maintain the plate impedance at a substantially constant value it obviously is essential that the signal voltage be kept within such limits that the grid never is positive with respect to the filament and (with the tubes now available) that the plate current must never reach zero even on the most negative portions of the input cycle. This is illustrated in Fig. 2.

OSCILLATOR IMPEDANCE

When the same tube is operating as an oscillator or r.f. power amplifier the operating point is not definitely fixed by the plate voltage and grid bias, but depends also upon the adjustment of the circuit and the degree of loading. In most of our oscillator circuits the bias is supplied by the d.c. grid current flowing through a grid leak resistor, so that the bias is also dependent upon the circuit conditions. To further complicate matters, the currents and voltages cannot be analyzed readily because they depart widely from the sinusoidal form on which most calculations are based. The grid voltage ordinarily swings from a value sufficiently negative to

completely cut off the plate current, to a positive value which results in plate saturation, giving a badly distorted plate current wave form. Such a condition is illustrated in Fig. 3, which represents the plate voltage and plate current forms with sine wave input to the grid circuit. The grid voltage in a self-excited oscillator will not necessarily follow the sine form, however, although it may closely approach it in a high-*C* circuit.

It is apparent that the plate impedance cannot be measured by the method described previously, since the operation is not confined to the "straight" portions of the characteristic curves. It is also evident that any adjustments which cause a change in the form of the plate current wave, such as adjustment of feedback or a change in the load, will cause the plate impedance of the tube to change. Calculation under such conditions becomes difficult. Fortunately, however, the question of matching impedances is of relatively small importance in the adjustment of a transmitter. The explanation of this is found in a simple analogy to ordinary electric power work.

An oscillating tube can be looked upon as an a.c. generator. The tank circuit and antenna tuning them become analogous to a power transformer, and the antenna itself a resistive load, assuming that the antenna circuit is tuned to resonance with the oscillator. The corresponding simple generator circuit is shown in Fig. 4. Now when one is designing a transformer for power work there is no attempt made at matching the impedance of the transformer primary to the generator impedance; if this were done all the power output of the generator would be dissipated in the transformer and there would be no power available for the load.

A good transformer will have an extremely high impedance at no load, and when fully loaded the "reflected" impedance — impedance of the load referred to the primary — will be such that both transformer and generator are operating at high efficiency. This condition is *not* the same as that which gives maximum power output. The latter results in an unwarranted waste of power; in fact, half the total power developed is used up in the generator itself. It is easy to see why this is so; since for maximum power output the generator and load impedances must be equal, the power divides equally between them. The factor which determines the impedance into which the generator is working is the degree of loading in the secondary circuit of the transformer, the design of the transformer being fixed.

Similarly, there is no point in trying to design a tank circuit which matches the impedance of the tube, even if the tube impedance were known. As the illustration shows, the tank circuit can be considered to function as a transformer, and should therefore operate with the least possible power loss. Hence the need for good condensers

and low-resistance coils in a transmitter. The impedance of a good tank circuit will be extremely high with no output to the antenna, and, as in the case of the generator, the amount of load determines the impedance into which the tube is working. The loading, as we all know, is very simply adjusted by varying the antenna tuning and coupling. It is likewise poor practice to attempt to adjust the antenna coupling until the load impedance equals the tube impedance, because half the power will then be lost in the tube. What we want is high efficiency.

EFFICIENCY

The importance of high efficiency is well illustrated by a homely example. The plate dissipation rating of a 'Type '10 tube is 15 watts, and when this amount of power is being lost in the tube the plate will be a cherry red color. However, the tubes are often operated with inputs as high as 40 or 50 watts with the plate perfectly "cold." Evidently the tube and load impedances are not matched. The higher the tube efficiency the greater is the permissible power input for a given plate dissipation. If the efficiency can be made as high as 80%, the input to a Type '10 tube may be as much as 60 watts without exceeding the allowable plate dissipation; on the other hand, if the circuit is adjusted so that the tube and load impedances are matched (presumably resulting in the maximum output) the greatest allowable input would be 30 watts. In the first case the power output to the load would be 45 watts and in the second case 15.

THE *L-C* RATIO

In general, the higher the *L-C* ratio in the tank circuit of an oscillator or r.f. power amplifier the better is the possibility of obtaining high efficiency. The reason for this is that the impedance into which the tube is working becomes higher as the *L-C* ratio is increased, and as the load impedance becomes greater in comparison with the plate resistance of the tube a greater proportion of the total power generated is dissipated in the load. In practical circuits this cannot be carried too far because it is almost certain that a change in the *L-C* ratio will also change the plate impedance of the tube, so that the gain may not be as great as might be expected. However, up to a certain point the efficiency does increase as the *L-C* ratio is increased.

LOW-*C* VERSUS HIGH-*C*

The somewhat higher efficiency obtainable with low-*C* tank circuits is not a valid argument for their use in self-controlled oscillators, however, because the much better frequency stability obtainable with high-*C* circuits is worth more in practical operation than a slight increase in efficiency. It is advantageous, however, to reduce somewhat the amount of capacity in the tank

circuit of an r.f. power amplifier whose frequency is fixed by a separate oscillator, because the output will be greater and the frequency stability will not suffer. Even in this case it should not be carried too far, however, because as the *L-C* ratio is increased the harmonic output also increases, and interference may be caused on some other band than that on which the transmitter is supposed to be working. Use of low-*C* circuits, by the way, is one possible explanation of why a number of stations nominally on the 7000-ke. band have been reported as interfering with

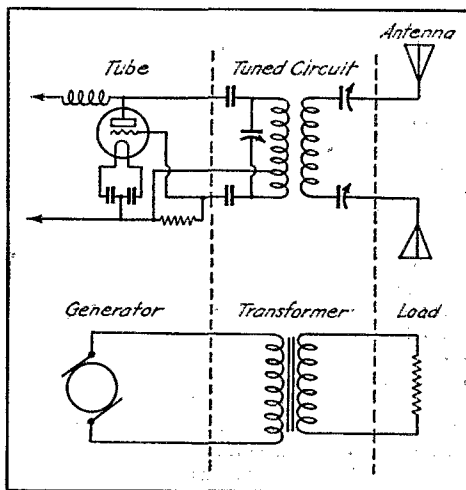


FIG. 4

transatlantic 'phone stations on frequencies above 14,000 kc!

THE CLASS-C AMPLIFIER

So much for the design of the output circuit of an oscillator r.f. power amplifier. These principles should be applied whether the tube is used for straight c.w. or for 'phone work, but in the latter case it is necessary to know what sort of load the r.f. tube offers to the modulator. The tube being modulated should be operated as Class-C amplifier, and when so operated the power input will be directly proportional to the plate voltage over most of the operating range. In other words, the tube circuit acts like a pure resistance of a value equal to the d.c. plate voltage divided by the plate current, and it is this value which is the load impedance for the modulator tube. It is evident that the resistance can be varied within quite wide limits simply by changing the plate current—and that the plate current can be changed by adjusting the coupling to the antenna or a Class-B amplifier following. The value of resistance so obtained—and this is the only one to be considered in modulator computations—bears no relation at all to the "rated" plate impedance of the r.f. tube.

Standard Frequency News and Schedules

A Million-Dollar Service Free—Let's Use It!

THE A.R.R.L. Standard Frequency service is one of those things that is valuable to us if we take advantage of it and a dead loss if we don't. Of course that applies to anything that is "free." It's like air. We don't have to use it but we get along a lot better if we do. And if we had to pay real money for it we would value it a lot more than we do. Thus we got to thinking about the actual cash value that the s.f. service might have for amateurs — evaluation of almost everything in terms of dollars and cents seems to be the thing these days — and we wound up with some rather interesting figures. Perhaps they might serve to sell the idea of using s.f. transmissions to some of the fellows who have been passing them up.

Each calibration that is made from a standard frequency transmission is worth at least \$5.00 to the fellow who uses it. Figure it out. Suppose you wanted to have that new frequency meter calibrated by a commercial laboratory. You would send it in express prepaid, have it calibrated, and get it back express collect. The charge for an accurate calibration would be at least one dollar per point. That would be at least \$4.00 for four points at 100-kc. intervals in the 7000-kc. band, and more for the 3500- and 14,000-kc. bands. Worse yet, the calibration would be doubtful because the conditions under which the meter was calibrated might be considerably different from those under which it must be used in the station, and what bumps and bangs the poor thing got in shipment nobody but the husky expressmen could tell. Besides, the calibration may go haywire at any time — suppose a tube goes south — and back the meter must go for another expensive ride.

The calibration service provided by the A.R.R.L. Standard Frequency System eliminates not only the expense and inconvenience of commercial calibration but also the uncertainty that must accompany calibration anywhere outside the amateur station. The best calibration is the one which is made right where the frequency meter is to be used. Moreover, the accuracy of the calibration signals (within .01%) or better provided by the s.f. stations is practically as good as that of the frequency standards generally used by calibrating laboratories. And the calibration service is on tap almost at the user's convenience, absolutely free of charge.

There are over 19,000 licensed amateur stations in the U. S. A. alone, according to the latest figures issued by the Radio Division of the U. S. Department of Commerce. If each station will take advantage of the s.f. transmissions just once a month, the A.R.R.L. Standard Frequency Sys-

tem can have a real value of *over a million dollars per year* to the amateurs of the United States. Here we have over a million dollars, worth of frequency calibration service brought right into the amateur station on a gold platter. Every amateur has the opportunity of cashing in on his share without paying a cent to anyone. Who can afford to pass it up?

Here are the transmitting schedules for April, and May and June. Let's cash in on them.

DATES OF TRANSMISSION

Apr. 26, Sunday	BB	W9XAN
	C	W6XX
May 1, Friday	C	W6XX
May 3, Sunday	C	W1XP
May 8, Friday	A	W1XP
	B	W9XAN
	B	W6XX
May 15, Friday	BB	W1XP
	B	W9XAN
	A	W6XX
May 16, Saturday	BX	W6XX
May 17, Sunday	C	W9XAN
May 22, Friday	BB	W6XX
	B	W1XP
	A	W9XAN
May 24, Sunday	BB	W9XAN
	C	W6XX
May 29, Friday	C	W6XX
May 31, Sunday	C	W1XP
June 5, Friday	A	W1XP
	B	W9XAN
	B	W6XX
June 12, Friday	BB	W1XP
	B	W9XAN
	A	W6XX
June 13, Saturday	BX	W6XX
June 14, Sunday	C	W9XAN
June 19, Friday	BB	W6XX
	B	W1XP
	A	W9XAN
June 21, Sunday	BB	W9XAN
	C	W6XX
June 26, Friday	C	W6XX
June 28, Sunday	C	W1XP

STANDARD FREQUENCY SCHEDULES

Friday Evenings			Friday and Sunday Afternoons		
Schedule and Frequency			Schedule and Frequency		
Time (p.m.)	A	B	Time (p.m.)	BB	C
	kc.	kc.		kc.	kc.
8:00	3500	7000	4:00	7000	14,000
8:08	3550	7100	4:08	7100	14,100
8:16	3600	7200	4:16	7200	14,200
8:24	3700	7300	4:24	7300	14,300
8:32	3800		4:32		14,400
8:40	3900				
8:48	4000				

Saturday Morning Schedule and Frequency

Time (a.m.)	BX
	kc.
4:00	7000
4:08	7100
4:16	7200
4:24	7300

The time specified in the schedules is *local standard time at the transmitting station*. W1XP uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time. Schedule BB transmitted by W1XP is intended particularly for European amateurs and starts at 2100 G.C.T. Schedule BX is transmitted especially for amateurs in Oceania and the Far East. It is transmitted starting at 1200 G.C.T. by W6XK. Reports on these special schedules are particularly desired, not only from overseas hams but from those in the Americas.

Although the frequencies of the transmitting stations are not guaranteed as to accuracy, every effort is made to keep to within 0.01% of the announced frequencies. The frequency standards are calibrated against the National Frequency Standard. Frequent checks on the transmissions are made by laboratories equipped with accurate frequency standards and the transmissions are also checked by the U. S. Department of Commerce monitoring stations.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes, divided as follows:

2 minutes — QST QST QST de (station call letters).

3 minutes — Characteristic letter of station frequency by call letters and statement of frequency. Characteristic letter of W1XP is "G," of W9XAN is "D," and of W6XK is "F."

1 minute — Statement of frequency in kilocycles and announcement of next frequency.

2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Howard A. Chinn in charge.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

REPORTS

Handy blanks for recording and reporting the transmissions can be had for the asking. Just drop a card or send a message to Hq. asking for s.f. report blanks and they will be sent postpaid. When you receive a transmission be sure to send in a report addressed to the A.R.R.L. Standard Frequency System, QST, West Hartford, Conn. After a record of the report has been made at this office it will be forwarded to the proper transmitting station.

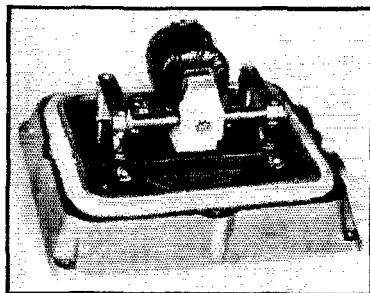
5000-KC. BUREAU OF STANDARDS SIGNALS

Standard frequency signals of 5000-kc. frequency, accurate to a few parts in a million, will be transmitted by the Bureau of Standards Station, WWV, on the following Tuesdays: May 5th, 12th, and 26th; June 2nd, 9th, 16th and 30th. The transmissions will occupy two-hour periods during the afternoon and evening of each of the above dates, the hours being from 1:30 to 3:30 p.m. and from 8:00 to 10:00 p.m., E.S.T. More complete details of this service will be found on page 39 of January QST. These signals are particularly useful for calibrating piezo sub-standards, etc. Reports on WWV transmissions may be forwarded to the Bureau of Standards direct or via A.R.R.L., West Hartford, Conn.

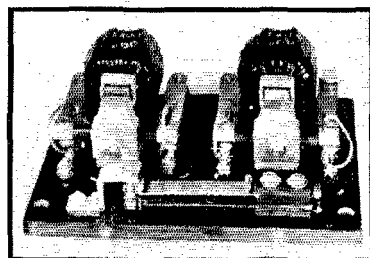
— J. J. L.

New A.C. Relays

TWO new relays have recently come on the market. The first is a relay designed for keying the high-power transmitter. The relay coil works directly from the 110-volt a.c. line, taking one ampere. There are two sets of contacts on the relay, one of which is adjusted to close slightly before and open slightly after the other set, so



that grid and plate circuits may both be keyed. Large silver contacts handle heavy currents without burning. Pigtail connections to the mov-



ing contact members insure low-resistance connections. Two types of covers (not shown in the photos) are available, one of glass and the other

(Continued on page 44)

W9EGU, Henning, Minnesota

ALONG about the time that sparks were rapidly being replaced by tube sets W9EGU (without the W, of course) started to make holes in the ether with four UV-202's. One by one they went the way of all tubes, however, and after the demise of the last survivor a 203 made its appearance, to be followed later by a 203-A. By the time the latter had decided to quit, much water had run under the dam, so that crystal control was given a try, and eventually the present transmitter was evolved. W9EGU is owned by Cy. L. Barker, Dakota Division Director, A.R.R.L.

Since the station is located along two sides of a room, it was impossible to get one good photograph of the whole layout; therefore the transmitter and receiver are shown separately.

As the photograph of the transmitter shows, there are several separate panel-mounted units. The crystal oscillator, using a Type '10 tube, is entirely enclosed in a copper box mounted on a shelf on the wall. Two crystals are available, one having a frequency of 3547 kc., used for 3500-kc. phone, 7000-kc. c.w. and 14,000-kc. c.w. and phone, and the other in the 3500-kc. c.w. band. An RCA Model AP935 power amplifier delivers 350 volts at 50 ma. for the crystal tube. Directly beneath the oscillator box is another Type '10 tube used as a doubler, which obtains its plate supply from a Silver-Marshall power transformer, a pair of Type '81 rectifiers, and a brute force filter consisting of 6 μ fd. and a 32-henry choke. This tube is replaced by a Type '65 when the transmitter is used for 3500-kc. work.

The third tube in the transmitter is a Type '03-A. This tube is used as a neutralized amplifier for 3500-kc. work, as a doubler for 7000 kc. (the Type '10 stage omitted in this case) or as a second doubler, following the '10, for 14,000 kc. This tube is the modulated amplifier when 3500-kc. phone is used.

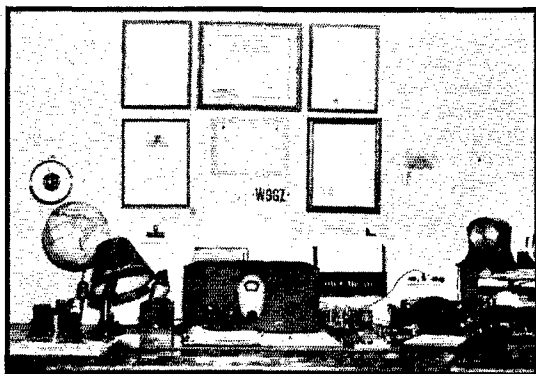
The final tube in the transmitter is a Type '60. The plate supply for this tube is obtained from a Thordarson 1-kw. 2000-volt transformer, the output of which is rectified by a pair of Type '66 tubes. A 1- μ fd. condenser is next to the rectifier, followed by a 36-henry choke and a 3- μ fd. con-

denser. In addition to handling the '60, this plate supply furnishes power for the '03-A through a 100,000-ohm voltage divider. The voltage divider is also utilized for the blocked-grid keying system. The screen voltage for the '60 is obtained from the main plate supply through a 100,000-ohm resistor.

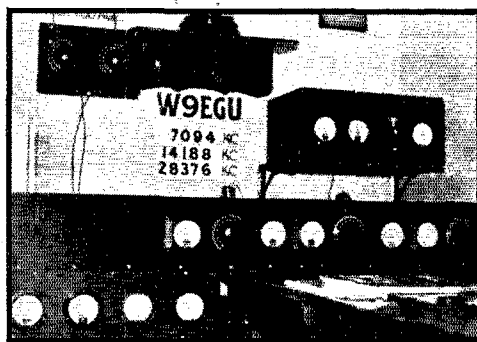
The modulating system consists of a pair of Type '45 modulator tubes in parallel, fed by a single stage of speech amplification and a single-button microphone. This unit is not visible in the photographs.

The large number of measuring instruments in the transmitter makes it easy to tell what is happening in each stage and thus simplifies the tuning. Each of the stages has its own plate milliammeter and tank r.f. ammeter, and in addition

there is a thermo-milliammeter in series with the crystal. A 3000-volt d.c. voltmeter measures the plate voltage and serves as a bleeder for the



PLENTY OF ELBOW ROOM FEATURES THE OPERATING TABLE AT W9EGU



THE CRYSTAL-CONTROLLED TRANSMITTER AT W9EGU

The cabinet mounted on the shelf on the wall at the right contains the crystal oscillator. Just below is the long panel behind which are the other three stages of the transmitter, utilizing a Type '10 or '65, a Type '03-A and a Type '60. The antenna tuning condensers are mounted on the small panel on the wall at the upper left. The power equipment is below the transmitter on the floor.

filter condensers. There are also the usual filament voltmeter and antenna ammeters.

The antenna is a Zepp built to have a fundamental of 7094 kc. It is 50 feet high.

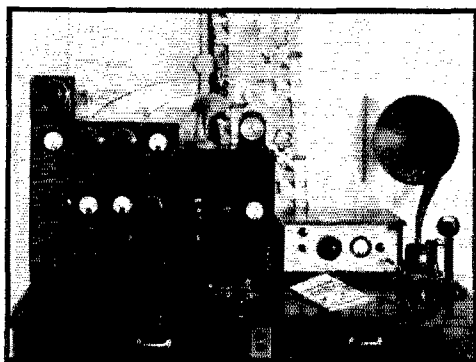
The receiver is a National SW5 d.c.-operated outfit, with the push-pull second audio stage removed to make room for peaked audio. Ordinarily only the first audio stage is used, however, and a very short receiving antenna is sufficient for most work.

Most of the DX at W9EGU has been done on

7000 kc. Every continent except Africa has been worked, including contacts with some 44 different countries. The station was the first in the ninth district to work Japan. During the winter of 1928-29 a regular schedule was kept with WFBT of the Byrd Antarctic Expedition, with consistent R6 and R7 reports from the South Pole.

W5AIE, Albuquerque, New Mexico

BACK in 1909 Warren M. Andrew, owner of W5AIE, started out in "wireless" with a modern set (for those days) consisting mainly of a spark coil and coherer. The bug firmly entrenched itself and has been active ever since. A succession of spark and c.w. transmitters followed, ranging from low to high power, until the present equipment has been decided upon as representing the most satisfactory from all points of view. W5AIE believes that a properly designed low-power set can just about fulfill all the wants of the average amateur and do it



W5AIE — A BUSINESS-LIKE STATION

At the left of the operating table is the oscillator-amplifier transmitter used for 7000-kc. work. The calibrated monitor is sitting on top of the transmitter cabinet. The set in the center is a self-excited Type '10 outfit operating on 3500 and 14,000 kc. The a.c. receiver and loud-speaker are at the right.

more cheaply and with less danger to the people who have to live with it than high power.

As is often the case, the feminine member of the household had something to say about the appearance of the outfit; the result is that all units are enclosed in cabinets. The cabinets for the transmitters, of which there are two, are built of veneer with quarter-round stock bracing each of the joints. The sides and front are screwed to the quarter-round, making a substantial box which can easily be dismantled in case repairs to the equipment become necessary.

The main transmitter, that on the left-hand side of the operating table, is an oscillator-

amplifier set using a pair of '45's in push-pull to excite a pair of push-pull Type '10 amplifiers. The self-controlled m.o.p.a. rig was decided upon in preference to crystal control because of its greater flexibility, and because when properly constructed and adjusted the stability is very nearly equal to that of a crystal set.

The oscillator, which employs the t.p.t.g. circuit with a resonant grid coil — essentially the same as the low-power set described in November *QST* — is mounted in a copper can which completely shields it from the other parts of the transmitter. The plate tank circuit is capacity coupled to the grids of the Type '10 amplifiers. Different tank coils may be plugged in to change bands, but this transmitter is used almost exclusively on the 7000-kc. band, the secondary transmitter being used for the others. The oscillator and amplifier occupy the top portion of the cabinet, while the power supply equipment is mounted in the bottom.

A 250-watt Acme transformer furnishes the plate power taken by the transmitter. Another transformer supplies filament power for the '10's and the rectifiers. A separate 2.5-volt transformer lights the filaments of the '45's. The high-voltage winding on the Acme gives 550 volts each side of the center-tap, which is rectified by a pair of Kenotron tubes (the tubes are 14 years old, by the way) and then filtered. The filter consists of 6 μ fd. next to the rectifiers, a 30-henry choke, and another 6- μ fd. bank of condensers. Needless to say the reports are always "pure d.c." with this filter. A 30,000-ohm bleeder resistor is used across the output of the rectifier-filter.

When the set is in operation the oscillator is allowed to run continuously, and keying is accomplished in the filament center-tap of the amplifier. To eliminate B.C.L. QRM a key-thump filter is incorporated in the transmitter, made up of a homemade choke shunted by a Clarostat in the negative high-voltage lead, and a 2- μ fd. condenser in series with a 600-ohm resistor across the key. This filter eliminates clicks and thumps so effectively that no interference is caused to a sensitive broadcast receiver located in the next room, the antenna for which is parallel to the transmitting feeders.

The second transmitter, to the right of the

EXPERIMENTERS' SECTION

HEAT CONTROL

THE circuit shown in Fig. 1 is used by a California experimenter for controlling the temperature of a crystal oven, and possesses some advantages over the usual type of temperature control circuits. These are explained in the following letter:

"The resistance R_1 consists of No. 36 silk-covered Advance wire strung zig-zag between very small tacks about $\frac{1}{4}$ " apart so as to cover the four vertical sides of the crystal compartment. The relay is a Western Electric G-11, but a telegraph relay works just as well. In either case

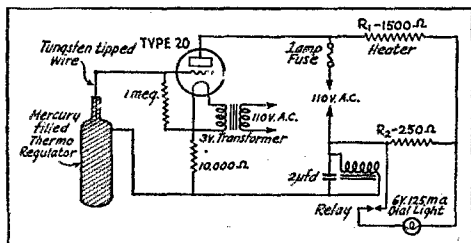


FIG. 1

it is a good plan to replace the original contact points with tungsten points from Ford coils. The resistance R_2 is of Advance wire wound on a micarta strip.

"The advantages of this system are that the whole thing runs directly from the 110-volt a.c. line, requiring no extra-battery; that the contact in the thermo-regulator between the tungsten wire and the mercury is called upon to carry only about 2 microamperes, so that sparking is avoided and the mercury surface remains clean; and that even a poor contact between wire and mercury is quite sufficient to cause the relay to operate. The system also avoids the necessity for a relay making contact in the open position; and the temperature control is somewhat improved by the device of having the relay short the extra resistance R_2 instead of closing the gap of infinite resistance ordinarily used. This spares the relay contacts a great deal, and allows sufficient current to flow while the relay is open to almost supply the heat losses of the box. Of course, the values of the resistances R_1 and R_2 will vary with the goodness of the box and the temperature chosen; my box, which has relatively poor heat insulation, consumes less than 10 watts for temperatures around 40 degrees C.

"In this system the relay operates about once

in fifteen seconds, remaining closed about half the time. The temperature of the crystal varies from the mean value by ± 0.03 degrees C., but is usually within 0.01 degrees of the right value. The plate current of the Type '20 tube is about 1 ma. in the open position of the relay, and 3 ma. when the relay closes."

A COMBINED A. F. AMPLIFIER AND OSCILLATOR

The combination amplifier and audio-frequency oscillator shown in Fig. 2 will be found useful by many amateurs, especially beginners.

Three single circuit jacks are used to provide a quick and easy change from amplifier to oscillator.

The lead from the primary of the a.f. transformer is a flexible two-way cord with a phone plug. This plug is used either in the receiver output or in jack No. 1. When plugged into the receiver output, with the phones in jack No. 3 and the key open, we have a one-tube audio amplifier. Place the plug in jack No. 1, the phones in jack No. 2, and the oscillator is ready for use.

Care must be taken, when inserting the leads from B+ and P into the plug, that the B+ lead, when the plug is in jack No. 1, will make contact with the lead going to the plate of the tube.

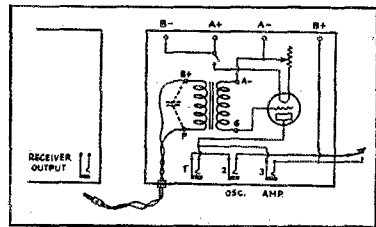


FIG. 2

With a Type '99 tube and 45 volts of "B" battery there will be plenty of power when the device is used as an audio oscillator, although a higher voltage will be better when it is used as an a.f. amplifier.

— L. A. D. Oakley, Toronto, Canada.

USING THE PLATE MILLIAMMETER AS A VOLTMETER

It is often desirable to measure various voltages in a transmitter, but the necessity for such measurements may not arise often enough to justify the purchase of a high-voltage voltmeter. In

such cases the plate milliammeter can be pressed into service, and the circuit arrangement shown in Fig. 3, suggested by W. Walter Filson, W3BEI, is convenient.

The two double-pole single-throw switches shown in Fig. 3 are both in one Federal anti-capacity switch, so that a single throw of the switch toggle closes one and opens the other. To

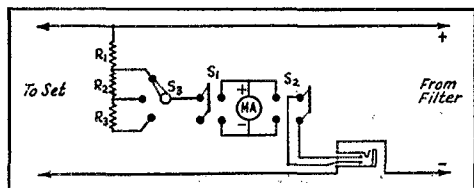


FIG. 3

read voltage, \$S_1\$ is closed and \$S_2\$ open, and a short-circuited plug is inserted in the jack to close the negative line. With the plug removed from the jack, \$S_1\$ open and \$S_2\$ closed, the meter reads the current in the circuit. As this particular switch also has an "off" position, in which both \$S_1\$ and \$S_2\$ are open, it is possible to take the meter entirely out of the circuit. The plug must be in the jack in that case, of course.

The switch \$S_2\$ is a convenience in case the meter is to be used for more than one voltage range. In W3BEI's case the meter has a range of 0-150 ma., and the resistors \$R_1\$, \$R_2\$ and \$R_3\$ are 50, 950, and 4000 ohms, respectively, giving ranges of 0-7.5, 0-150, and 0-750 volts.

When using a milliammeter in this fashion it must be remembered that the current is higher than that taken by a high-resistance voltmeter and the regulation of the power supply must be taken into account when the voltmeter is removed. The series resistors must likewise have sufficient current carrying capacity.

Indoor Transmitting Antennas

By Kelsey Ladue, W8PQ*

At some time or other in our lives have we not all had that dream: the "perfect antenna." To the average amateur, the perfect antenna is one of those beautiful 80-foot latticed masts in the backyard, the guy wires liberally broken up with strain insulators, and the antenna gracefully sloping down to the shack window and entering through a large pyrex bowl.

While some of us may be fortunate enough to have structures like this, to the majority it remains but a dream. Some of us may have 30-foot poles on the garage. Very good. But what about the rest of us, whose backyards, if any, are unsuited to antennas of any type? To these unfortunates, this article is dedicated.

What about the indoor antenna? Oh yes, I

* 15731 Wisconsin Ave., Detroit, Mich.

know at that word "indoor" you will throw up your hands and shake your heads skeptically. But why let that little word scare you? We use indoor receiving antennas, don't we? They work. Then, why not an indoor transmitting antenna? If we can hear high-frequency signals on an indoor antenna, why, in the name of good common sense, can't we transmit them? It sounds perfectly logical, doesn't it, when we look at it from this angle?

Acting on this theory, the writer constructed one in the attic. It is the conventional Hertz, with the exception that it is "bent" — bent meaning that it is in the shape of a square and extends almost completely around the attic, there being only about three feet separating the two ends. The single wire feeder, about ten feet long, descends directly to the transmitter through the medium of a trap door, which luckily happened to be in exactly the right place. At no point is this antenna higher than 25 feet above the ground. So much for the construction.

Now the next thing, operation. And here is the surprise; it works, and it works equally as well

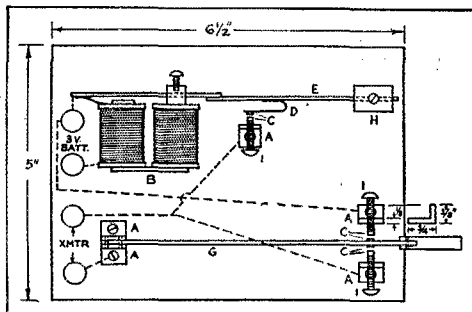


FIG. 4

- A — Angles bent from strips of $\frac{1}{8} \times \frac{3}{8} \times 1\frac{1}{2}$ flat brass.
- B — Low-frequency buzzer.
- C — Contacts from old spark coil.
- D — Spring brass, $0.01 \times \frac{1}{4} \times 1\frac{1}{2}$ bent in the shape of a "U" and soldered to E.
- E — Brass rod $\frac{1}{8} \times 3\frac{1}{2}$ round, soldered to buzzer vibrator.
- F — Hard rubber, $1\frac{1}{2} \times 1\frac{1}{4}$.
- G — Flat brass, $5\frac{1}{2} \times \frac{1}{2} \times 1/16$.
- H — Lead weight, 2 oz., with set-screw.
- I — 8-32 brass machine screws.

(and I am inclined to think a little better) than the regular antenna that was being used at the time, which was hung on a 30-foot pole on the top of the house. To you who are blessed with great technical knowledge, this may seem like a mighty broad statement, as it violates many of the hard and fast rules that we have learned about keeping antennas high and as free from all things as possible. Nevertheless, many tests were made with both, and without a single exception the QRK's reported were identically the same. The reports of QRI, however, changed from "near d.c." to "pure d.c. crystal"! The increased stability was due, no doubt, to the fact that, being

inside, the antenna is absolutely free from any disturbances.

As to DX, at W8PQ using two Type '10's in parallel and with an input that has never exceeded 100 watts, all continents with the exception of Asia have been worked while using this antenna. Reports of R8 have been received from Europe. Incidentally Detroit has the name of being one of the hardest towns in the country to "get out" of.

The indoor antenna has several advantages over the outdoor type. Mainly, ease of construction; signals steadier with swinging at a minimum; and last but not least, accessibility. This alone means quite a lot when one has to climb up on a slippery roof in the dead of winter to

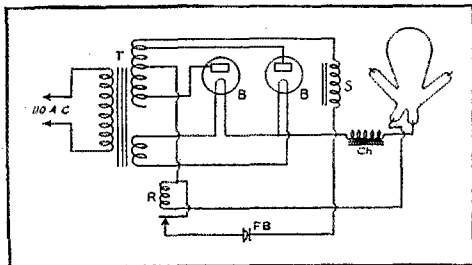


FIG. 5. — FLASHER-BUTTON TIPPING CIRCUIT
 T — Keep-alive transformer, 55 and 85 volts each side of center tap.
 B — Tungar bulbs.
 R — Reversed relay.
 FB — Flasher button. The slow variety is better than the fast.
 S — Tipping solenoid.
 Ch — Keep-alive choke.

make repairs or adjustments. As to the disadvantages, I have found none. This antenna has been in use at W8PQ exclusively for the last three years.

So, why let that little word "indoor" scare you? If you have not the facilities for the erection of an outside antenna, put up an inside one and I feel that you will have no regrets for having done so.

I would be very pleased to hear from any one who has tried anything along this line and to give a further description if any one should be so interested.

AN AUTOMATIC KEY

Fig. 4 is a diagram of an automatic key which can be constructed without any particular difficulty from parts which almost any ham has on hand or can procure at the corner hardware store. The idea was contributed by W. E. Lloyd, W8TR-W8CAN, who has been using one for several months on Naval Reserve work.

The buzzer is the ordinary annunciator type which can be purchased for a half dollar or less, almost anywhere. A brass rod, E in the diagram, is soldered to the vibrator arm of the buzzer and

an adjustable weight placed on it to regulate the speed of the dots. The key will make dots at a rate of speed determined by the position of the weight as long as the key lever is held against the dot contact. The construction of the key is made quite clear in the diagram.

By proper proportioning of the length of the arm E and the size of the weight, the speed can be adjusted over quite a range.

Tipping the Arc

By Eugene A. Hubbell, W9ERU-CDC*

A little over two years ago I purchased a mercury arc rectifier; at least, the keep-alive transformer, sustaining choke, tube, cradle and can. I did not buy the tipping arrangement, believing I could easily build that myself. It didn't take me long to find out that this wasn't so easily done. I struggled along with the thing until a year ago, or so, when I bought a pair of Rectobulbs for my 210's and operated with those.

However, this fall I put in first one fifty-watt and then two, and to supply the heavy current tubes I reconnected the mercury arc, and have had a deuce of a time getting it to tip. The trouble was this. The filaments of the Tungar bulbs hit so slowly that when using the keep-alive d.c. for tipping the arc, the load was on the tubes before they lit and just wore them out in short order. When using a.c. the arc would tip before the tubes lit, and the mercury pools would run apart before there was enough voltage from the Tungars to bridge the gap and cause an arc.

So I decided that a delayed time relay in the K.A. circuit to throw the juice into the tipping solenoid after the Tungars were lit was the thing needed. I spent most of a day, with a finely machined brass cylinder and a ground steel plug, trying to build a delayed time relay until I

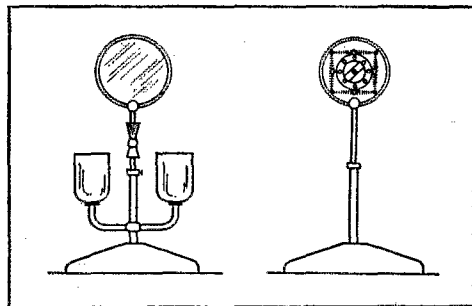


FIG. 6

finally woke up. Now my arc delays ten seconds, tips easily and rocks continually until it catches. All I'm using as a delayed time relay is a 25-cent flasher button from the variety store. This is put in the tipping circuit and automatically starts

* 227 N. 4th St., Rockford, Ill.

functioning a few seconds after current is applied, and, since it is a flasher button, it rocks the arc continually. Fig. 5 shows the method of hooking it up.

With further regard to tipping the arc, if 110 volts a.c. is used from the primary of the arc transformer, that is, the 110-volt input, there is a possibility of the high voltage traveling back into the line via the reversed relay in the keep-alive circuit. Consequently, I am using a.c. from the secondary of the transformer, instead of the primary, and as a result the insulation is ample to stand any voltage that the arc will rectify.

The tipping solenoid is wound of No. 20 d.c.c., 500 feet on a $\frac{3}{8}$ " brass tube about four inches long. A $\frac{1}{2}$ " steel plunger works inside of the tube and, as the pull was not enough with this arrangement, a soft iron $\frac{1}{2}$ " rivet was put at the lower end of the tubing, extending about $\frac{1}{2}$ " up in the solenoid. This greatly increased the pull.

There is very little chattering, and the a.c. voltage applied is approximately 85 volts. The secondary of the transformer I have is wound for 55 and 85 each side of center, and I am using one-half of the secondary. Since this is merely used for a momentary pull, it does not seem to affect the voltage on the Tungar bulbs appreciably.

Home-Made Microphone Stand

Harold O. Bishop, W300, sends us a suggestion for constructing a microphone stand which seems

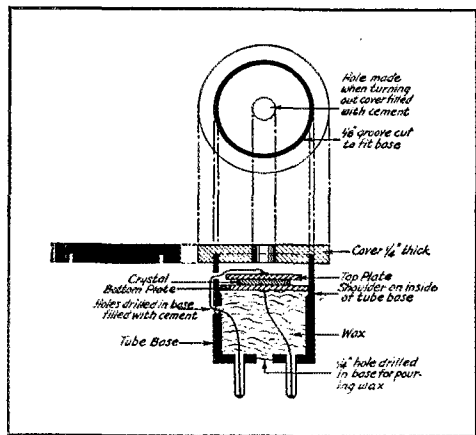


FIG. 7

to be FB. A shaving stand, purchased at small cost from one of the so-called 5 and 10 stores, is the basis of the gadget. Fig. 6 shows "before and after" views.

To convert the shaving stand into a microphone stand first remove the glass in the frame by cutting the wood back. A little pressure on the glass will make it fall out. Then remove the metal cups by bending back and forth until they break off.

The next step is to drill holes in the metal ring at the points where the suspension hooks are to be mounted. The holes should be a little smaller in diameter than the hooks so they can be threaded and the hooks turned in. The brush holder may be used to hold the microphone cord in place.

The set-screw on the side allows some adjustment of the height of the stand.

More Tube-Base Crystal Holders

Since the appearance of the drawing of the tube-base crystal holder in the February Experimenters' Section, two similar ideas have been received. They offer some further refinements, and are shown herewith in Figs. 7 and 8.

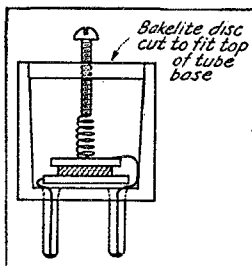


FIG. 8

Fig. 7 is a holder used by David F. Mackenzie, W8BPW. Upon cleaning out the base it will be noticed that there is a flange about a quarter inch from the top, and the bottom plate is made to just fit the top portion. The arrangement of the top plate and the connections to the pins are clearly indicated in the drawing. A hole is drilled in the bottom of the tube base and, after the plates are mounted and the connections made, the tube base is turned upside down and hot sealing wax poured in to fill the space. A $\frac{1}{4}$ -inch bakelite disc with a $\frac{1}{8}$ -inch circular groove the same diameter as the tube base forms the cover.

Howard A. Fast, W6BUZ, suggests the holder shown in Fig. 8. A bakelite disc is cut to fit snugly in the top of the tube base, and in the center of the disc a hole is drilled and threaded to take a machine screw. A fine spring soldered on the end of the screw rests on the top plate and allows adjustment of the pressure.

When the Rope Breaks

Did you ever stand woefully at the foot of your mast with the wreckage of a once-beautiful sky wire around you and wonder how in creation you were ever going to get a rope through the pulley again without taking down the whole works? If you haven't, one of the exquisite sensations in ham radio is still before you. The problem isn't hopeless; read this letter from Fred B. Daniels, W9EBN:

"Here's a stunt for putting up a new rope and pulley on the antenna pole when the old rope breaks and pulls through the pulley. My stick is a 20 foot "2 x 4" on top of a 30 or 35 foot tower, and I didn't want to take the whole thing down to

(Continued on page 44)

• I. A. R. U. NEWS •

Devoted to the interests and activities of the
INTERNATIONAL AMATEUR RADIO UNION

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Headquarters Society:

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Norwegian Radio Relay League
Radio Society of Great Britain
Rede dos Emissores Portugueses

Reseau Belge
Reseau Emetteurs Français
South African Radio Relay League
Sveriges Sändareamatörer
Union Schweiz Kurzwellen Amateure
Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

WELL, we're back at it again, discussing 3.5-mc. DX and communication. First of all, one of several similar examples of what is being done on this band: J. G. Hogan, ZL2FM, at Wellington, N. Z., reports hearing W6COE's phone QSA4 R6 consistently over a long period of time. What do you think of that? Several west coast phones — as well as the c.w. gang — are pouring signals into the Antipodes at intervals from their 3.5-mc. outfits. The present informal tests designed to bring out further tendencies in that direction should prove of much interest.

At the time of writing, the International Contest is roaring along in full force, so that the DX stations are populating the high-frequency bands to the present detriment of 3500, but in a few weeks this will all be changed, we hope, and a lot of low-frequency DX will be had before the onslaught of summer conditions — or will the descending solar effect curve be steep enough to overbalance the customary summer decline? That's possible, too.

In line with that latter thought, we've cogitated over the idea of proposing some 3.5-mc. Equinox tests to be held through the week of May 17th-23rd, centering around the date May 21st, from 0000 to 0000 G.C.T. when summer crosses the line in its lap of the relay race of the seasons. The formal promulgation of such tests has been rejected as impractical for several reasons, but we wish, nevertheless, to suggest to all I. A. R. U. members and stations everywhere using this frequency band that they make a special point to accomplish international working during that week and especially during May 21st. Come on in, low-frequency men!

And above all, don't forget to report all work done, please.

While not directly concerned with amateur radio, the recent international work of the technical staff of *QST* in receiving the February 12th transmissions from HVJ bearing the world message of Pope Pius XI, for rebroadcasting through the Columbia Broadcasting System of 76 United States and Canadian broadcasting stations, is of particular interest in that it demonstrates the utility of amateur receiving equipment even when compared with the far more elaborate systems of commercial companies.

During the initial testing of HVJ, the Marconi-built Vatican City station rated at 10-kw. antenna power, the technical director of the Columbia System, Mr. E. K. Cohan, came up to Hartford with a request for cooperation in making this broadcast the most successful ever accomplished. As a result, a receiving station was set up by Jim Lamb and George Grammer, and for a week before the event the Vatican City station as well as dozens of other international high-frequency BC stations were heard through the corridors of the new HQ building.

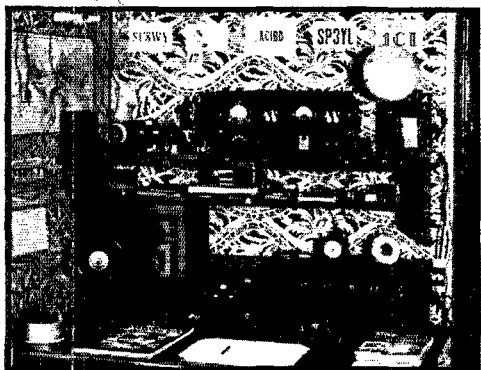
The rebroadcast was highly successful from both a technical and an entertainment standpoint. Fading was almost totally eliminated by the use of automatic volume control assisted by a directive receiving antenna system. The background level was not greatly higher than with studio programs, due to careful audio filtering of the higher sibilant and noise frequencies, and the extreme sensitivity of the equipment used.

The receiving apparatus consisted of a duplicate of the high-frequency superheterodyne converter described in the July, 1930, issue of *QST*, and an 11-tube superheterodyne broadcast receiver of standard American make. The frequency resulting from the beat between oscillator and

first detector working on 15,120 kc. was about 560 kc. This signal was taken through a band-pass filter of excellent characteristics and amplified by two screen-grid stages before it reached another oscillator and detector, whose beat produced an intermediate frequency of 175 kc., followed by two more r.f. s.-g. stages. When rectified by a third detector, the resultant audio frequencies were amplified in an audio system with an almost flat characteristic. The final stage consisted of two Type '45 tubes in push-pull.

At this junction a tube-to-line transformer and an attenuation pad were used to match the impedance of the output tubes to the 500-ohm telephone line which carried the program to New York City, a line distance of more than 100 miles. A large cabinet model dynamic loudspeaker was connected to a supplementary 15-ohm winding on the transformer, and was used as a monitoring speaker. A volume level indicator indicated the output in decibels at all times, and showed that about 5 watts was present at the output terminals.

Morse and telephone lines connected with the master control studio in New York, so that contact was maintained at all times between the monitoring point from which the program was



OK1AH, ALOIS WEIRAUCH, MASTEC KRALOVE NO. 9, CZECHOSLOVAKIA

A member of the WAC Club, this station works on all bands with 25 watts input to a Phillips TCO4/10. A Zeppelin antenna is used for the lower frequency bands, while a voltage-fed Hertzian arrangement operates on 14 and 28 mc. OK1AH is one of the seventeen Czechoslovakian stations licensed at the present time.

fed to the broadcasting stations, and the receiving point. In addition, a receiver was kept tuned to a broadcasting station carrying the rebroadcast program, so that an accurate check was had of exactly what went out over the air.

The first WAC in 1931? Well, the first one issued went to George David White, ZL1FU. Oh, you mean the first *made* in 1931? Well, that, so far as we know at present, goes to a man already a member of the WAC Club, and another ZL — O. W. Gillion, ZL2BZ. On January 1, 1931, he

had worked all continents by 3:45 p.m., N.Z.T., corresponding to 0415 G.C.T. Here are the stations worked: HB9Q, VU2AH, ST2C, W8CRA, VK6FT, and LU4DQ. The first five were worked between 1240 and 1515 G.C.T. Then came a "full stop." South America proved impossible to raise, conditions for this continent being impossible until afternoon, when LU4DQ came back to a call.

All these contacts were on 14 mc. with an input of 40 watts and the familiar T.P.T.G. circuit. Mr. Gillion's WAC Club membership was initially achieved entirely on 7 mc. Mighty FB two-band international working, say we.

While there is only one grade of WAC Club certificate issued (and one special endorsement for phone work), no consideration being taken so far as club membership is concerned of power or frequencies used, some highly interesting applications are received bearing notations of the very, very low power used in securing the right of the applicant to this coveted award. We have previously noted Jos. W. Jennison, VK2JJ, and Hans K. Plisch, OK3SK, who worked all continents with inputs of less than three watts each.

Now comes A. S. Andrews, VQ2BA, who has worked the six continents with no greater input at any time than two watts. An LS5 power valve, with up to 200 volts drawing less than 10 milliamperes, did all the good work. This is the second WAC certificate going to OM Andrews, he first having worked them all some time back with a fifty-watter from VQ2BH. Returning now to Durban, South Africa, and his own call ZS5F, he has rather rashly expressed his determination to apply for that WAC for 28 mc. which we offered, quite vainly it seems, some time ago. We're afraid he won't do that very easily before about 1940!

Here's the first response to our request for further DX Time Tables made some time ago. It is most interesting to note, in connection with the expected shifting of radio conditions, a variation of several hours in this table, in some cases from similar lists prepared a year or more ago. As the compiler, George W. Morrow of W8BKP, says: "These times are much different from last year's, but I have found I cannot even hear DX at the times I did during 1928 and 1929." The location of W8BKP is in a strategic position for a list of this kind, the QRA being Washingtonville, Ohio. Conditions at this point should closely resemble those existing throughout most of the eastern half of the United States and the utility of the table should cover a wide area because of this. The times, as usual, are G.C.T., with 0000 representing midnight. For E.S.T. subtract five hours, for C.S.T. subtract six hours, subtract seven for M.S.T., and eight for P.S.T. Seasonal deviation must also be taken into account with

increasing or decreasing latitudes. With these preliminaries, then, here goes:

14-MEGACYCLE BAND

<i>North America</i>			
Cuba, Labrador, Mexico, Porto Rico, etc.		1200-2300	
Northwest Canada, Alaska (scarce)		2300-0200	
<i>South America</i>			
Argentine, Brazil, Chile, Uruguay, Peru, Ecuador		1300-0200	
<i>Europe</i>			
England, France, Portugal, Denmark		1200-2100	
Sweden, Norway, Finland, Poland		1200-1800	
Germany, Spain, Hungary		1500-2100	
Others heard but rarely		1700-2100	
<i>Africa</i>			
Union of South Africa		1900-2200	
Egypt, Morocco, Algiers		1700-2200	
<i>Asia</i>			
Iraq, Hedjaz	1200-1500	2100-2300	
Java, India		1200-1400	
Hongkong, Japan (very rare)		0500-0700	
<i>Oceania</i>			
Australia, New Zealand, Hawaii (very rare)		0600-0800	

Now for some more from other sections to fill out the picture. How about it, you fellows who contributed last year? Do you check with the above — or your previous findings?

 Robert Larcher of France, long familiar to amateurs everywhere as a secretary of the R.E.F. and conductor of the French QSL Bureau, has discontinued the latter enterprise. Cards for French stations no longer go to his address as listed in these pages and in the call books for years, but should now be directed to: R.E.F., 19, Rue Claude Vellefaux, Paris 10ème, France.

 By radio through W8BAZ comes the Australian traffic report for February. Here 'tis:

<i>Division</i>	<i>Outward</i>	<i>Inward</i>	<i>Relayed</i>	<i>Total</i>
Victoria				
VK3ML	49	20	3	72
VK3DC	29	17	10	56
N. S. Wales				
VK2RC	12	19	52	83
Queensland				
VK4MI	8	4	0	12
VK4LJ	22	20	0	42
South Australia				
VK5IT	16	51	37	104
West Australia				
VK6WI	24	29	0	53
Tasmania				
No report				

British Notes

By J. Clarricoats, Hon. Sec. R.S.G.B.

The 28-mc. tests held during the month of January were a complete failure, due to poor conditions on that frequency. A copy of the T & R Bulletin containing a report on the test results will be forwarded to all non-members who forwarded information.

British Empire Radio Week proved an unqualified success. Conditions improved on all bands during the latter part of February, with

the result that a large number of Empire contacts were established.

The outstanding individual performance stands to the credit of G6RB and ZL2BE, who made the first G-ZL contact on the 3.5-mc. band. The former station was using 22 watts and was reported R4. Many G stations have returned high scores, but until full logs are received in London the Trophy Winner will not be known.

During February many excellent transoceanic contacts were made with North America on 3.5 mc. G6RB, G6FO, G6WY, G6QB and G2IP are some of the successful English stations.

London amateurs during the month welcomed home Mr. Cecil Rimeckles, late operator of SU-8RS and winner of the Wortley-Talbot Trophy. The award was made at the London Area Dinner on March 17, 1931.

Dr. Curt Lamin, D4AFA, was also in London during February and was a welcomed visitor at the meeting held on February 27th, when the Gramophone Company lectured on "Sound Reproduction."

Two outstanding performances in connection with DX working deserve recording. In both cases Mr. Old, G2VQ, one of our foremost Empire Link Stations, is concerned. Firstly, G2VQ and ZL3AR have contacted on schedule nearly 100 times, while G2VQV, ZS4M and W8ADM have carried out more than 25 three-way contacts. These stations are to be congratulated on their efficiency and consistency of operation

Norwegian Notes

By G. H. Peterson, Pres. N.R.R.L.

Interest in Norway is centering around the forthcoming Norwegian Message Relay Contests, which are going to take place regularly, beginning with the week of March 15th. These tests have been arranged to prove the possibility of message handling via amateur radio, and are a further development of the results obtained during the November 3.5-mc. tests. They are being met with intense interest all over the country.

Conditions on the general bands have been fine, and the 3.5-mc. band is coming into general use for European communication.

Swiss Report

By Th. Schinzel, HB9Q, U.S.K.A.

Activity of Swiss amateurs is greatly increasing, and since our last report the number of licensed stations has nearly doubled. As has already been reported in the January issue of QST, the yearly fee for amateur transmitting stations has been reduced to 40 francs including the receiving license. The examination we must pass is now much simplified, and is handled individually according to the candidate's schooling and profession, so that anyone having a serious interest

in high-frequency work can accomplish it. It would, however, be wrong to believe that conditions for amateur radio in Switzerland had ever been intolerable; our magistracy has always shown a pleasing interest in our activities.

Our President, Mr. Degler, is now on the air again under the call HB9A. His transmitter, an FB portable affair, has been inaugurated on the occasion of an interesting test in the mountains, which was held under the auspices of the Swiss



HERE IS THE PORTABLE TRANSMITTER OF HB9A, INSTALLED FOR THE TESTS AT PIZ SOL COTTAGE, DESCRIBED IN THE SWISS REPORT IN THIS ISSUE

In the background is H. Degler, President of the U.S. K.A. and owner of the station. He is assisted by Th. Schinzel, HB9Q, writer of the Swiss Report.

Alpine Club, and took place on October 13th and 14th. The intention was to prove the usefulness of high-frequency transmitters in case of Alpine accidents. HB9A set up his station with the assistance of HB9Q in Piz Sol cottage at a height of 2230 meters; the second station was that of HB9O (Dr. Schoenlank, our Secretary) which was built up at Razar (height 520 meters). HB9R was second operator there. On 7 mc. no contact could be established, but matters were all the better on 3.5 mc. where constant communication was possible.

Due to the lack of time only a few QSO's were made with stations abroad. This test will soon be repeated with more stations at a greater height (3500 meters), and an examination will then be made into DX conditions at this altitude. If this test proves successful it is probable that the Swiss Alpine Club will furnish some of the cottages with short-wave transmitters.

Most of our stations have now extended their wavelength range to include the 3.5-mc. band and on two evenings weekly national contacts only are accomplished on this band. As we expected, 3.5-mc. operation has proved the only means for handling local Swiss traffic. 1.7 mc. has not yet been tried, but we intend to request our magistracy for the cession of this band so that with the increasing overloading of 3.5 mc. we can emigrate to the lowest of our frequency ranges.

To cultivate collaboration, the U.S.K.A. recently arranged two relay contests on 3.5 mc.

The task was to send a message over a series of stations and back again. The message contained the names of six towns, and at every station where the message arrived one of the names was to be changed when it was re-transmitted. The second of these tests took place in connection with a contest for our receiving amateurs. The participants were to note the message with its alterations, requests for fills, repetitions, etc., and prizes were awarded to the HB's delivering the best and most complete reports during the General Assembly in March.

HB9F, the only YL in Switzerland (for her picture see page 53, March, 1930, *QST* — C.B. D.), is on the air again with QRP. HB9G, our Traffic Manager and only Swiss possessor of a WAC certificate, has been working W's on 14 mc. lately, and also got a report from Cuba. HB9H is eagerly looking forward to his first QSO with South America, for then he will have worked all the six continents. He recently worked his first two VK's. HB9K contents himself with working Europe on several bands, and HB9L also becomes acquainted with the old continent. HB9M is a very busy ham. He unfortunately is suffering from heavy QRM, and besides is forced to use an indoor antenna, so that little DX working is possible. HB9N has been abroad for studies for quite some time, but during his holidays he has done a lot of work on 3.5 mc. His hobbies are break-in and endurance QSO's, which he maintains through whole nights in order to study conditions on this band.

HB9P is doing a great deal of experimental work with QRP. HB9Q is a busy DX-hound and rag-chewer. Since November, 1930, he has had more than seventy QSO's with VK and ZL, and is keeping a daily sked with VK3WL on 7 mc. He has also succeeded in establishing several first contacts between HB and foreign countries. He only complains that he can't seem to get out to the West. HB9R rebuilds his station every two days, but nevertheless was successful in working a W.

Different newcomers are constructing their transmitters, so that in a short time there will be about 20 HB's on the air. The Zürich gang is meeting fortnightly, and always spends a pleasant and interesting evening together. We hopefully look forward to a very promising development of our Swiss high-frequency amateur radio.

The WAC certificate is regarded to-day as the highest general honor an amateur can receive, and is eagerly sought after by every station not now a member of that impressive order. The meaning of "WAC" is universally known, and fully as well-known (we hope) is the fact that in order to secure this certificate a card must be submitted for each of the six continents, clearly indicating the fact and circumstances of two-way communication.

Realizing this, it appears to us to be a discourtesy for an amateur to refuse to send a QSL card to another station, when the latter specifically requests it for the purpose of applying for membership in the WAC Club. Several cases where this has happened have come to our attention recently, and we wish to deplore any such inconsiderate practice. There is little excuse for refusing or neglecting to QSL in the face of such a request.

You may need a card yourself some day!

German Notes

By Dr. Curt Lamm, For. Sec'y D.A.S.D.

Program of the Sixth Annual Convention of the D.A.S.D.
Hamburg, May 22-26, 1931

Friday, May 22nd:	Visit to valve factories and laboratories at Hamburg, airport stations, and the aeronautical observatory.
Saturday, May 23rd:	Sightseeing trips in and around Hamburg.
20.00	Official opening. Presidential address.
	Welcome by the Hamburg D.M.'s, etc.
After 23.00	Visual QSO's, rag-chewing <i>ad infinitum</i> .
Sunday, May 24th:	Meeting of the Board and D.M.'s of D.A.S.D.
9.30-14.00	Lunch.
14.00	Business Meeting. (Detailed business agenda to be published shortly before convention.)
15.00-19.00	Informal meeting. Dinner. Movies.
20.00	Lectures and demonstrations on various problems connected with short-wave radio.
Monday, May 25th:	Lunch.
10.30	Discussion on various technical problems, station visits, stroll, etc. Exhibition of strange radio gear.
14.00	Boat Party: visit to Heligoland Island.
15.00	
Tuesday, May 26th:	

Again we cordially invite all foreign friends to take part in the convention, and we hope to see lots of old and new faces among our group at Hamburg. Anyone desiring to attend is requested to communicate with D.A.S.D., headquarters at Blumenthalstrasse 19, Berlin W 57, Germany.

New A. C. Relays

(Continued from page 32)

aluminum, the latter completely shielding the relay, since the base is also aluminum. Provisions are made for pipe connections to the relay so that the leads may be shielded as well. The action is snappy, and the relay follows all hand keying speeds very readily.

The other relay is a time-delay affair designed for controlling the power supply equipment. It is so arranged that the primary circuit of the

plate transformer is not closed until the rectifier and transmitting tube filaments have had time to reach their operating temperatures. A thermal relay is connected to two magnetic relays (the latter of the same type of construction as that used in the keying relay) in such a way that the plate transformer circuit is not closed until the heater element has gone through one complete cycle of heating and cooling, thus making the time delay feature always operative even though the line switch be opened and instantly closed again. The time delay can be adjusted between 15 and 60 seconds. Both of these relays are products of the Ward-Leonard Company, Mount Vernon, N. Y.

A Full-Wave Mercury Vapor Rectifier Tube

(Continued from page 24)

connecting the filaments first in one direction and then in the other. When properly connected a blue haze will be apparent inside both of the plates, instead of one.

The arrangement of two Type '80-M tubes used as a full wave rectifier will give an increased supply of current for any type of setup requiring more current. The schematic circuit of such a rectifier is shown in Fig. 5.

Experimenters' Section

(Continued from page 39)

put on a new pulley, or climb the pole to run the rope back through the old one.

"I made a wire basket shaped like a dog's muzzle, with the wire which forms the rim of the opening arranged like a slip noose, as shown in Fig. 9. I then fixed up a kite about 4½ feet tall, and tied the basket, from which the pulley and rope were suspended, about halfway up the kite string, maneuvered the kite over the pole, pulled the basket down over the top by pulling on the rope which passed through the pulley, jerked the kite loose, and I had a new pulley and rope placed right near the top of the pole. If a plain loop had been used instead of a basket, it might have slid down to the guy wires before tightening.

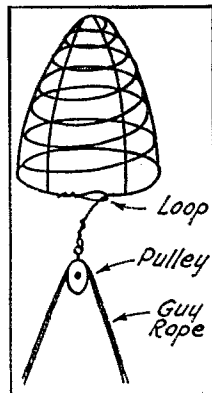


FIG. 9

"If this has never been published before the idea might be useful to some hams. It could also be used to replace broken guy wires."

Oemd 0lf ct1aa 1br 1bx 1cw 2ac 2eas cm8uf cm8mp d4fy 4gk 4nuz 4pww 4qv 4zn ear16 39 97 136 hafic 2d 3cx 3xl 6d 8c 9af ilau 1ww oh2nx 5ng 7nd 7nf oa7vs oklif sm6ua sp3ar 3li 3lm uoej fy py2ab vel1r ldr vo8mc 8z xd4lec

W9CKQ, Frank E. Dailey, Route 1, Box 10, Fort Madison, Iowa

7000-ko. band

cm2jm cm2ra cm8lc en28 holfg hckla kalhr kaljr ear116 nj2pa rx1aa tg2elo ti2rs velce ve2bb ve3fw ve3gf ve3gt ve3ll ve3rf ve4ei ve4fp ve4gd ve4it vk2ek vk2hg vk2hm vk2hw vk2kl vk2lx vk2mh vk2ns vk2ow vk2zk vk3go vk3jk vk3om vk3kr vk3pp vk3rg vk3rs vk3sk vk3tm vk3vp vk3wl vk3xa vk3xi vk3zo vk3zx vk4aw vk4bh vk4cg vk4ju vk4rw vk5am vk5bj vk5gr vk5hg vk5it vk5ix vk5mb vk5mf vk5rx vk5xk vk6bo vk6hk vk6lg vk6mo x1aa x1g x3k x5c x9a x9b xbaa xbad xebq vn2bg z1aa z1bn z1bt z12ac z12aj z12bz z13cm z14av z14bm nudg pdt prb

14,000-ko. band

hc2jm k4alk lu3de lu3wb lu5ac py1aw py2ab x9a

ZL3BB, Wallace T. Smith, 28 Derby St., St. Albans, Christchurch, New Zealand

7000-ko. band

ac2co hc1fg kalfr k6odd k6ocg k6eln k6exp k6evw k7ox pk3bq vp1ax vk2gh vk2gv vk2ho vk2hw vk2jf vk2jh vk2kj vk2oj vk2lx vk2nm vk2oj vk2rg vk2sa vk2sk vk2sx vk2wx vk2xa vk2xi vk2zk vk2zo vk2za vk2fy vk2hb vk3ab vk3bb vk3gj vk3hm vk3jr vk3ju vk3lp vk3li vk3pr vk3rw vk3wl vk3zx vk4ab vk4jw vk5dr vk5hg vk5lo vk5wr vk5xk vk6bo vk6fl vk6mu vk6vi vk7jk wicek w2ama w2avs w3bm w4aa w4ly w5akz w5ava w5axx w5blb w6abb w6abp w6agd w6aic w6ajl w6aov w6amm w6bbx w6bht w6blp w6bui w6bva w6byy w6czk w6dtt w6een w6eep w6eec w6ejh w6eri w6eef w6eex w6eqx w6eyc w6gez w6jm w6mb w6sf w6sp w6ty w6yu w7adm w7aax w7ag w7jm w7qc w8bau w8bck w8cno w8den w8qx w9am w9cgm w9evd w9dbt w9edl w9gv w9kd z1lak z1lf z1lb z1lp z1lf z12b z12bz z12gd z12gt z12gw z13ac z13ab z13ak z13as z13aw z13cm tg2clo

W1BFT, C. B. Evans, 37 Madbury Road, Durham, N. H.

ce1ai ce2ab ce3ab ce3cr em2jm cm2ar em2jt cm2rx em2sh cm2wa cm2xa cm2xd cm8lc cm8er cm8uf ct1aa ct1ae ct1bx ct2ac cm2z cx2bt cx1fe dftat ear18 ear37 ear39 ear177 f8aa f8ca f8cs f8ej f8fs f8gi f8ol f8sh f8sl f8ap f8as f8tx f8whg fm8hs fow g2ao g2by g2cj g2lz g2zp g5bj g5by g5bz g5jf g5mi g5qa g6hp g6lp g6qb g6rb g6vp g6wt g6wy g6xq hc1fg hc2jm hh7c illl k4alk k6cdd k6evw lu1bt lu3de lu3fa lu9dt lu6jj nj2pa nl8mi nl8mre n11bx nn7aj oa4z oa4v ok1na on4dj on4fe on4fp on4ja on4jw on4ra on4us on4vu oz7t pa0da pa0iv py1aw py1ah py1ba py1cm py2ab py2bf py2bj py2bm py2dm ex5m v1ba v1yb vn2bg vk2dp vk3pp vk5hg vo8ae vo8mc vo8q vo8z x9a xpa0jv ynu1 ztit

W9AHX, Marion Severson, Vincent, Iowa

7000-ko. band

w1aqq w1axe w1afu w1agk w1ajx w1apz w1aqp w1atp w1avl w1aw1 w1bet w1bft w1bhn w1bnp w1bxc w1cet w1cg w1cwr w1ept w1dc w1dr w1ko w1ls w1me w1mg w1mlk w1rv w1sh w1um w1vr w2acy w2adt w2adw w2aew w2afr w2alo w2alu w2ang w2anj w2aph w2aup w2axn w2bdt w2bfi w2bhv w2bjz w2bkg w2bqj w2bto w2bql w2bvy w2bwd w2bxt w2byq w2bzv w2bwv w2oda w2okw w2cls w2ctn w2db w2dh w2fn w2fw w2wr w2zc w3aa0 w3aa5 w3abk w3ace w3abv w3abp w3ard w3asp w3afu w3awm w3awv w3bat w3bfu w3bus w3cab w3cbv w3cin w3jin w3mv w3nm w3rn w4ag w4ahu w4aig w4aiu w4ajh w4alm w4alf w4dg w4ed w4ei w4ft w4gx w4kh w4mq w4pa w4pf w4rp w4sj w4tp w4nj w4jw w5afe w5ag5 w5ahq w5ait w5ajr w5ald w5aoe w5alq w5aqy w5as w5aav w5aag w5aau w5aau w5bam w5bek w5bfv w5bg w5bqz w5bh w5bim w5bmi w5bmu w5bn w5bob w5boc w5boe w5bpe w5cf w5ds w5fc w5gp w5hn w5hy w5kc w5lb w5mi w5mm w5rg

w5tp w5ty w5uf w5vj w5vq w5wg w5zk w5zrz w6agv w6alhp w6aunh w6azh w6bau w6bed w6btk w6byg w6ci w6cum w6dip w6dmm w6dre w6der w6dwa w6dwi w6eev w6egh w6ees w6ean w6tt w6wo w6yu w7aah w7aao w7afx w7aho w7aih w7ait w7alw w7apw w7atw w7ab w7bb w7ka w7kl w7lk w7gp w7ny w7pp w7px w7th w7ub w7ux w7vk velbr ve2ac ve2be ve2ca ve2cl ve3cf ve3cr ve3dr ve3ew ve3gx ve3ha ve3ud ve4bu ve4bq ve4cv ve4io ve4jeve5ac x29a x1aa x9a cm2ay cm2xa

W1AU, Ed. Norris, 29 Monroe St., Brockton, Mass.

cm1by cm1oe cm2ax cm2jm cm2xd cm5ex cm8uf cr8ca ct1aa ct1ae ct1by ct2ac cx1af cx1an cx1pl cx2bt cx3ab d4abg d4abf d4wao ear21 ear39 e18c f8ca f8ej f8eo f8eq f8ew f8ex f8fp f8jr f8aly f8asz f8axq f8kwt f8nkt f8rso f8srt fm8cr fm8cor g2ax g2ay g2az g2bg g2by g2cj g2dh g2dz g2hh g2ma g2nu g2vq g2wv g2yw g5bm g5ml g5oc g5pj g5yk g6br g6dh g6fa g6gs g6hp g6lk g6ll g6mf g6ot g6qb g6ra g6rb g6rg g6rh g6ut g6wt g6wy g6zq g6xq hc2jm k4alk k4kd k4ug lu1ba lu2ca lu3de lu3fa lu4dq lu5ab lu9dt nj2pa nl8mre nl8mi oa4j oa4z oh2nm oh3nb oh3na oh5pg oh7cl oh7ne oh7nd oh7nf ok2ai on4ar on4fp on4j on4k on4l on4he on4j on4pp on4ro oz7pl pa0xf pa0qf pa0qr pa0wv pc3 py1ah pa2qa py3ah pxbx rx1aa splkx ti2hw uo2cm uodx ve5al ve5ad ve5bi ve5cu ve5ee ve5eg ve5ha vk2tx vk3go vk3oc vk3wc vk3zi vo8av vo8mc vo8z vo8z vn2bg vq2bk vu2ah x1aa z12b x3ar ss4s ss5u ztit zt0j zuld

W4AKT, R. O. Higgins, Charlotte, N. C.

bx b7x ce3ch cm1by cm1fm cm1mm cm2cf cm2jm cm2jt cm2ra cm2sh cm5ni cm8uf cm8yb cm8jt ct1aa ct1bx ct1by ct1ow ct1ab d4abg d4ako d4brv d4ggg d4uan ear21 ear52 ear94 ear96 ear98 ear10 ear12 ear128 ear136 ear185 e18c f3mta f3ocf f3ami f3cs f3dmf f3ej f3er f3eq f3er f3ex f3ff f3fo f3fk f3ks f3lbg f3lz f3pqq f3pz f3rgd f3rj f3sard f3sc f3sf f3sm f3tq f3tv f3uk f3wkv f3wrg f3xz fm8cfr freari frear149 g2ao g2ax g2ay g2bj g2cj g2dh g2kb g2nh g2ns g2oi g2pa g2vq g2aw g5by g5bz g6dd g6is g5la g5lv g6mi g6qf g5vm g5wq g5yg g6er g6gc g6ge g6hp g6ia g6jg g6lk g6mf g6rb g6rg g6vp g6wn g6wt g6wy g6xn g6ya haf3c haf3d haf3q haf3h haf3e haf3af hb9c hk1da k4pfl k4kd k6agi k6aja k6alm k6boe k6cab k6cib k6cog k6ed k6vg k6xp k7mm kafn kn2 lu2ca lu3fa nj2pa oa4t oa4y oa4z oh7nb on4aa on4fe on4ja on4jw on4k on4lu on4uu pa0bv pa0eo pa0mm pa0qq pxr py1ca py2az sm5tc ti2ags ti3xa te4sr v1yb vo8ae vo8j v1ba vk2dy vk2ek vk2as vk3bz vk3hl vk3tr vk3zx vk5gr vk5lx vk5wr vk5yk vk6cb vk6mo vk6wi vk7ch vk7kj x1aa x9a xiler xu5wa xw1b x2ba x1ar x12ac x12bg x13aj x13as x13cx x14ao x14bo 55k

W9UM, Lake Wawasee, Syracuse, Ind.

7000-ko. band

fm8cfr fm8ih lu1cz vk2bg vk2cr vk2dy vk2dx vk2gq vk2he vk2hk vk2hm vk2hu vk2hw vk2jv vk2jt vk2jw vk2kg vk2ks vk2lb vk2lx vk2mh vk2mr vk2nb vk2ns vk2nr vk2tl vk2ps vk2nx vk2sk vk2sk vk2vd vk2wd vk2wh vk2wp vk2wu vk2yj vk2zz vk3ai vk3av vk3as vk3bq vk3bv vk3bz vk3cx vk3dl vk3em vk3fm vk3gu vk3hk vk3hl vk3hw vk3jk vk3ju vk3jw vk3ka vk3ks vk3la vk3mh vk3ml vk3nm vk3or vk3pk vk3pp vk3ra vk3rg vk3rj vk3wl vk3wx vk3xi vk3za vk3z vk3zw vk3lx vk3kv vk4aj vk4aw vk4bh vk4kv vk4ju vk4ll vk4rj vk4wh vk4wk vk4bs vk5bo vk5by vk5da vk5ga vk5gr vk5hg vk5it vk5jh vk5jo vk5kw vk5lx vk5mb vk5mf vk5ob vk5ux vk5wr vk5x vk5pk vk5mh vk6bo vk6fl vk6ft vk6lg vk6mo vk6nk vk6sa vk6vi vk7bq vk7ch vk7hl vk7jk ve5ap ve5az ve5ea ve5ca ac2bx hkc hk1aa hk1da hko ti3xa cm1mm cm1fm cm1fa cm2fn cm2mw cm2lc cm2pa cm2jm cm2rz cm2wa cm5fe cm8uf cm8yb hc1fg hc1le hc2je f8er f8fo f8gq f8gs f8rj g5by g6hp g6wt on1t tg2gp hh7c k6aja k6ami k6bce k6cog k6dju k6erh k6crv k6ces k6ctg haf3d xiler nj2pa x1b x26a x1aa x1ax x5c x9a x7a cm8mp vo8a vo8mc vo8z z1aa z1aj z1ar z1bn z1lr z1as z1ag z1ag z1aj z1bh z1bg z1dj z12do z12du z12gk z12gn z12gp z12gq z12gs z12gt z12gw z12kj z13ai z13aj z13ar z13aw z13ba z13bb z13cb z13cc z13ck z13cm z13cp z13ct z13cv z13cx z14ai z14am z14ao z14bk z14bo z14bq

z4bt nn1nic rx1aa rx1ao o4q4 o44v obe obgr kalhr
ka1sl k4kd k4rj k4ug ct1bx ys1fm ear121 v1po vol x5z
vxz4x daiv tp1a iph x17e ynl w8x4x kdih lcjk lx x1xp x2of
obb pxr vn2bg 2k4 lcfu vjp f3oeb

7-inc. fones

hkc hclfg x26a w9aeq

14,000-ke. band

k7mn lu2ca lu3fa lu4dq lu5dj lu8dj lu8djc lu9dt vk 2hc
vk3hk on4na on4bj py2az py2ba py2au py2bf py2bj py2bk
py2bn py2bq py2bm py2bo py3ad py7aa ve3am ve3av
ve5bh ve5ec ve5fx ve5ea kfu2 ec3ch ce3er ce7aa ti2cb ti2fg
ti2ea ti3xa ti2ag hclfg hc2jc f8ex f8rj f8tv g2by g2nh g2vq
g5by g5ml g5vm g8wt g8vy vs6ah nj2pa cr9en x1aa x3a
x9a vo8j vo8mc vo8z z4z4 vq2ty o44c o44j o44q o44t o44y
o44z k4kd k4bpf k4rl ct1bx ct1aa eur94 ear96 ear98 ear131
ear136 ear141 ex1af yv3lo yx1vk

*OKIAW, Alois Weirauch Mestec Kralové,
Czechoslovakia*

ap6jm ar2su autai au7ch em1by cm2sh em8yb er9en et2al
et2ac fm8bg fm8cr fm8ir fm8lc fm8mac fm8mst fntun2 fu2c
ka1za lu3de om1tb pk3bq py1cx sulaa sulac ti3xa velar
ve3hd vk3xi vs2af vs7al w1af w1ay w1ad w1ept w1lz
w1me w1mk w2adp w2aoe w2axs w2bak w2bkt w2eko
w2eyx w2ov w2rs w3bbb w3bdo w3buf w4ft w4ux w8axa
w8adm w8dy w8pk z1lj z1ar z13as z4m zu6w zxbm
zg5av xy6lkr

W9EBO, Burlington, Wis.

7000-ke. band

em2jm em2wd em2rz em2xa em5im em8ol en2 en7 ex7
ear98 f3oeb f3oeb f8pz celah ce3bm hh7c hk1da j1do kn2
kx3 k4aan k4kd k4rj k6aja k6boe k6cmc k6cdd k6cog
k6dmm k6cem k6erh lcfh lu2ca n1jt n2pa n1nic o44v
om1tb pjmm pxr ti2hv ti3xa ve4bb ve4ce ve5ec v1ba vk3jk
vk2na vk3dx vk3cx vk5hg vk2ak vk4ju vk3pp vk3vp vk5xk
vk3dy vk5mb vk2ek vn2bg vs6ag vo8mc x1aa x9a x9b x26a
xebm xebq yhed ys1fm z1aa z1ao z1ac z1bz z1zb z1zq
z12be z12gw z12ar z12cm z13aw z13az z13aj z14ao z14am

14,000-ke. band

em2rz em2sh em2xd em8uf fm8rit g5by g5vm g6qb hclfg
k4alk nj1pa py2ab veidr ve2ca vo8z vo8mc x9a

*G6PP, M. W. Pilpel, 54, Purley Ave., London,
N. W. 2., England*

7000- and 14,000-ke. bands

w1aal w1abn w1ajo w1aym w1azg w1azy w1ben w1bet
w1bme w1bw w1clj w1dw w1eh w1go w1ih w1lz w2ad
w2alo w2ano w2ans w2aoi w2atb w2atz w2avj w2axs w2ayn
w2az w2bao w2bfl w2bhc w2bo w2bpa w2bri w2btv w2bue
w2bwd w2byi w2cec w2cex w2cfy w2chm w2cjj w2cot
w2cxy w2caz w2ctn w2cwk w2cwr w2gh w2ho w2hq w2ol
w3ajb w5amp w3md w3ut w3wx w4ao w4de w4dv w4ft
w4mj w4mm w4nh w4oc w4ppi w4r w4rx w4tr w4zh w5eb
w5ql w8aav w8aet w8aps w8ase w8bf w8bgv w8bif w8bkp
w8cdj w8eni w8era w8dhm w8dvt w8ea w8efe w8ekj w8kc
w8kq w8nb w8pe w8si w8gic w9mi w9rv em2jm cm2ra
em5ni em8yb k4kd kfu2 ve1bv ve2am

*W9FFQ, Milton Carlson, 413 S. Second St.,
Rockford, Ill.*

7000- and 14,000-ke. bands

ce3ch ce7aa em1by em1fm em1mm em2ax em2ay em2bo
em2ef em2fn em2jm cm2jt cm2pa cm2sh cm2wd em2ww
em2xd em5cx em8uf em8yb ep1aa ct1aa ct1bx ct1by ct2ac
cx2ak d4abg ear21 ear96 ear125 ear185 ei8c f3mta f8bj

f8eo f8ex f8fo f8hr f8kz f8pz f8rj f8tg f8xd fm8mst g2ao
g2by g2cj g2dh g2nh g2vq g2zw g5by g5is g5la g5ml g5vq
g5yg g5yk g6dh g6bp g6ia g6jg g6nf g6nh g6rb g6rg g6vp
g6wl g6wt g6vy g6xn g6xq g5nj hc1fg hc2jc hc2jm hc7e
k4alk k4bpf k4kd k4ug kaljm lu1cz lu2ca lu3de lu3fa lu9dy
nj2pa n8mre n1bx o44i o44j o44q o44t o44v o44y o44z
on4fp on4gn on4bj on4j on4uu on4wk pa0bn pa0fb pa0gg
pc3cp py1ah py1ao py1ca py1cm py1cr py2au py2ay py2az
py2bf py2bk py2bm py2bg py2bo py2da py2dk py2qa py8ia
rx1aa tglas ti2ags ti2ea ti2fg ti3xa v1yb vk2dy vk2he vk2jz
vk2kl vk2lx vk2sk vk2ax vk3gf vk3go vk3hk vk3hl vk3jk
vk3kl vk3me vk3ml vk3nm vk3rg vk3tm vk3vw vk3wk
vk3wl vk3xc vk3zx vk5gr vk5hg vk5ik vk5kj vk5wr vk6wi
vk7ch vo8ae vo8j vo8mc vo8z vs6ah x1aa x1b x1c x1d x1n
x1xp x3a x5c x9a x9b x4fa xu5wa ys1fm z1lar z12ay z13as
z5ip zsl z4m z5uu z1it z1zr z1p sera b7x ss2ap oxxb
k4m k5xo vxz4x xw2ll xw1 pxr km4 bx xebq pxba z8a xw1b
w1oxy

28,000-ke. band

w4ne w6ahp w6bxw w6een w6dio dih

*W3AFH, William Meade, 425 Cummings Ave.,
Trenton, N. J.*

3550-ke. 'phone

w1adq w1ahb w1aky w1apu w1aub w1aut w1avk w1axb
w1bcr w1bje w1blh w1bmn w1bmt w1bok w1bon w1emp
w1epd w1cqb w1eru w1cz w1gw w1id w1nc w1oc w2abw
w2aca w2ael w2ang w2aid w2aih w2ain w2ama w2amb
w2ant w2aoe w2asq w2bco w2bgq w2bsi w2bts w2bub
w2bxo w2byf w2baa w2bec w2bcm w2cfd w2cfw w2cgg
w2che w2ckw w2cmj w2cmu w2coj w2coo w2cql w2cql
w2cqv w2eso w2ena w2cuk w2cvk w2eb w2fr w2gj w2hy
w2kr w2wff w3aex w3ahh w3aid w3akx w3alz w3aad
w3aqt w3arn w3asg w3aay w3atr w3awv w3bag w3bah
w3baq w3bd w3bdy w3bzf w3bj w3blz w3bmm w3bms
w3bq w3br w3bch w3chi w3em w3gk w3je w3js w3jv w3mp
w3okx w3oo w3ss w3uj w3uk w3wi w3za w4aad w4acu
w4aja w4ak w4amj w4amk w4amq w4anz w4ans w4hn
w4pm w4pw w4tm w4wy w5abo w5apw w5awg w5bi w5ej
w5kx w5pp w6abf w6bon w6bql w6car w6ene w6far w6fed
w6rm w7aao w7ant w8aci w8acy w8ahf w8ajh w8akh
w8aol w8ars w8asb w8asm w8auk w8awp w8bae w8bej
w8bjg w8bit w8bkn w8bok w8buv w8bwx w8bxv w8bxy
w8cfd w8clv w8cqe w8cul w8cvi w8cvt w8cym w8dqp
w8dy w8dfr w8dia w8die w8div w8dtk w8dpt w8drl
w8dym w8dte w8dvw w8eht w8fe w8ih w8me w8nx w8oj
w8pz w8rl w8wm w9aei w9aju w9awx w9bpu w9bwi w9cdd
w9efh w9cpw w9esh w9esx w9dkm w9dur w9duw w9edw
w9efo w9epv w9etd w9fke w9frq w9fuj w9ful w9geo
w9gku w9ph w9pv velak veldq ve3gm ve3oc velax

*W2ADP, C. Brewster Lee, 1339 Teaneck Rd.,
West Englewood, N. J.*

14,000-ke. band

g2nu g2cx g2ol g2od g2ay g2by g2nh g2ei g2ao g2ma g2lv
g2pa g2kl g2xh g2xv g2pp g5vm g5bj g5la g5by g5bz g5mi
g5ey g5qf g5fa g6xn g6xc g6vy g6wn g6wl g6rb g6wt g6ga
g6hp g6nf g6vp g6jg g6yq g6om g6xq g6qb g6xb g6xa
on4aa on4nj on4sd on4uu on4j on4ja on4fe on4fq on4gm on4he
on4je on4fm on4eu on4or ct1aa ct1bx ct2aw ct3ab d4ggg
d4rhr d4aap d4abg d4jl d4uak d4ll oh7nt oh8bn oh5ng
oh2ow oh7nb pa0qf pa0af pa0em pa0mm pa0fb pa0gp
pa0ps pa0pf pa0flx pa0gg pa0vm f8pz f8lgb f8hr f8kz f8tv
f8swaf 8to f8eo f8ej f8acv f8rg f8pa f8uk f8smi f8sz f8dt
f8pz f8ex f8ul fm8mst f3mta f3smi uo3wb uoler la1g sulaa
sp1kx ear96 ear94 ear116 ear18 ear21 ear98 ear128 oa5a
oz7vp ti3xa ti2ags k4rj k4kd k4kf k4bpf em1by em2sh
em2jm em2jt em8uf nj2pa o44z o44q o44y py1ca py1cm
py2bn py2ba py2bk py2ay py2qa py2u py7aa py7ab
yv3lo ce3er ep1b lu3dh lu9dt x1xp x1aa x9a b7x yxz4x
r3pr(QRA?) iph xpynd pxr xw1b xw2ll z1it zslp ztir
zuld z4m z56y z5zt z5zn zu6w z55u

• CORRESPONDENCE •

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A Solution to the Phone Problem

Red Hill, Pa., Feb. 28, 1931

Editor, QST:

There have been many wild and even ridiculous suggestions on how to solve the 'phone problem. However, the 1750-kc. band is the only real solution, and, contrary to what many individuals think, it is really an excellent solution.

The only reason many would not even consider working on the 1750-kc. band is that they think it is no good. I had more or less that same idea myself until I tried it for the first time several weeks ago. Results have shown me that the only reason anyone could possibly think that this band is no good is because they have not tried it.

I built a small experimental transmitter using only one Type '10 tube, and by using a small loading coil my 3500-kc. Zepp tunes up. The first station worked was WSAPQ, about 200 miles away, who gave me QSA5 R5 in daylight. By the way, WSAPQ was using only a Type '01-A tube and he was QSA5 R5. Next was a QSO with W9BJA in Missouri. He reported me QSA5 R6. What more could anyone want from a '10 tube? And just think — plenty of room and no QRM for hours at a time.

Phone stations are heard nightly as far west as Kansas, Nebraska, and Colorado, with fine volume on just an ordinary receiver like most of us have.

What I can't understand is why more of the fellows don't take advantage of this fine band. It would relieve the QRM situation on the 3500-kc. 'phone band and at the same time I'm sure everyone who tries the 1750-kc. band will be surprised and delighted with the fine results. Try it, fellows, and you will be sorry you did not do it sooner. You can talk for hours without any QRM. I know I'm sorry I didn't give this band a try long ago.

— Jack Wagenseller, W3GS-W3BF

The Sun and DX

La Cotte, St. Brelades,
Jersey City, Channel Islands

Editor, QST:

The editorial in February QST is interesting in that it shows that the solar cycle is affecting the U. S. A. as much as it is the rest of the world.

Amongst hams the world over there is a spirit of friendliness, so it may interest you W's to

know that in the R.S.G.B. is a concern somewhat similar to your Communications Department, styling itself "Contact Bureau." It is divided into groups, each of six hams, and each group studies certain aspects of radio.

Groups 2A and 2B are on the subjects of fading and allied phenomena, and it may interest you to know that 2B, as early as July, 1929, gave a very accurate forecast as to the solar cycle which many laughed at at the time, but which is now obviously true. In view of your editorial may I, as Group Centre of 2B, add that we have definitely proved a few points apart from the solar cycle one.

One thing: changing earth potentials can set up fading or affect signals, and it has recently been proved that our theory as regards earthquakes is correct.

We also have proved beyond doubt that sun spots affect different bands that amateurs work in, and we have one "astronomer" member whose duty it is to report when sun spots are visible and when they are not; because, depending upon sun-spot activity, we find that different bands are more useful at certain times. We have got this down to such fine limits of accuracy that we can tell almost from day to day whether 1.7 or 7 mc. is best for local work, or whether 14 mc. may provide us with DX.

I am not trying to advertise in the least, but at the same time it is interesting, in view of the time and space we used to devote to drawing out times and bands for working different parts of the world, to know now that if we can get sun observations we know exactly what to expect from week to week, or even from day to day.

Finally it is our conviction that if the 28-mc. and 56-mc. "merchants" have the patience to wait till around 1937-38 they may yet find that these bands are of general use, but at present the 7 and possibly 3.5 are the coming DX bands, and 1.7 the local working band, till 1933 has passed by us.

Obviously I cannot give details in so short a letter, but if those A.R.R.L. members who are also members of R.S.G.B. will study the findings of Groups 2A and 2B in the *T & R Bulletin*, they will get a fairly good forecast as to the conditions to be expected.

In proof of the improvement of the lower frequencies, the British press is suddenly quoting cases of medium band American broadcast stations. We used to get these easily in 1924, and

with improving receivers and transmitters how is it that the last few years have not brought them in, and why all the fuss now about U. S. A. broadcast reception? Obviously something is happening to bring them in, and it is equally obvious what the "something" is.

Extending this a little further it is not difficult to frame a DX table for each year of the solar cycle on the different amateur bands, if we have the patience to wait till we have the complete cycle and therefore the collection of data for each band through each year. It will be useful to the next generation if not to this.

— A. M. Houston Fergus, G2ZC

A Contest Suggestion

Gulfport, Miss.

Editor, *QST*:

We have a lot of contests, and they are a mighty good thing. They make the contestant shine the contacts on his key and dust the soot off the antenna if he hopes to skin his fellow "hams." They inspire a lot of thinking about the equipment, methods of operation or whatever the contest is about, which is all good.

We need a lot of thinking about frequency meters and the operation of them. So why not have a frequency-meter contest? One of the Standard Frequency Stations could be imposed upon to put out a signal somewhere in one of the amateur bands. Those taking part in the contest could have a try at determining the frequency of the signal. You'd have to be good as there are some mighty good meters in service.

— Dr. R. H. Baker, W5BTL

Those Rotten Notes

Station C, Route 6, Box 515,
Milwaukee, Wis.

Editor, *QST*:

The writer left amateur radio in 1929 to become a commercial operator. Up to that time eight years of amateur radio operation had piled up. It had seemed to us that that game was improving every year. Returning to amateur QSO in 1931, we find that, although many improvements and simplifications of amateur equipment have been made, signals crowding the amateur bands are often of such poor quality that it is almost impossible to get anywhere without high power. This is particularly noticeable on 14 megacycles.

These rotten wobbled raw a.c., r.a.c., d.c. backwash, and i.c.w. signals would most of them disappear if the owners of stations emitting such signals could be induced to change over their transmitters to use tube equipment of lower power. Then probably they could afford to install a power supply with decent regulation and a real d.c. output. Hi-C self-excited oscillators with or

without power amplifiers and properly adjusted are necessary. But they are no good if the power supply is inadequate.

The transmitter in use at W9IH is the low-powered outfit described in November *QST*. This is quite a comedown from our successful type '52 set, but we had no adequate power supply for the latter and would rather not be guilty of being a rotten old-fashioned frequency hog and QRM hound. We are logging for the selfish-cited column all unlawful signals heard. It hardly seems possible that the owners of these outlaw stations ever use a monitor. But perhaps they have no conscience and do not care about their fellow amateurs. Let's hope they wake up before the RI gets 'em. It won't be long now!

Robert B. Guthrie, W9IH

P.S.: In three weeks of operation with a vertical antenna and with an input of about three watts, this Type '45 set has been in communication with Brazil twice and Costa Rica once. Hurrah for the "High-Power Holiday!"

"How and Why"

Box 308, Hiram, Ohio

Editor, *QST*:

I have read every issue of *QST* and the Handbook from 1924 up until now, and so far this is the first time that I have had the nerve to "up and say my little piece."

In the last issue of "the good book" I came across the letter written by Mr. Russell, W9EEY. I arise to remark that I agree with him heartily regarding the request for technical information in the form of *QST* "write-ups."

I venture to say that over 90% of the operators of amateur stations do not fully comprehend just what takes place when they twiddle the dials, other than the assurance that when things are adjusted as per directions the outfit can be expected to "perk." We can all build outfits and make them work. Do we all understand how and why they work? Yes, we do *not!!!* All of the gang that I have met and talked with voice the same opinion; and I have talked with plenty in the last year or two.

One other thing on my chest and then I am through.

One is appalled at the number of phones that have come on the air in the last year. I know of at least five cases where *new* hams went on the air for phone operation, without first getting acclimated to amateur radio via c.w. Also, I know of two cases (and I suspect a great many more) where these phones have nothing better than an absorption-type wavemeter for frequency checking purposes, and they never saw a monitor! Yet we wonder at off-wave and slip-shod operation!

— R. W. Stauffer, W8BZA, W8CQC

More High-Power Holiday Comments

838 Hauser Blvd., Los Angeles, Calif.

Editor, *QST*:

I never thought that the day would come when amateurs themselves would urge that they be deprived of any of their privileges. Yet in January *QST* I read a letter suggesting that we ask the Federal Radio Commission to make it unlawful to use anything larger than a Type '10 tube in amateur transmitters. And in March *QST* there are not a few who seem to agree. I am amazed. To be perfectly frank, I am disgusted.

Mr. Schnell seems to have the mistaken idea that we amateurs are concerned only with beating the other fellow. He talks of "giving us an even start," and since some are limited as to power he suggests that every one be limited — and limited by *law*! He seems to think that I will be satisfied with small results, if only my results are better than those attained by my fellows, who are working under the same unfortunate handicap. He misses entirely the point that our greatest obstacles to overcome are fading, weather effects, atmospheric, and distance. That warm glow of pride, wonderment, and satisfaction that occasionally comes to all of us as we sit back after having finished a real QSO with a station on the other side of the world, or after we have completed a particularly worth while bit of traffic handling, is not an emotion of selfish satisfaction at having "chiselled" a fellow amateur out of QSO, or even of pride at having done better than he. It is instead a satisfaction of overcoming the forces of nature, of having accomplished the seemingly impossible with an instrument made by our own hands.

The only way to consistently overcome these forces is to use a reasonable amount of power. And by reasonable I mean anything up to and including one kilowatt of power! Except under favorable conditions it can *not* be done with a Type '10 tube. I know because I have tried it. Although it gave me many contacts, some real DX, many thrills and more disappointments, I wasted more time, more CQs, more calls, and more patience trying to operate with that tube than in all the time I have used a Type '52. There has been much wailing about "ham's inhumanity to ham," but the greater part of it has resulted from misunderstandings caused by lost QSO's due to the fading out and the unreadability of weak signals.

It is not the effect of high power alone that causes QRM. W6AM with one kilowatt is very sharp and steady here at 13 miles. The other night I worked an "8" who was using a Type '10 tube with i.c.w. and he was broad at 1800 miles. When all signals are pure d.c. crystal-controlled it would be a more appropriate time to talk of limiting power. Under those conditions it will not be possible for a Type '10 to put out a

broader signal than a one k.w. outfit. And when that time comes it will not be necessary to limit power as QRM will no longer be a serious problem.

As a matter of fact the higher-powered rig may actually produce a smaller amount of QRM than the low-powered rig. The man with the high-powered set is able to give a short call, and proceed immediately with a QSO. The man with the low-powered set may have to call a dozen times before some one interested finally detects his weak appeal. And every time he calls he is creating QRM.

Low-power contests have a legitimate place in amateur activity, but to compel all amateurs to compete in such a contest, whether they wished to or not, would be not only unwise but unfair. If there are those who prefer to use low power, let them do so. Certainly no one would be foolish enough to suggest that we influence the Federal Radio Commission to compel them to use higher power.

If the rest of us wish to use higher power, even though we "burn it up unnecessarily," as Mr. Schnell believes, in putting an R8, QSA5 signal into a point that could be reached with an R3, QSA 2 signal from a Type '10, please allow us to "waste" our power thusly. At least we pay for it.

— J. Lee Smith, W6AWP

694 Carpenter St., Columbus, Ohio

Editor, *QST*:

Anent Fred's "noble experiment," the high-power holiday, controversy over which is now raging. With all due respect to him, both as a good radio man and a personal friend, still I say his plan will be a "pain in the neck" in the end.

May I ask — are we ready for such a step in uncivilized and uncontrolled hamdom?

The plan is fine if — and I say if advisedly — if:

1. We can control *all* amateurs and make them play straight.
 2. Uncontrolled hams would not run amuck and ruin schedules and traffic lanes and relay routes.
 3. All amateurs would run tubes at rating and have decent regulation and power supplies.
 4. It would not be a temptation for "bootleg" high-power operation which could not be controlled.
 5. Would not end in chaos and leave the well-meaning ham with a low-power set on his hands.
- What I wish to know is this: Have we not enough troubles without inviting more? There are easier ways of making conditions on the air worse, and we might use the time, money and energy to furthering the cause of the icy plate and the stunted plate supply.

I, for one, don't have much chance to work my set, and use high power so that when I do I can blast through the selfish ether hogs with their broad, wabbly, hoggish, selfish, dripping wet,

soggy, warbling, squawky, frequency jumping and creeping signals, through the awful galaxy of notes, raw a.c., i.c.w. and the whole spectrum from that on up the awful travesty to the pure crystal-controlled job, through the morons who want to try this and that, never stay put, wander up and down seeking a mythical hole in the QRM, take fiendish pleasure in twisting dials and jamming the band as a whole. Don't want, when I do get a few moments to work my old heap, to be jammed by some ignorant or selfish ether buster, nor will I be forced to become another frequency "jumper" to get away from them. Now that that is off my chest, let me say this. Rather than cut down power, agitate still more the doctrine of "purism" so all may have a chance.

Let's be sensible. We are not ready for such an ideal yet.

— Howard R. Storck, W8BYN

Burmester, Utah

Editor, *QST*:

After the first shock of reading Schnell's letter in the January issue of *QST* I will have to say "I agrees wid you there, brother, I agrees wid you there." I thought he was kidding at first, but after thinking it over I am sure he has a bright idea.

At present I am operating a little 10-watt outfit and have a 150-watt outfit partially completed, and I for one am willing to scrap the big outfit and spend all my energy making the 210 perk.

I believe that Schnell's idea as suggested could never be put over, though, unless we take it kind of easy. Now here is my suggestion: why not set aside one band for the experiment, and let the high-power boys have the rest. Now the 40-meter band would be best for the experiment because of its adaptability to both day and night communication. It would be the best single band for the low-power idea.

Amateur radio seems to go best when we are fighting handicaps anyway, if you could call low power a handicap. It is certain low power would go a long way to solve the QRM problem. But, of course, we would have to watch those notes just the same. This arrangement would tend to make us more democratic also, because the boy with the gold wouldn't have much on us less fortunate brethren. And we would know that if the other fellow got better DX than we it was because of superior ability or better location.

I say more power to the movement for less power! I am with you Schnell, old boy. What sez you, gang?

— Leonard F. Zimmerman, W6EYS

2904 N. Robinson St., Oklahoma City, Okla.
Editor, *QST*:

If any one were to ask me, I would say that Fred Schnell rang the bell with a big *bang* in his letter proposing a "High-Power Holiday." A

proof of the sore spot he touched is shown in the rise he is getting out of some of the fellows. If the proposition were without merit it would have passed unnoticed.

Power, power, and *more* power. That has been the steady trend. It is the old story of following the line of least resistance to overcome inefficiency, poor design and what not. What has ever been accomplished by following the line of least resistance? Stagnation, lack of progress, dulling of creative genius and entrance into the doldrums of utter indifference. The overcoming of obstacles and still more obstacles sharpens the wits, uncovers unknown genius and places a high light upon achievement. The march of progress is only strengthened by opposition. A procession without an objective soon stops.

As regards quantity or bulk of results probably power has "It." On the other hand, interesting problems add zest to the quality of results obtained as a result of tackling the other limit as an objective. Which is the most attractive: the hairy brute of the stone age swinging his bloody war mace or the nimble swordsman taken from the pages of Dumas? Goliaths are still being slain by Davids. What romance is there in brute strength? Do you fellows with 1 kw. still get that old thrill you experienced at one time? Bet you don't.

I cannot see where the commercial problem is at all similar to our problem. If their trend is towards ever increasing power as a means whereby they may increase the reliability of their service, that is their own business. Our problem is discovery, development and the adapting of those discoveries and developments to use, and as a natural sequence our actual use of them follows. It is questionable whether power is the only solution to 100% reliability. Clear our bands of high power and let's see whether the ingenuity and perseverance of our members cannot rise to the heights and solve the problem in our old brilliant style that so ably established the use of short waves — and at the same time give the fellow with a slender pocketbook an equal chance.

— K. M. Ehret, W5APG

1675 Olive Ave., Chicago, Ill.

Editor, *QST*:

After reading over all the correspondence in March *QST* about the "High-Power Holiday" suggested by Fred Schnell, I would like to add my opinion on the subject.

The greatest good to the greatest number is the first thought we should bear in mind on all questions of policy in Amateur Radio. It is evident that the big boys are not serving the fraternity as they should on this score.

In the 3500-ke. phone band the "big boys" with 50 watts or better have it pretty well their own way. They ride over the "little fellow" and do succeed in QSOing like stations, but what about the fellows who can't pack a mean wallop?

It has come to such a pass that a low-power phone or c.w. outfit can't find an opening in the noise level of "High Power." Tell me, is it fair to amateur radio to have a few with long pocket-books crowd out the many other interested ones in this way?

A lot of fellows built first-class low-power rigs with crystal-control and did everything possible to minimize QRM. We were very successful in our QSO's until the "big power boys" started up.

I choose not to go on record as a crank simply because I can't afford high power. I am strong for the man who buys good apparatus and plenty of it to do proper experimenting. But the fellows with a big signal and not enough knowledge to control it need regulating, in the interest of the whole A.R.R.L.

— E. J. Luxem, W9FUA

Farmersville, Texas

Editor, *QST*:

After reading Fred Schnell's letter published in the January issue of *QST*, I wonder how an old-timer could get such an idiotic idea into his head. Low power may be OK sometime, but it is not reliable.

If we want to cut down QRM in our bands, let us follow the suggestion of W9DOE, and eliminate a.c. sigs. This can be done without removing the bulwark of amateur radio.

Ex-3XU says that he would like to get back into the amateur on equal footing with all other hams. This Socialistic idea deserves no consideration. I cannot afford a one-half kilowatt set, but I am not jealous of the hams who can.

— Morris Harton

Phoenix, Ariz.

Editor, *QST*:

Regarding this power holiday stuff in the last two issues of *QST*. It appears to me that we have lost enough ground in the last few years without someone rising up and advising limiting the power when the high-power stations are much in the minority now. I agree fully with some of the fellows that say that consistent long distance work cannot be accomplished with small power. As long as the law gives us a little power, why not take it and be satisfied without raising an excuse for our power to be lowered. If all the high-power boys were to voluntarily reduce to a pair of 210's for three or four years we would never have the privilege of using any more.

It's a cinch that all the fellows that want can use 10's or even smaller tubes if they wish, so let 'em have the power they want. Naturally if this idea ever came to a common vote and the small power boys had anything to say about it the power limit would probably drop, because there are dozens of little guys to every big one.

I'm not using an extra high-power layout myself, but the only reason is that I can't afford it.

I have been hamming 10 years and have always found that the more power the better results, so, for one I'm against the idea of reducing power.

— H. F. Rawls, W6DRE

Technical Information Service Rules

PROMPT handling of inquiries concerning amateur equipment and problems will be greatly facilitated if the following rules are observed when writing to the A.R.R.L. Technical Information Service:

1. Before writing, consult the Radio Amateur's Handbook and your files of *QST*. Nine times out of ten you will be able to find the answer in *QST* or the Handbook.

2. If reference is made to the Handbook, mention the page and the edition to which you refer. If reference is made to *QST*, mention the page and issue you have in mind.

3. Write on one side of the paper only, and use a typewriter if possible.

4. Number the questions and make a separate paragraph for each question. Make the questions as brief and as direct as possible.

5. Make diagrams on separate sheets of paper and fasten them to your letter with a pin or paper clip. All diagrams should be schematic — do not send pictorial diagrams.

6. Print your name and address in full on each sheet of paper. A return address on the envelope is not sufficient, because the envelope is destroyed by the office manager as soon as the letter is opened.

7. Keep an exact copy of your questions and diagrams, and mention that you have done so.

8. Do not ask for opinions on, or comparisons of, business concerns or their products.

9. Enclose postage for the reply but do not send an envelope. It is much more convenient for us to use our own envelopes with our stationery.

10. Address all questions to the Technical Information Service, American Radio Relay League, 38 La Salle Road, West Hartford, Conn.

Strays

To avoid a lot of cut and try work in building a transmitter using a fixed-tune grid coil, W9DKF suggests connecting a midget condenser of about 50 μ fd. across the coil, making a t.p.t.g. out of the circuit. The advantage is that no bulky coil and condenser are required for the grid circuit.

R. F. Bracewell, operator on the *S. S. Shabonee*, keeps a log of amateur calls heard during the vessel's trips from California to the Orient, and will be glad to listen, when possible, for hams who would like to know how far their signals carry across the Pacific. Mail should be addressed to him in care of the General Petroleum Corp., San Pedro, California.

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager

E. L. Battey, Asst. Coms. Manager

Emergency Work in Nova Scotia

AMATEUR radio once again provided emergency communication when the severe sleet storm of last February completely demoralized the telephone and telegraph systems in the Province of Nova Scotia. All communication was severed between the Island of Cape Breton and the mainland. Stations VE1AL, VE1BN, VE1AX, VE1AZ, VE1CC and VE1DQ all did splendid work during the tie-up.

VE1AL at Sydney reports as follows: "The big storm hit us February 9th, followed by another on the 11th. My antenna and W1BM's went by the board. However, I was fortunate since I keep a weak link in my antenna — when it gives way it saves the antenna and halyards. All power went off. For two days was on storage 'A' and 'B' batteries. VE1BN and I were asked for communication. Handled some 14-mc. stuff to Brooklyn via W2FD. Tried to get hold of VE1BV on 7 mc. but n.d. Moved to 3.5 mc. with a 211 and 640-volts batteries. VE1AX, VE1CC, VE1AZ and VE1DQ stood by and took traffic for the C. P. R. and the Telephone Company (record, post, and private messages). Got a filament transformer from VE1BK and at times got power. The Telephone Company got the Power Company to run a special line to VE1BN. He came on and did some very good work. On February 15th VE1AZ came on the air at 9 a.m. and relayed important traffic until 10 p.m. — single handed — FB! Our newest ham, VE1CK, stood by for VE1CC when VE1BN and I were working VE1AX or VE1AZ. When their signals died out VE1CK would let us know if VE1DQ or VE1CC were on the air."

VE1AZ writes: "As Cape Breton is the sight of the main coal and steel industries of Nova Scotia, the need for more rapid communication than mail was imperative and amateur radio filled the breach for some days until emergency crews of linemen had restored the miles of wire brought down by the sleet. Telephone engineers estimated the weight of ice on the wires between two poles as two tons. The telephone superintendent went to Sydney to oversee the restoration work. Seeing the need for prompt outside communication he thought of amateur radio and had a message broadcast from CJC B asking anybody on the mainland to communicate with Dr. Blackett, VE1AZ, at New Glasgow and ask him to call Sydney on 3.5 mc. The message was picked up on the mainland and relayed to VE1AZ. His transmitting antenna having come down with the other wires, VE1AZ 'phoned VE1AX at Halifax and had the satisfaction of hearing VE1AX's "CQ Sydney" on the air a minute later, and the answering call of VE1AL at Sydney. VE1AX put in several shifts of eight hours with VE1AL, transmitting messages for the press and telephone and telegraph companies. When a power leak made receiving impossible at VE1AX, VE1CC came on the air, received from VE1AL and relayed to VE1AX, who was using 'phone transmission. Later VE1AZ had his antenna put up by the 'phone company, and power being restored in Sydney VE1BN also got on the air."

In addition to the stations mentioned above incidental work was done by VE1CE and VE1DR. After wire communication had been reopened the amateur operators received grateful thanks from officials of the telephone and telegraph companies as well as words of appreciation from others to whom aid was given. Congrats to the VEs. Another job well done!

Traffic Briefs

The Chicago Radiophone Club announces a hamfest to be held in Chicago July 3rd, 4th, and 5th, and extends a cordial invitation to all members of the amateur fraternity to attend. Further information and details can be obtained by writing to W9BEF, 4935 Henderson Street, Chicago, Ill.

Members of the Stockton Radio Club located in the San Joaquin Valley Section are operating a schedule of code practice for beginners at 7-7:30 p.m., P.S.T., on the 7-mc. band as follows: W6SF — Tuesday; W6DTJ — Wednesday; W6FAN — Thursday; W6BBC — Friday. Reports from anyone picking up these code practice transmissions would be welcome and should be addressed to D. I. McNamara, Secretary, Stockton Radio Club, Stockton, Calif.

PA0QQ, official station of the N.V.I.R., broadcasts a message to all amateurs on exactly 3750 kc. at 2400 G.M.T. every Saturday night. This message is in connection with the newly formed Rag Chewers Club of Europe. Reports on the reception of any of these broadcasts would be greatly appreciated and should be sent direct to the N.V.I.R.

In figuring the "score" (M x R²/T) for the Transcon message started by W4PW on the third Sunday of our January 'Phone versus C. W. Transcon Relay we find that a miscalculation was made. In April QST the score is shown as 550 instead of 2200. The figure for the "miles per hop" on W4PW's message was accidentally used instead of the "total miles" figure making the difference in score. The higher score of W4PW raises the standing of the 'phone side for the third Sunday from 670.9 (based on the number of messages started) to 835.8; and from 610 (based on the number of messages filed) to 758.

Quoting from a letter just received: "I heard one 'phone man spot another in the band only last week by telling him he was okay, just a little above W1MK. But W1MK was on 3960 kc. then, while the 'phone (W3 ---) was 3925 or so . . ." Attention of 'phone men is called to the fact that W1MK now has an additional operating frequency of 3960 kc. and when working there could not possibly be used as a marker for the 'phone band. Care should be taken not to confuse this new frequency with W1MK's 3575 kc. frequency, which can be used as a marker 25 kc. outside the legal limits.

MORE EMERGENCY WORK

As the result of a very bad snow storm on March 16th and 17th Salisbury, Md., was entirely cut off from the outside world, all wire communication being disrupted. W3VJ furnished the town with the only means of quick communication. He received many press dispatches from W3ER at Baltimore and W3SE at Mappsville, Va., and handled emergency messages of great importance. W3BR at Baltimore also assisted in the work. This is just another example of the true value of amateur radio to a community. An outstanding feature of the above work is perhaps that it was all carried out on 3500-kc. 'phone. FB!

W9ECI at St. Louis, Mo., reports on his part in a bit of emergency work on March 7th. At 9:15 a.m. he raised W9FKO at Springfield, Ill., who said he was trying to raise Quincy, Ill., as he had traffic for there, and all wires were down between Quincy and Springfield. W9ECI agreed to help FKO contact Quincy. They tried for forty-five minutes without success and then again hooked-up. W9ECI said he would find out if a wire was through to Springfield from St. Louis. He found that one wire was open and took the message from the Springfield wire chief, and had it put on the wire at St. Louis. A reply was received later and relayed back to W9FKO. By that time a wire was through from Springfield to Quincy and amateur radio was no longer needed. Good work, OMs.

Official Broadcasting Stations

(Local Standard Time)

CALL	FREQUENCY	SCHEDULES
W1AJC	7150	Tues., Thurs., Sat., 6:00 p.m.
W1ANH	3990	Tues., Thurs., 7:15 p.m.
W1ANH	14,100	Sun., Sat., 3:15 p.m.
W1APK	3525 (phone)	Sun., 9:00 a.m.
W1APK	3600 (CW)	Wed., Fri., Sun., 9:00 p.m.
W1AQL	3870	Mon., Wed., Fri., 7:00 p.m. Also try to send on 3870 at 3:00 p.m. Sundays.
W1ATJ	3948 (cc)	Mon., Wed., Fri., 6:45 p.m.
W1CDX	3950	Tues., Sat., 6:30 p.m.
W2ACD	3960 (cc)	Mon., Tues., Wed., Thurs., Fri., Sat., 6:15 p.m. and 11:15 p.m.; Sat., 12 midnight. Also several times Sunday.
W2AZV	3660	Mon., Wed., 7:15 p.m.; Sun., 6:30 p.m.; Sat., 11:00 p.m. Various times daily if time permits.
W2BGO	3650	Daily, except Tuesday, 3:00 a.m.
W2BIV	3700	Sun., 1:00 p.m.
W2BO	7130 (cc)	Sat., 11:00 p.m. Weekdays when possible, 8:00 p.m.
W2CBB	7200	Daily except Sat. and Sun., 4:45 p.m.; Sat., 12:15 p.m.; Sun., 1:15 a.m. Three or four times during the day on Sunday.
W2CL	7264 (cc)	Mon., 7:00 p.m.; Sun., 11:00 a.m.
W2FF	14,390 (cc)	Sun., 10:30 a.m.
W2FF	7100	Tues., Fri., 10:30 p.m.
W2MQ	14,220 (phone)	Sat., 3:30 p.m. and 4:00 p.m.
W2MQ	3850	Sun., Tues., Fri., 9:00 p.m. and 10:45 p.m.; Mon., Wed., Sat., 7:30 p.m. when W2MQ is on air. Also several times throughout Sunday.
W2PF	3910	Tues., 10:30 p.m.
W28C	3856	Tues., Fri., Sat., 7:00 p.m. and 9:00 p.m.
W3ALE	3600	Mon., Thurs., 10:30 p.m.
W3BWT	7300	Mon., Thurs., 7:00 p.m.
W3CDT	3640	Sat., 7:30 p.m.
W3CDT	7150	Fri., Sat., 10:30 p.m.
W3HY	3880 (cc)	Daily, 6:37 p.m.
W3OO	14,200 (phone)	Mon., Wed., Fri., 6:00 p.m.
W3ZA	3500 (phone)	Sat., midnight; Sun., 10:30 a.m.; Wed., 7:30 p.m.
W4AII	3547 (phone)	Sun., 8:00 a.m.
W4ALH	3840	Tues., Fri., 9:30 p.m.
W4ALH	7100	Mon., Wed., Sat., 9:00 p.m.
W4MS	3500	Mon., Wed., Sat., 7:30 a.m. and 3:30 p.m.
W4MS	7120	Mon., Wed., Fri., 7:30 p.m.
W4MS	7120	Mon., Tues., Wed., Thurs., 7:30 a.m.; Mon., Wed., Fri., 5:00 p.m.
W5ACY	3700	Mon., 8:00 p.m.
W5ACY	7150	Sun., 1:00 p.m.; Wed., Fri., 9:00 p.m.
W5AHB	7116 (cc)	Daily 12:15 p.m.; Sun., 8 p.m.
W5ABQ	7100	Tues., Thurs., 7:30 p.m. and 9:30 p.m.
W5AUL	7200	Mon., Wed., Fri., 6:30 p.m.; Sun., 1:00 p.m.
W5BHO (W5BSN)	7000 kc.	Tues., Thurs., Fri., 7:00 p.m.
W5MM	7050 (cc)	Tues., Thurs., 6:30 p.m.
W5MS	7300	Mon., Tues., Wed., Thurs., Fri., 1:00 p.m., 11:15 p.m., 6:00 p.m.; Sat., Sun., 1:00 a.m., 11:15 p.m. Also early Sundays and Monday mornings from 3:00 a.m. to 7:00 a.m.
W5PP	3550 (phone)	Mon., Fri., 7:00 p.m.
W5RH	7140	Daily, noon.
W6ABK	3500 (phone)	Daily, except Sat. and Sun., 7:00 p.m.
W6AEO	7050	Tues., Thurs., 6:00 p.m.
W6ALU	7015	Daily, except Sunday, 6:50 p.m.
W6AMM	7250	Tues., Thurs., 7:00 p.m.
W6AOA	3664	Daily, 1:00 p.m.; Sun., 1:00 a.m.
W6AWT	3532 (phone)	Tues., Thurs., Sat., 7:00 p.m., 10:30 p.m.
W6AZH	7200	Tues., Wed., Thurs., Fri., 7:00 p.m.
W6BBJ	3550 (phone)	Mon., Wed., Fri., 10:30 p.m.
W6BBJ	14,100 (phone)	Sunday, 12:00 noon. Also at any other time on either frequency when convenient.
W6BVB	3750	Tues., Thurs., 8:45 p.m.
W6BVB	7150	Mon., Wed., Fri., 5:45 a.m. for Orient and P. I. hams.
W6BYH	3600	Tues., Thurs., 11:00 p.m.
W6CDZ	7200	Tues., Thurs., 12:30 p.m.
W6CDZ	7280	Tues., Thurs., 12:30 p.m.
W6CXW	7145	Daily except Sun., 8:30 a.m.
W6DWH	3545 (phone)	Mon., Wed., Fri., 12:15 p.m.; Wed., Thurs., Fri., 8:00 p.m.
W6DWH	3545 (phone)	Mon., Wed., Fri., 7:00 p.m.
W6EGH	7115	Daily except Sunday 6:30 p.m.
W6ESA	7174 (cc)	Mon., 5:00 p.m.; Wed., 3:30 p.m.; Fri., 5:00 p.m.
W6QA	3841	Mon., Wed., 7:30 p.m.; Tues., Thurs., Fri., 5:30 p.m.
W68Q	7052 (cc)	Tues., Thurs., 5:00 p.m.
W68Q	14,104 (cc)	Mon., Wed., Sun., 5:00 p.m.
W6TE	7270	Mon., Wed., 6:30 p.m.
W6TE	14,350	Fri., 6:30 p.m.
W7AAT	3750-7040	Daily, except Sat. and Sun., 10:30 p.m. (Automatic transmissions.)

CALL	FREQUENCY	SCHEDULES
W7ANT	3515 (phone)	Sat., Tues., 11:00 p.m.
W7FL	3950	Tues., Thurs., 7:00 p.m.
W7FL	7142.3	Mon., Wed., Fri., 11:00 p.m. Also on phone band every night at 6:30 p.m.
W7MQ	3560	Wed., Fri., 8:00 p.m.
W7MQ	7080	Mon., Wed., Fri., 12:00 noon.
W8AFM	14,200 (phone)	Mon., Wed., Fri., 9:30 p.m.
W8AFM	14,200 (phone)	Mon., Wed., Fri., 7:15 p.m. Various times Sun. on 14,200 either phone or C.W.
W8AJ	14,330	Mon., Thurs., 7:45 a.m.; 6:30 p.m.
W8AXV	7056 (cc)	Mon., Wed., Fri., 9:30 a.m.
W8BAH	3760	Mon., Fri., 7:00 p.m.
W8BDK	3680	Mon., Tues., Tues., Sat., 10:30 p.m.
W8CEO	3705	Mon., 7:15 p.m. and other days when station may be used.
W8CLN	3834 (cc)	Fri., Mon., 6:00 p.m. Daily in daylight when conditions in band justify it on 3510 or 3546 phone.
W8CMB	3965	Mon., Wed., Fri., 7:30 p.m.
W8CPC	14,000	10:15 p.m. Several times Sun. Daily, between 3:30 and 4:30 p.m.; Sun., between 12:00 and 2:00 p.m.
W8CUY	3900	Mon., Fri., 7:30 p.m.
W8CNH	3511 (phone)	After all broadcasts from W1MK and 10:30 p.m.
W8DLG	3830	Fri., Sun., 7:30 p.m.; 8:00 p.m. Also as time permits on above and other frequencies during the week and Sun.
W8DME	3930	Mon., Tues., 7:00 p.m.
W8DPO	3650	Tues., Thurs., Sat., 10:00 p.m.
W8DPO	7150	Daily, 7:00 p.m., 9:00 p.m.
W8DRJ	14,200	At intervals all day Sun.
W8DRJ	7024 (cc)	Wed., 7:30 p.m.; Mon., Fri., 1:00 p.m.
W8HD	14,048 (cc)	Mon., Fri., 7:30 p.m.; Sat., noon.
W8HD	3658	Mon., 8:00 p.m., 10:00 p.m.; Fri., 8:30 p.m., 9:30 p.m., 10:30 p.m.
W8ON	3610	Sun., Wed., Fri., 8:45 p.m.
W8PL	7090 (cc)	Mon., Wed., Fri., 6:00 p.m.
W8WF	3520	Daily, 6:00 to 7:00 p.m.; Wed., Fri., 10:30 to 11:30 p.m.; Sat., Sun., 11:00 to 12:00 p.m.; Sun., 8:00 to 9:00 a.m.
W9AAB	7085 (cc)	Tues., Thurs., Sat., 7:30 p.m.
W9ACS	3750	Mon., Wed., Sat., 7:00 p.m.; Sun., 12 midnight.
W9ACU	3510 (phone)	Mon., 9:00 p.m.; Thurs., 6:30 a.m.
W9ACU	7030	Tues., 12:00 noon. Other irregular times on 3510 (phone).
W9AFN	3625	Sun., 12:45 p.m.
W9AFN	7250	Sun., Wed., Fri., 11:00 p.m.
W9AIR	14,325	When believed necessary.
W9BAN	3800	Mon., Wed., Fri., 9:00 p.m.
W9BEF	7280	Mon., Wed., Fri., 11:30 p.m.
W9BEF	14,200 (phone)	Sun., 12:00 noon. Various times throughout week.
W9BKJ	3735	Tues., Thurs., 7:00 p.m.
W9CJQ	3660	Mon., Wed., Fri., 7:00 p.m.
W9CSR	14,200	Mon., Sat., 6:00. Also at any other time when on air.
W9CTW	7160 (cc)	Mon., Wed., Fri., 1:00 p.m.
W9DDB	3743 (cc)	Sun., Tues., Wed., Thurs., Fri., 7:00 p.m.
W9DDB	7020	Sun., 4:00 p.m.
W9DUD	14,100	Tues., Thurs., Wed., Fri., 5:00 p.m.
W9DUD	7080	Sun., Thurs., 5:00 p.m.; 10:00 p.m.
W9DZM	3600	Mon., Fri., 7:30 p.m.
W9DZM	7290	All other week days, 11:00 p.m.
W9EDW	3538	Daily, 2:00 a.m.
W9ERU	7020	Mon., Wed., Fri., 6:00 p.m.
W9EPX	3836	Sun., Wed., Fri., 11:00 p.m.
W9EPY	3855 (cc)	Mon., Tues., Thurs., Fri., Sat., 11:00 p.m.
W9EQX	3515 (phone)	Sun., Wed., 7:00 a.m.
W9FCW	7150	Thurs., Fri., Sat., 7:00 a.m.
W9FCW	14,300	Sun., 9:00 a.m., 7:00 p.m.; Mon., Tues., Wed., 7:00 a.m.
W9FFD	3984.4 (cc)	Mon., Fri., 10:00 p.m.
W9FFD	7180 (cc)	Wed., 10:00 p.m.
W9FNK	3565	Sun., Mon., Thurs., 10:45 p.m.
W9FNK	7300	Last two weeks in month; Sun., Mon., Thurs., 7:00 p.m. first two weeks in month.
W9FTA	7030	Sun., 3:15 p.m. first two weeks in month.
W9FYM	3800	Daily, 7:30 a.m., 10:15 p.m.
W9GDU	7100 (cc)	Daily, 7:00 p.m.
W9GDU	7100 (cc)	Sun., Wed., Fri., 6:45 p.m.; Sun., 4:00 p.m.
W9GFL	7225	Mon., Wed., Fri., 5:30 p.m.
W9GFL	14,100	Sat., Sun., 5:30 p.m. or 3:30 p.m.
W9DMM-	3750	Tues., Thurs., 5:30 p.m.
W9GFL	7065 (cc)	Daily, except Sun., 9:00 a.m., 12:00 MN.
W9GFL	13,130	Daily, 12:00 N.
W9JL	7185	Mon., Wed., 12:15 p.m.
W9JL	7220	Sat., only, 5:30 p.m.
W9QT	3900	Daily, except Mon., 8:30 p.m.
W9SO	7120	Mon., Wed., Fri., 1:00 p.m. Also at various other times.
K6YAL	3500-3550 (phone)	Mon., Tues., Wed., Thurs., Fri., 2:30 p.m.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
KAHER	455	226	720	1401
W3CXL	51	166	1174	1391
W5WF	295	383	342	1020
W9DZM	293	187	512	992
W8CMB	202	195	509	606
W9QT	280	195	350	805
VE3GT	210	223	273	706
W9DZG	307	321	76	704
W8GZ	55	116	532	703
W6QP	85	81	626	792
W3GS	158	251	264	673
W8DD8	271	139	242	652
KAISL	102	105	400	607
W3CXM	54	69	482	605
W9GJI	171	27	332	530
W1ZY	304	161	40	505
W3SM	121	33	347	501
OMITB	251	131	112	494
W9DGS	165	181	104	450
W5VQ	80	19	346	445
W6ALU	31	16	392	439
W8DLG	40	66	323	429
W6AKW	21	16	391	429
W6DPJ	35	62	325	422
W9OX	102	78	234	414
W9DNP	93	67	254	414
VE2AC	176	148	82	406
W5BMM	92	94	225	404
W3WW	96	98	304	398
W9BMA	175	154	62	391
W6BRV	5	2	381	388
W8YA	102	59	221	382
W6YU	179	172	30	381
W3NF	65	34	340	381
W5MK	76	103	198	377
W5AUW	164	171	38	373
W8D88	46	27	296	369
W4GX	166	67	22	366
W8ATV	77	172	282	361
W9BA	51	33	238	347
W89G	121	13	206	340
W9CPM	137	148	54	339
W9ECZ	166	165	6	337
W3BWT	95	74	168	337
W2CEX	272	26	38	336
W5EM	126	193	6	325
W8BAH	161	69	94	324
W9BNT	87	74	160	321
W9CVQ	47	39	235	321
W1CGX	53	61	204	318
W8CG	41	38	236	315
W9CDE	57	35	172	314
W9ARE	46	32	236	314
W3EV	116	128	68	312
W3HY	120	114	78	312
W6AM	168	139	4	311
W2LU	37	26	242	305
W9ERZ	144	139	19	302
W5HY	65	55	180	300
W3SJ	136	24	140	300
W5AMC	104	88	104	296
W8BGY	135	17	20	292
W8TJ	112	103	76	291
W3FJ	140	118	28	286
W8BZB	95	109	80	284
W6EKC	39	63	182	284
W8OF	59	92	130	281
W9E8J	39	39	208	277
W6YGI	108	19	138	265
W9GFL	54	31	179	264
W9EJQ	12	25	224	261
W9GJS	66	68	126	260
W6ERK	93	75	80	258
W3WJ	19	19	202	256
W5YW	126	109	20	255
W5EB	24	17	214	255
W6BPC	108	102	37	247
W8RN	37	26	184	247
W2CWX	110	106	38	244
W9GJX	37	62	122	241
W4JR	102	104	34	240
W9BIJY	75	70	92	237
W8CVJ	112	115	8	235
W5BIU	111	83	40	234
W9DUW	33	47	174	234
W9CEG	33	25	164	227
W9PAW	104	101	24	229
W5AHI	27	30	170	227
W2BJA	66	66	94	226

W8DUB	2	—	222	224
W9FFY	115	43	64	222
W8APQ	87	94	38	219
W9BQW	18	46	162	216
W8DNO	87	87	121	212
W8CG	32	79	100	211
W6CTP	92	96	1	209
W8MV	96	100	10	206
W9DKL	70	50	86	206
W9NP	20	161	24	205
W3LC	12	3	186	201
W8DYH	35	38	126	200
W6PL	41	32	127	200
VE3ZZ	53	62	74	199
W3MC	63	65	79	197
VE4CV	84	85	24	193
W3FX	94	92	4	190
W8ERU	77	85	16	186
W8PP	96	65	24	185
W9CFE	68	78	36	182
W6FFP	52	64	63	179
W5IQ	47	60	68	175
W1BEO	105	54	16	175
W2AI	88	73	16	174
W9AFN	69	77	28	174
W6BYB	104	70	—	174
W1AFB	63	61	50	174
W3ZF	78	120	12	170
W8CWO	32	60	38	170
W1ASF	60	105	12	167
W4AG	82	82	4	168
W1ALA	82	80	6	168
W9FYH	80	54	33	167
W1ABY	86	51	30	167
W1CHS	75	75	18	166
W5ABI	42	58	64	164
W1CCP	73	50	40	163
W5OJ	78	68	16	162
W8BAT	84	61	17	162
W9DRG	61	75	24	158
W3AEW	66	59	64	156
W1ZB	37	70	65	156
W5ASG	66	68	18	152
W1EFP	60	54	36	150
W9FHU	49	56	44	148
W1DOQ	58	56	34	148
W6AMM	33	131	6	140
W2CBB	51	53	6	140
W8MH	63	88	16	137
W9ADN	68	64	1	133
W9DBW	60	58	10	128
W6DOT	58	59	8	125
W8ANV	58	57	10	124
W1ME	42	52	30	124
W9AIR	34	63	26	123
W6CGJ	52	50	20	122
W8BHK	30	51	40	121
W1CHR	55	54	9	118
W8BBH	23	27	64	114
W9EGI	28	58	26	112
W6DZQ	39	58	14	111
W8BFG	48	55	6	109
VE4CG	53	52	4	109
W1BHG	15	65	25	105
W6ID	47	53	4	104
W8TI	46	50	2	98
W6ERS	41	54	2	97
W9CPT	44	51	2	97
W4TR	22	52	30	94
W6CS	19	57	14	90
VE2BB	9	71	8	88
W6BAX	10	68	—	78

All these stations appearing in the Brass Pounders' League are noted for their consistent schedule-keeping and dependable message-handling work in amateur radio. Special credit should be given to the following stations in the order listed responsible for *over one hundred deliveries* in the message month: W5WTF, W9DZG, W3GS, KAHER, VE3GT, W8CMB, W9QT, W8CMB, W6HM, W9DZM, W9DGS, VE2AC, W4GX, W6YU, W5AUW, W3CXL, W9ECZ, W1ZY, W9NP, W9BMA, W9CPM, W8DDE, W6AM, W9ERZ, W8BGY, OMITB, W3EV, W3ZF, W3FJ, W8CZ, W8CVJ, W3HY, W8BZB, W5YW, W2CWX, W1ASF, KAISL, W4JR, W1MK, W8DU, W6BFC, W9FAW, W6AMM, W8MV.

Deliveries count a total of 200 or more bona fide messages handled and counted in accordance with A.R.R.L. practice, or just 50 or more *deliveries* will put you in line for a place in the B.F.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.F.L. membership also?

Traffic Summaries

(FEBRUARY-MARCH)

Central led by Ohio	20958
Pacific led by Los Angeles	12314
Atlantic led by Eastern Pennsylvania	11398
New England led by Connecticut	6581
Delta led by Louisiana	3945
Roanoke led by Virginia	3659
Dakota led by Southern Minnesota	3621
West Gulf led by Oklahoma	3492
Hudson led by Northern New Jersey	3388

Midwest led by Iowa	2167
Rocky Mountain led by Colorado	1665
Ontario	1323
Southeastern led by Georgia-South Carolina-Cuba-Isle of Pines-Porto Rico-Virgin Islands	927
Quebec	847
Prairie led by Saskatchewan	592
Northwestern led by Montana	483
Vanalea led by British Columbia	457
Maritime	151
1040 stations originated 23,501; delivered 20,265; relayed 34,202; total 77,968. (86.2% del.)	



Once again *Ollio* leads the way, this time with a total of 7034! The runners-up with scores over 2000 are: Illinois, 4593; Eastern Pennsylvania, 3810; Michigan, 3358; Los Angeles, 2496; Kentucky, 2428; Connecticut, 2416; Western New York, 2336; Md.-Del.-D. C., 2297; and Philippines, 2108. Notice that several new Sections are coming to the front. The high total for the country—77,968—is partly due to the Sweepstakes Contest, which was under way during the past reporting months. We are glad to see the *Banner* changing hands more frequently. Just a tip—watch out for E. Pennsylvania and Michigan.

EXPEDITIONS

The Wilkins-Ellsworth Transarctic Submarine Expedition headed by Sir Hubert Wilkins, noted explorer, announces plans to leave Portsmouth, N. H., about May 1st. They plan to go under the North Pole in the Submarine *Nautilus*, entering the ice north of Spitzbergen in June to emerge two months later from under ice north of Alaska. The *Nautilus* will use the call WSEA. The transmitter has a power of 200 watts with calling frequencies of 5525, 11,050, and 16,580 kc.; and working frequencies of 5555, 6620, 8290, 8450, 11,110, 13,240 and 16,660 kc. The operator is R. E. Meyers, ex-W3AJZ. He hopes to handle much of his traffic via amateur radio. Watch WIMK broadcasts for latest information and stand ready to give Meyers full cooperation in every way possible.

All amateurs are asked to listen each Monday and Friday until further notice for FPCF, the station of the Haardt Trans-Asia Expedition. FPCF located at Pamir has a 500-cycle 1 k.w. transmitter and will attempt contact with the U. S. A. at 1820 G. M. T. on 8240 kc. (36.4 meters) and also at 2200 G.M.T. on 8000 kc. (37.5 meters) Mondays and Fridays, listening in amateur bands for replies. The expedition has a personnel of thirty-five, and will travel for 18 months in the wilds of Asia. The members of the party hope to be able to send messages to the United States with the help of amateur operators. Kindly report to A.R.R.L. HQs if you either hear or work FPCF.

The auxiliary schooner *Northern Light*, KGEK, left San Francisco April 2nd bound for the South Sea Islands and Australia. KGEK uses a 75-watt set with 500 cycle plate supply. Authorized frequencies are 8330, 5555, 13,240 and 16,660 kc. The 8330 kc. frequency will be used mostly. Amateur stations are asked to give full cooperation in contacting KGEK and handling traffic. Please report any work done to A.R.R.L. for compiling of information for QST.

The 1931 Dickey Orinoco River Expedition station DDOE expects to be on the air by May 15th and will work amateurs on the following frequencies, and between the following hours: On 14,400 kc. (20.8 meters) from 4 to 6 p.m. E.S.T.; on 11,300 kc. (26.6 meters) from 6 to 8 p.m. E.S.T.; and on 8790 kc. (34.2 meters) from 8 to 10 p.m. E.S.T. W. J. Lanz, ex-2IV-2CYT, left New York on the *Munamar* on April 1st to become operator on DDOE. He will cruise up the Orinoco River with Dr. Dickey and establish a base 1600 miles inland, at which point the radio equipment will be set up. Look for DDOE at the times and on the frequencies mentioned above. Two 50-watters in a self-rectifying TPTG circuit will be used. General amateur contact will be attempted as well as contact with WHD, station of the *New York Times*.

Louis R. Huber, formerly W9DOA-W9AEJ, ex-WIMK, and now W9SU, has accepted a position with the United States Coast and Geodetic Survey as first-class wireless operator on board the U.S.C. & G.S.S. *Discoverer*, NIJT. The *Discoverer* will leave Seattle, Wash., sometime during the summer on its annual trip to Alaska to chart the coast line, take various soundings, carry on radio-acoustic work, etc. While regular radio traffic work will be on 600-706-800-850 meters, there may be a little ham work done also with a set which operates near the 7-mc. ham band. Amateurs are requested to help whenever opportunity is offered.

W2CCD reports that IPH, the International Pacific Highway Expedition, is coming through very regularly and strong (RT to 8) on the East Coast. He hears IPH each evening about 9:00 p.m. E.S.T. at the bottom of the 7000-kc.

band (bottom in kc.) with a 240-cycle note. W9GHI worked IPH at 7:00 p.m. C.S.T. on February 18 while the expedition was in southern Mexico. More reports would be appreciated.

W3CXM, Army Amateur Net Control station for the 3500-kc. band, on a regular Monday drill night, made twenty-three contacts with Corps Area Net Control stations and handled a total of 201 messages (only six originated) between 6:20 p.m. and 5:00 a.m. Can anybody tie this?

DIVISIONAL REPORTS

ATLANTIC DIVISION

WESTERN PENNSYLVANIA—SCM, Robert Lloyd, W8CFR—W8DLG leads the gang this month; he reports W8EFA, a new ham in his town. We welcome W8YA back into the game. W8APQ stayed up all night to win a fountain pen in the Army QSO contest. W8EIM is a new ham hatched under Doc's wing. W8CMP has a new one—the TNT-Dynatron! W8AJU is after DX on 7 mc. W8AGO has a new WE 212-D power amplifier. W8DUT keeps two schedules on 7 mc. W8CJO says W8RG had his O-3 RF ammeter burned out by static during a sleet storm! W8DGV built a new receiver. W8AJE hears airplane ignition from the flying field nearby. W8AVY helped W8CUG with a Ham exhibition in a Pittsburgh furniture store. W8ARC is out of town a great deal of the time. W8DNO ran up a nice total in the Sweepstakes contest. W8BSE aspires to the BPL. W8ASE is knocking the sixes off on 3.5 mc. W8AQY sends a lot of dope from Erie. W8BNU and W8KID are both on 14 mc. W8BWT burned out his power pack. W8AT and W8DXI are both on the air. W8AYH is hunting a power leak. W8BUC sends in his first report. W8AAG is busy installing the Naval Reserve station in Pittsburgh. W8DYL thinks he will try crystal next! W8BXC and W8CBX are both going out for traffic. W8AAQ has a mess of dead plate batteries on his hands. W8DRA is using a new MOPA. W8BRC is on with crystal. W8BFD is in the Naval Reserve. W8QO and W8CUN are coming on the air. W8BSO has a 3000 meter receiver—see KBW's February Editorial! W8CFR is still having bad luck; his sister bumped into his receiver and it sure smashed up when it hit the floor!

Traffic: W8DLG 429, W8YA 382, W8APQ 219, W8CMP 75, W8AJU 40, W8CUG 40, W8AGO 31, W8DUT 20, W8CFR 12, W8DYL 12, W8DGV 8, W8CJO 9, W8AVY 6, W8AJE 6, W8DNO 212, W8BSE 106, W8ASE 59, W8AQY 34, W8AYH 2, W8BUC 2.

EASTERN PENNSYLVANIA—SCM, Don Lusk, W3ZF—By the time this is being read a new SCM will probably be nominated, and I want to take this opportunity to thank you for your splendid cooperation in the past and also to ask you to support the succeeding SCM as you have me. W3GS as usual leads the traffic hounds this month. W3NF is arranging a trancon route to operate all summer. The second issue of the local Ham news is out and it's a Wow. Don't forget, you fellows, that it costs money to print this little paper, and your contribution would be appreciated whether it's five cents or five dollars. W3EV comes in third this month. W3LC just made the BPL this month. W3MC gets PDC and BCL complaints since he has installed type '66s. W3FX enjoyed the Sweepstakes. W3MG is chief op at W3BIS (Beckley College). W8CWO threatened to make the BPL and he sure did ART. W8CFI received his ORS appointment. W3VB is working hard for an ORS. W3AQQ is turning actor for a while. W3QV is working consistently. W3AAD requests an ORS application blank. W8DHT handled some Sweepstakes traffic. W3UX is tired of traffic again. W8VD has been sick. Sorry to hear that, Bert. W3AKB reports that the Frankford Radio Club is running an FB code and theory class every Monday night. Everyone is welcome. W3UH sent in his report early. W3QP got a new National receiver. W3OK made application for ORS. W3OP says 7 mc. was thick with QRM during contests. W3BES blew his 50-watter. W8AIT is fast becoming a traffic man. W3AOJ expects to become an ORS. W3PB can be heard on the air regularly; anyone wishing schedules into Philadelphia should QSO him. W8AWO of the three musketeers from Scranton hasn't very much time for radio these days. W3AQN is handling the York traffic. W3ADE complains of the lack of traffic on 3.5 mc. after midnight. W8EU takes the cake for rag chewing ART.

Traffic: W3EV 312, W3LC 201, W3FX 190, W3AAD 92,

W3OK 54, W3AOJ 22, W3PB 19, W3GS 673, W3NF 381, W3MC 197, W3MG 172, W8CWO 170, W3ZF 170, W8CFI 161, W3VB 139, W3AQQ 160, W3QV 95, W8DHT 92, W3UX 88, W8VD 77, W3AKB 72, W3UH 62, W3QP 57, W3OP 40, W3BES 34, W8AIT 30, W8AWO 16, W3AQN 26, W3ADE 6, W8EU 2.

SOUTHERN NEW JERSEY — Acting SCM, Dr. Luther M. Mkitarian, W3SG — The following are new ORS: W3AWV, W3BBB, W3QL, W3JL, W3BAQ and W3UW. The following stations have applied for ORS appointment: W3ANP, W3BGF and W3BPH. The Acting SCM visited the Trenton district and found a very good bunch. How about a Radio Club? W3BEX has moved to Astoria, N. Y. W3ZC is building an MOPA. W3BCV has QSO'd VK's on 14 mc. W3BHT is debating on his high school team. W3ANP is President of the Morris Radio Club. W3UW's 250-watt 'phone is working. W3BPH and W3UJ are still experimenting on 'phone transmitters. W3BKM is a new ham in Earleton. W3BIM is a new ham in Trenton. W3QL has a new MOPA. W3SJ complains of QRM from W3J. W3BM is rebuilding. W3SM is active in Naval Reserve net. W3ASG is active in Army Amateur net.

Traffic: W3JL 117, W3SJ 300, W3ASG 71, W3ZI 20, W3BBB 18, W3QL 65, W3AWV 33, W3BEI 10, W3BAQ 9, W3BKM 2, W3ZC 24, W3BCV 13, W3BHT 11, W3BGF 7, W3ANP 17, W3ATA 4, W3ABG 3, W3AKV 8, W3UW 18, W3SM 501.

WESTERN NEW YORK — SCM, John R. Blum, W8CKC — W8UCY is trying out 'phone. W8AJ has a 250-watt on 14 mc. W8CSW reports DX very good. W8BDV reports plenty of activity for the F.L.T.S. W8DWJ is now W4ANS. W8ABQ has daily schedules with him. W8CKI is off the air for a while. W8AJZ is a new ham in Ithaca. W8BJI has a new P.P.M.Q.P.A. W8DBX receives foreign reports on 3.5 mc. W8BJO is mostly on 7 mc. W8DME spends about all his spare time on Navy work. W8DJA has joined the A. A. Net and reports as new hams W8BYH, W8EET and W8BZG. W8DSS sends in a big total. W8QL is back with us again. W8QB is on 14 mc. mostly. W8BYO is a 100% traffic man. W8DSA is moving. W8BDK reports 18 hams were honored by a visit from the R. I. W8CVJ was active in the S.W. contest. W8BCN is old W8CHL. W8DEJ reports W8CCK is visiting up North. The SCM visited at W8CUY's not so long ago and almost froze. W8BLH is busy with O. O. work. According to W8DCX we have as new members W8CKL and W8EJN. W8BDV is on with a type '10. W8DEQ has B.C.L. trouble. W8AWM and W8BYD seem to be "head men" over in Jamestown. W8BIF has a new crystal outfit. W8AYM is working on the new Police Net organized by W8BYD. W8BHK is A. A. net control. W8CMN is heard from. W8CYG is looking for schedules on 3.5 mc. W8BFG enjoyed the Sweepstakes contest. W8BRV is a new op in Seneca Falls. W8CFL for the first time had a wash-out in traffic. W8CPC now uses four type '52s in P. P. parallel in the last stage. W8DMJ has plenty of schedules. W8AUU is also a DXer. W8CZP is a new operator over in Hornell. W8DUB had a fine score in the Sweepstakes. W8BHU has a new T.N.T. W8BUP turns in a good report for a starter. W8CKC spent three weeks up on 1750 kc. and had as many contacts, but better QSO's than on 3500 kc.

Traffic: W8BUB 112, W8BHU 10, W8DUB 224, W8CZP 22, W8AUU 6, W8BYD 26, W8DMJ 55, W8CPC 47, W8BFG 109, W8DCV 18, W8BCN 23, W8CVJ 235, W8BDK 36, W8DSA 23, W8BYO 42, W8QL 34, W8DSS 369, W8DJA 30, W8DME 65, W8CYQ 9, W8BEK 121, W8AYM 87, W8BIF 20, W8DI 15, W8DHW 2, W8DEQ 6, W8DBV 35, W8CUX 24, W8DCX 9, W8B.H 3, W8BJO 60, W8DBX 315, W8BJI 2, W8CKI 53, W8ABQ 1, W8BDV 34, W8CJW 24, W8CKC 24, W8AFM 6.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Forrest Calhoun, W3BBW — Maryland: W3ADO, the Naval Academy station, sent in a nice report. W3AFF reports lots of action in Western Maryland. W3AIL is waiting for filter condensers. W3WF is using two type '10s. W3BGV is getting crystal reports on his rig. W3ON and W3LF are also active. W3AHG rebuilt his rig and first QSO was NJ2PA. W3HU and W3TQ are new ones in Baltimore. W3TQ is using "à la Nov. QST" transmitter. W3PU was QSO Finland twice. W3BBW lost quite a few points in the Sweepstakes by starting early, so quit it all. W3IA is doing television work at W3XX on 2065 kc. and would appreciate reports. W3ZK is working 71s and VKs FB. W3BDY has a FB 'phone rig as has W3JS. W3VM still keeps his 'phone going. Delaware: W3HC worked G6RB

on 3500 kc. W3AJH says DX has been "vy gud" the past month. W3ALQ hasn't been on much since his sickness. District of Columbia: W3CXL sure handed an FB bunch of traffic. W3BWT is still sending in a nice total each month. W3BAT was QSO-J2CD on 14 mc. W3ASO sent his report with a fine bunch of traffic. W3OZ has been doing work in the A.R.R.I. Net for the American Legion. W3CDQ wants to know what happened to our totals. (So do I — Y. L. — SCM). W3AKR is using a type '12A while moving and rebuilding.

Traffic: W3CXL 1391, W3BWT 337, W3BAT 162, W3ASO 82, W3OZ 72, W3ADO 62, W3AFF 48, W3AHG 46, W3HC 44, W3PU 16, W3BBW 16, W3AJH 10, W3LA 6, W3CDQ 5.

CENTRAL DIVISION

INDIANA — SCM, George Graue, W9BKJ — Thanks to the RMs for their efforts in lining up the various traffic routes. The results are more than pleasing. Traffic honors go to W9CVQ this time, with W9ESU second. W9ELO has his 100-watt station completed. W9CLO is still QRL crystal grinding. W9ELX works DX aplenty with a type '04A. W9EEJ is a new op at WFBM. W9FUT's signals compare favorably with a rock mixer plus an air hammer. W9AHL after struggling with induction, r.f., feedback and rotten filter is finally getting a trace of DC in his wave. W9CTV is building a new transmitter held together with screws instead of bell wire. W9GJS has several schedules working FB. W9DDB lost his transmitter and all else in a fire. W9FHB will soon have a MOPA going on 7 mc. W9AKD has left town for good. W9BDE is working all dist. on 3.5-mc. 'phone. W9CKY has trouble in keeping r.f. where it belongs. W9CWE is a new ham in So. Bend. W9AMI has a long-wave receiver and copies W9ASX, the op of KDSR. W9AEB is trying MOPA before graduating to crystal control. W9EIJ is also trying out MOPA. W9EXL is changing over to P. P. W9DHM is trying to define DX. Six of the Elkhart gang recently paid W9UM a visit. W9A00 claims a 50% increase in output by changing to TPTC. W9ADW put in type '81 rectifiers. W9CKG has plenty of schedules. W9AKJ has a new type '52. W9BAW hopes to have a portable on the air soon. W9GGJ's conscience bothers him since his signals were listed with the Prehistorics. W9AIP has a 250-watt in the final stage. W9DSC and W9PHM are going strong with 14-mc. 'phone. W9DHI is QRL work. W9AAI burnt up his MG set. W9AXH is experimenting with television. W9FCX put up a new antenna. W9GOE is a new ham in Mishawaka. W9FSG is still pounding out à la haywire. A wind storm wrecked the antenna of W9EFV. W9DWL is building a super-het. W9BWI is trying to get "hoarse" power out of his 'phone set. The major portion of W9CFL's set is relays. The Ft. Wayne Radio Club has applied for station license.

Traffic: W9CVQ 321, W9ESU 277, W9GJS 260, W9CKG 231, W9AKJ 70, W9AMI 67, W9ABW 47, W9GGJ 38, W9AIP 22, W9BQH 22, W9CYQ 21, W9DSC 17, W9DHI 15, W9FYB 15, W9AEB 12, W9AXH 12, W9FCX 10, W9FSG 8, W9EIJ 8, W9EFV 4, W9YV 49, W9DUW 234, W9EXL 1, W9BKJ 26, W9DWL 15, W9ETH 12, W9CVX 51.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — Just look at our traffic totals! Shows what you fellows can do when you *all* pitch in. W9QT and W9OX make the BPL. After having made sure of winning Watkins' type '52, W9QT-W9ZZE says to give it to the next highest man. There's real ham spirit! W9OX is starting to build a crystal outfit. W9ALR got QSA-4 in New Zealand while using a couple type '45s. W9CEE gets his through several schedules. W9AZY's tin lizzie did an inverted tail-spin and came out on top of him. W9EQO canvasses the whole town for traffic. W9DDQ got his traffic on 14 mc. W9EDQ is very fond of the TNT circuit. When it snows, signals jump right over W9FZV's shack. W9CNE has been appointed ORS. W9QT is now OBS. W9LH reports W9EP married, but still true to radio. W9BAN says W9DQC is putting in a 'phone. W9GGB sells radios and then buys parts. W9ARU insists he gets crystal reports. Even with increased power, W9ERH still can't get over the hills. Testing on 56 mc. cost W9AUH several type '10s. Welcome, W9EQM. W9BGV now has his type '52 on CW, as well as a good 'phone outfit. W9AIN has been trying for a prize in International Tests. Low power plus tin roof equals low totals for W9BO. W9CDA will soon have a Heinz receiver — has rebuilt it seven times already. W9BEW works in both A-A and U.S.N.R. Nets. W9EYW has his heart set on building a 'phone. W9FTV

was not so lucky in the International Tests. W9FQQ is having battles with BCLs. W9CWZ applied for ORS. W9AEN is having trouble getting out well. W9CFH says tin roofs are good radio sponges — they soak up his signals. W9BAZ is building a 75-ft. steel tower for his new antenna. After building a super-het. W9BWW found it wouldn't perk. Kentucky needs a good powerful phone for OBS. Those interested please get applications in promptly. Don't be bashful.

Traffic: W9QT 805, W9OX 414, W9ALR 188, W9CEE 182, W9AYZ 130, W9EQO 102, W9DDQ 96, W9EDQ 75, W9FZY 66, W9CNE 63, W9JL 62, W9LH 47, W9BAZ 36, W9BAN 27, W9GGB 20, W9ARU 19, W9ERH 17, W9AUH 11, W9EQM 11, W9BGV 10, W9AIN 9, W9BBO 9, W9CDA 8, W9BEW 7, W9EYW 7, W9FTV 4, W9FQQ 3.

ILLINOIS — SCM, F. J. Hinds, W9APY — You boys are doing fine, but we aren't yet getting reports on all Illinois traffic handled. Get your friends to send in their totals to W9APY. W9BEF has a fine 14-mc. phone going. W9ATY has been appointed First District A-A Net Control Station. W9DGZ did splendidly in the DX Contest. W9DAX uses a Loftin-White speech amplifier with impedance amplification. W9CYB pounds brass between his medical calls. W9AVE is doing nice work on the 3.5- and 1.75-mc. bands. W9GAI is experimenting with push-pull receivers. W9ERU QSP'd message from W1MK direct to VK6MO and worked Australia 10 out of 12 days in a row. W9ALA uses a type '10 PA crystal outfit. W9FGD works 14-, 7- and 3.5-mc. bands every day. W9ATS is a new traffic man with a type '10 and 700 volts. W9ET is now on 14 mc. almost entirely. DX is improving greatly at W9ANQ. W9CYN did fine work in the Sweepstakes. W9CTP is to be found almost entirely on 3500 kc. for traffic. W9BYL has trouble with the single wire-fed Hertz. W9ECZ says traffic is very good. DX is very good at W9CJM on 14 mc. W9DSS is mostly always on 3500 kc. for traffic work. Some "Govt. Interference" kept W9CGC off for a while. W9FTX says foreign stations don't answer CQs. W9FXE is building a new power supply. W9FGN is a new man with us. W9CUX gets fine reports on the coast. W9BNI and W9CKZ held a ham-fest. W9LL says 3500 kc. is getting better. W9BIR spends his time on CW in 7000-kc. band. W9FI is making a super-het. W9PK is active on both 7 and 14 mc. W9CZL is on 14 and 7 mc. A new MOPA is being planned at W9CKM. W9ERZ had over 11,000 points in the Sweepstakes. DX is good at W9KA. W9DZM is still our star traffic man. W9RT is the portable of W9DBE. W9CN is on during week-ends. W9FPN has a new crystal. W9BVP says DX is improving. W9GJJ has received a Commercial ticket. W9CUH is having a fight to get the new 50-watt crystal-control going. W9FGG is rebuilding. The blizzard brought down the antenna at W9FVO. W9EF worked K4BPF on 28 mc. W9GIV is kicking because the set won't kick. W9AFN is working on a new AC receiver. The OWs of W9GFU and W9APY went home for a month's visit to the folks. There is a new 4-tube AC 8-G receiver at W9DZG and it WORKS. W9BNN worked over 115 stations during Feb. on 1712-kc. band. W9ACU is in his own home now so can bore holes more freely. W9EMN is building low power MOPA for 'phone work. W9ADN was very busy with the DX contest. W9BSR is on 28 mc. and wants to conduct tests there with other stations.

Traffic: W9DZM 992, W9DGZ 704, W9EJC 337, W9ERZ 302, W9ERU 186, W9AFN 174, W9ADN 133, W9ALA 132, W9AMO 122, W9BNN 110, W9FGD 86, W9CTP 60, W9ANQ 54, W9ET 46, W9LL 44, W9AD 33, W9BYL 33, W9EF 32, W9FGN 32, W9ACE 31, W9CZL 30, W9CUX 25, W9CKZ 24, W9DBE 23, W9DSS 22, W9PK 22, W9GAI 20, W9DZG 18, W9CF 17, W9CNY 14, W9DKF 14, W9QI 14, W9ATS 13, W9CKM 11, W9KB 11, W9BVP 10, W9KA 10, W9BSR 9, W9CJM 9, W9CN 9, W9FI 9, W9BSR 9, W9ATY 8, W9EMN 8, W9FVO 8, W9FXE 8, W9FTX 7, W9GFU 7, W9BIR 6, W9GIV 5, W9APY 4, W9BRY 4, W9FCW 3, W9FPN 3, W9ACU 2, W9ENH 2, W9FO 2, W9GJI, 530.

OHIO — SCM, Harry A. Tummonds, W8BAH — From sixth, to fifth, to fourth, to third: now Headquarters advises "OHIO LEADS THE COUNTRY." We won the banner on approx. 3300 total and this month we have approx. 7000! Let's go now and make it 10,000. Here is the dope on the BPL W8CMB, W8GZ, W8DDS, W8ATV, W8RN, W8BAH, W8DU, W8BZB, W8SG, W8BBH and W8MH. W8CMB leads the state. W8GZ is right at the top. W8DDS, R.M., is the boy behind the new ORS net. Write him if you want schedules. W8DU, also RM, wants all S. Ohio Stations

to write to him. W8AXV, RM Ohio, 7000-kc. band, has a new MOPA on the air. W8BZB will arrange all schedules with the gang at Akron. W8BBH has a new DeForest 511. W8SG's personal call is W2BMX. W8BAH wants three traffic banners in a row for Ohio. W8MH had 1500 points in the contest then blew all his tubes. W8ATV is doing real work in the new Ohio net. W8BDU sent in a good report. W8DPF says new ORS net schedules work out FB. W8ADS has schedules with W8UW and W8CK. W8VP was in a coast to coast QSO party with 10 hams on 8650 kc. W8APC will have a crystal soon. W8ALG, W8BUD, W8BBI, W8CK and W8US report. W8RN is planning to return to the Lakes soon. W8BCF says the contest helped his traffic. W8DBK has an Amateur extra first ticket. W8BAC likes plenty of holidays. W8OQ is on 7100 kc. W8TK is QSO Calif., on 3500 kc. W8NP has a new MOPA per QST. W8LI handled special traffic from Akron. W8CX blew his tubes. W8JR is after an ORS appointment. W8BKM has A.A.R.S. and U.S.N.R. schedules. W8EJ schedules W8EB. W8CSS will have a new call, W8VZ. W8CEI has had trouble with BCLs. W8CIY and W8DMX handled Red Cross message. W8CGS will be off the air till new transmitter is finished. W8EB is Section ONE control station. U.S.N.R. W8CSB says traffic conditions good. W8UW has some good schedules. W8FA copied AB6, but no QSO. W8CUL says all his traffic was handled on 3522-kc. phone. W8DUD and W8CKX are new ORS. W8CDW, W8DMK, W8CEC, W8CZC, W8CUR and W8DCJ are new reporters. W8DFR is active at Canton. W8BZL has been working hard for the Akron party, and says W8JC will wear red shirt and green tie and W8CCK overalls and boots. Hi. W8BSR was active in Sweepstakes contest. W8CCK is waiting for the AC line to the new gas station he bought. W8HH has schedule with W8BZB. W8AOJ reports from Cleveland. W8ARW says: "Doc stork brought me a big eight pound YL." Congrats, OM. W8BNC has daily schedules with W8DDS. W8CFT will be an ORS soon. Report from W8DIH shows activity at the Norwalk Amateur Radio Assn. W8DIH worked VK3BL. W8CXN is doing good work at Findlay. W8KP, Cleveland reporter, starts with a good total. W8AIR has some good DX records. W8BYG says he has decided on a crystal. W8AWS worked X3J on 'phone. W8CNO will be at Akron with W8EVA and W8SK. W8CWC will be an ORS by next report. W8DGT is working on a transmitter for Alaska. W8UC reports QSO Calif. W8AKA, Cleveland Amateur Radio Assn., suffered loss of the club transmitter. Equipment was stolen from the club rooms. W8AZG, formerly of Pittsburgh, is now located in Cleveland. W8BTT holds regular schedules in the U.S.N.R. net. W8DHA reports from Irontown. W8ALG is acting Secretary of the Newark Radio Assn. C. J. Butler reports from Cincinnati. Please advise your call, OM. W8ACF is on 'phone in Cleveland. The following have been reported this month as new hams, W8AMW, W8EEQ, W8DGI, W8QU, W8CTD, W8EMI, W8CZT, W8DVI. Please write to the SCM for information on traffic work and ORS appointments. Thanks for the fine record this month; and now all together, "When the roll is called I'll be there"; what roll? Why the BPL, OB, and so see you at Akron, on the air, and in next report. "JOIN THE ALL OHIO ORS NET."

Traffic: W8CMB 906, W8CZ 703, W8DDS 655, W8ATV 361, W8SG 340, W8BAH 324, W8DU 291, W8BZB 284, W8RN 247, W8CKX 182, W8BDU 181, W8BKM 156, W8AXV 152, W8CNO 146, W8CFT 137, W8MH 137, W8BBH 134, W8CSB 114, W8UW 111, W8DCJ 83, W8CXN 82, W8VP 78, W8NP 76, W8CWC 77, W8CGS 65, W8CSS 61, W8DFR 54, W8ADS 53, W8DPF 51, W8APC 50, W8BNC 50, W8DMX 47, W8CZC 40, W8EJ 39, W8DMK 39, W8CDW 37, W8CEI 36, W8BZL 35, W8CUL 34, W8AOJ 34, W8EB 31, W8AIR 29, W8TK 28, W8DIH 25, W8BAC 24, W8BYG 23, W8OQ 21, W8BCF 20, W8KP 17, W8DBK 14, W8DGT 14, W8ALG 14, W8HH 11, W8UC 11, W8BSR 10, W8CIY 9, W8FA 8, W8AWS 8, W8ARW 8, W8BTT 8, W8CCK 6, W8US 6, W8LI 5, W8DUD 4, W8CK 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9ARE is moving to Duluth this month. Good luck, OB. W9GFL is now using MOPA per Feb. QST. W9FAW worked 43 sections in the Sweepstakes contest. W9EYH had a good traffic report. W9FHU reports a lot of DX on 7 mc. W9CFT has cured his BCL troubles. W9CER also reports good luck in the Sweepstakes contest. W9PSS has schedule with W9GMZ. W9ABM says his signals come in fine at one of the local theatres, coming out with the talkies. Hi. W9SO is rebuilding into MOPA. W9EPJ is still pushing 1000 v. into a type '10.

W9DTK is busy on his new job. W9ESZ has been working on 14 mc. W8BWZ is having trouble with induction from high tension line. W9DUX is a new station at Stanley. W9BIB wants to know what's the matter with the Army Net. W9FBJ is back with us on 3750 kc. W9FAA took his license examination this month. W9VD has shifted his key thumps from the BC band to the 3500-kc. band.

Traffic: W9ARE 314, W9GFL 264, W9FAW 229, W9EYH 167, W9FHU 149, W9CFT 97, W9CER 83, W9FSS 68, W9ABM 65, W9SO 48, W9EPJ 46, W9DTK 27, W9ESZ 17, W9BWZ 11, W9DUX 10, W9BIB 6, W9FBJ 5, W9FAA 4, W9VD 20.

MICHIGAN — SCM, R. J. Stephenson, W8DMS — The Detroit Amateur Radio Association elected W8FX second vice-president to fill the chair in the absence of the president and vice-president. At the February meeting, a "hamfest" was authorized and the committee surely gave us a good one. It was held at the National Guard Armory at Ypsilanti, and 192 registrations of hams from Michigan, Ohio, Illinois, and Ontario were recorded. After the speakers, an auction of equipment was held. About two truckloads of equipment were carried in and back out of the armory. The D.A.R.A. has as an auxiliary, a traffic group, headed by W8DYH, Detroit R.M., to promote message handling in this section. Get in touch with Ken for good schedules. W9GJX has been appointed R.M. for Northern Michigan, and with W8DED taking care of Western Michigan, we should have lots of action. W8BJ handles his traffic mornings. W8DNT is discontinuing code practice temporarily. W8LJ and W9HK report on good signals, calls heard, etc. W8DYH makes his 21st appearance in the BPL Record? W8COQ has been QRL on BC station WASH. W8RF is at WXYZ now. W8RP says business interferes with hamming. W8CKZ reports whole family ill and his transmitter is like the tin soldiers in "Little Boy Blue." W8DDO is QYL and also QRL with music. W8GP has built up a P.P. TNT job for use at the Air Show booth. W8SY and W8DV have qualified for W.A.C. They are believed to be the first Michigan stations to make it. W8CU cracked two crystals. W8BBX tried hard for the BPL, as did W8RPT. W8DEH just shakes his type '10 when he wants to turn off the filament. W8JK reports 35 members in the University of Michigan Radio Club, with interesting programs. The officers are W8DOE, Pres., W8RP, Vice-Pres., W8QS, Secy., and W8CJT, Treas. W9CE says that 14 mc. is getting better lately. W8AJC is rebuilding everything. W8BRS says W8OV and W8BQG are rivals for Graham MacNamee's reputation. W8AE is laid up in the hospital. Best wishes, OB, W8AXE rebuilt. W8BMG has been dethroned as King of 3.5 mc. in Kazoo since W8EKZ and W8DMR came on this band. W9VL visited W9GJX and improved the transmitter there. W8AZQ, W8AM, W8CQP and W8DET are all going with MOPA now. Miss W8DZ attended the hamfest and her registration number was 88. MIM. W8MW is still trying to get their crystals to perk. The W8DFE brothers are all set for plenty of traffic. W8CAT has been trying 1750 kc. with good results. W9GKR and W9CSI report thru W9HK. Let's have more news, and let's take that traffic banner again.

Traffic: W8BGY 292, W9GJX 241, W8MW 206, W8DYH 200, W8PP 185, W8CAT 162, W8BBX 160, W9HK 155, W8BMG 132, W9CE 118, W8BPT 115, W8DED 105, W8DEH 88, W8DMS 79, W8BJ 76, W8CLL 73, W8COQ 71, W9GKR 70, W8AGJ 65, W9CSI 62, W8BTK 55, W8GP 51, W8DXS 43, W9AXE 40, W8CU 39, W8ACW 39, W8DFE 35, W8SH 34, W8BMZ 27, W8DOV 25, W8LJ 23, W8JK 22, W8DNT 22, W8AAF 19, W8DRD 19, W8CFZ 18, W8AW 18, W8DQV 18, W8DDO 17, W8AZQ 16, W8BRS 14, W8NR 14, W8FX 14, W8BG 13, W8JX 13, W8AF 11, W8CMV 9, W8SS 8, W8WR 8, W8CQP 5, W8RP 5, W9EQV 4, W9EGF 4, W8VL 1.

DAKOTA DIVISION

NORTHERN MINNESOTA — SCM, Ray Weihe, W9CTW — A 100% ORS report this month. W9DOQ leads them all. W9FNJ has dreams of a crystal 'phone. W9EOZ leaves the section and air till fall. W9FAQ has a 50-wattier now with 800 volts on it. Director Barker, W9EGU, helped organize the N. P. Ry. Amateur Emergency Net, from St. Paul to the West Coast. W9BBL blew his rectos and now has type '66s. W9EHI has a new MOPA. W9CTW is experimenting with recordings lately. W9AH sent his report via radio. W9CWI, the 00, is hard at work logging off-frequency stations. W9GKO is back again after having a severe case of flu. W9BVH is surely working his

share of DX. Only important message reported handled by W9BHH was one delivered to a nice looking YL. HI. W9BRA is a new reporting station this month. W9ADS is rebuilding. W9GKM has a new type '52. W9AAN, the Northern Minnesota 'phone hound, is on 1750 kc. W9GGQ is getting W9COO going at Bemidji. W9CYZ sends a report. W9FTJ has been on the sick list so no traffic. W9FNQ is active with a 50-watt MOFA. Here is another warning to WATCH YOUR FREQUENCIES. . . . The Radio Division reports conditions worse than ever before. Please cooperate and help keep our section clear.

Traffic: W9DOQ 148, W9FNJ 96, W9EOZ 46, W9FAQ 45, W9EGU 42, W9BBL 29, W9EHI 28, W9CTW 27, W9CWI 22, W9GKO 19, W9BVH 18, W9BHH 11, W9BRA 11, W9ADS 10, W9GKM 9, W9AAN 8, W9GGQ 6, W9CYZ 6.

SOUTHERN MINNESOTA — SCM, H. Radloff, W9AIR — A new Amateur Extra First grades the wall at W9COS. Carl states recent test gives 15-minute service from Manila to Washington, where W3CXL is terminus for the "Oriental." W9FFY, a non-ORS, steps right up and rings the bell. W9BNN is still a contender for BPL. W9AIR enjoyed numerous visitors. W9BN enters a sizable 0-0 list. W9DRG reports W9FRJ, W9GHO and W9DGE at Owatonna on visit. W9BKX got quite a write-up on their A-A work. W9DCE now operates KGQC on the Hurley, and reports W9DHP at WOBM. W9CKU takes on a refrigerator line in anticipation of a hot season. W9FJK is in line for ORS. W9EYS introduces his type '01A to DX. W9EAT plays radio checkers with W9YL. W9AKN is busy with finals. W9EFJ turns in a regular report. W9FNK reports two new hams in Rochester, W9GLE and W9GMD. W9EYL gets out to ZL. W9EJR sports a new Chevvie. W9BQJ reports W9DBW has removed QRA to 45 B Quadrangle, Iowa City, Ia. W9DBC rebuilds for the 3.5-mc. band. W9GHO had trouble getting license renewal. Finals cramp the style of the W9YC gang. W9EFK hears plenty of DX on his new receiver. W9FAD is helping W9GBZ with his transmitter. W9FMB is interested in the 1750-kc. band. W9DWG plans a super-het. W9CYX puts Pipestone back on the map. W9BTZ is warming up the WE's. W9EEB makes home recordings of ham signals. W9FDX has a new type '24 detector. W9BNF reports W3LA is coming out here soon. W9FPY is going strong. W9FJI still shows signs of life. W9DSH is very QRL. W9CPM was very active in Sweepstakes Contest. More new hams are W9LS, W9LN and W9QJ at Minneapolis. W9BKK at Lambert and W9FPU at Worthington. W9CPM reports highest total for Section.

Traffic: W9COS 314, W9FFY 222, W9BNN 150, W9AIR 123, W9BN 116, W9DRG 158, W9BKX 83, W9DGE 44, W9CKU 24, W9FJK 24, W9EYS 17, W9FAD 9, W9AKN 8, W9EFJ 8, W9FNK 5, W9EYL 3, W9EJR 3, W9CPM 339.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — W9EGI says DX has been pretty good this month. W9CRL kept two schedules. On 1950 kc. we have W9DYA using low power. W9DGS is by far the highest traffic man. F.B. If any of the gang want traffic see the RM, W9DGS. At last W9DM is going and handling some traffic. W9BVF was on the air for the International Relay Contest. A new station, W9EMY, has an MOPA using a type '10 for PA on 7 mc.

Traffic: W9DGS 450, W9BVF 237, W9EGI 112, W9CRL 40, W9EMY 11, W9DM 10, W9DRA 1.

SOUTH DAKOTA — SCM, Howard Cashman, W9DNS — W9EUH reports things good on 14 mc. W9DKL is still running away with all the traffic. W9CFU has a new monitor. W9DB reports new QST-Mar. '31 transmitter coming up. W9TI has classy new SW het. W9FOQ is down with Y Litis. W9DKJ reports two new stations in Aberdeen, W9AQB and W9CAU. W9FLN is a new man in Sioux Falls. W9NM and W9CIR are the souls of brevity. W9DNS and W9DGR are busy with their BC stations. W9FLI and W9EDX are trying 'phone.

Traffic: W9DKL 206, W9NM 94, W93FU 88, W9EUH 61, W9FLI 15, W9ALO 14, W9DB 11, W9CIR 8, W9DKJ 5.

DELTA DIVISION

ARKANSAS — SCM, H. E. Velte, W5ABI — We have handled the largest amount of traffic this month that I have ever known Arkansas to handle. W5BM1 has made the BPL three times in a row. W5BRI won the National Army Amateur QSO Party with the large score of 168 points, and received an engraved fountain pen as prize. W51Q made the

BPL. W5HN's crystals went bad on him. W5LK is on 3.5 mc. W5BLG is using a type '10 on 3.5 mc. W5BPI is using a type '52 with a pair of new mercury vapor rectifier tubes. W5RW reports working G5BY on 14 mc. W5ABI is going to put a 250-watt on the air soon. W5SI has been busy rebuilding. W5ASG has been getting out well with low power. W5BDB is working on a MOPA and an AC receiver. W5LV has been rebuilding into a crystal-controlled 'phone and CW outfit. W5BTT gets out well with low power 'phone on 3.5 mc. We have two new stations reporting this month, W5FA and W5FB at Hazen.

Traffic: W5BRI 404, W51Q 175; W5ABI 164, W5ASG 152, W5RW 69, W5SI 35, W5BPE 18, W5GLG 11, W5BRI 8.

MISSISSIPPI — SCM, Wm. G. Bodker, W5AZV — W5ANI is "registered" because foreigners won't come back to him. W5ARJ is a new station in Jackson. W5AWP turns in a nice traffic total. W5AZV is building a 50-watt crystal MOPA for 7000 kc. W5AZV, W5VJ, W5BOT and W5BNX got their Army-Amateur certificates. W5BUI makes the BPL both ways! W5BUI is now an ORS. W5ID is quite active on 7000 kc. The Red Cross test message was received and delivered by the following stations: W5BNW, W5BOT and W5AZV.

Traffic: W5BUI 234, W5AWP 54, W5AZV 45, W5BOT 11.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — W5ACY is pounding 'em out in the A-A state net. W5RR received a "call heard" card from Russia. W5YW seems to be getting some DX. W5EB is keeping schedules with W6QP and W3CXL daily. W5BPN reports for the first time. W5BJA must have kicked the bucket. W5BKL got lots of traffic. W5AWA is pounding out from Baton Rouge. W5ANQ, W5QJ, W5ACY, W5ZK, W5WF, W5AO, W5ABS, and W5EB are all in the A-A state net. W5WF had a hot time during the Sweepstakes contest. All Louisiana amateurs are urged to report their activities.

Traffic: W5WF 1020, W5EB 255, W5YW 255, W5ACY 79, W5BKL 42, W5RR 8, W5BPN 2.

TENNESSEE — SCM, James B. Witt, W4SP — All traffic handled by W4AAD was on 'phone. W4GX worked 44 sections including Cuba in Sweepstakes contest. W4CW and W4GX are two new ORS. W4AFS is building a new 50-watt crystal transmitter. W4AFM has a new crystal outfit on the air. W4HK is building a 75-watt crystal job.

Traffic: W4GX 366, W4OI 114, W4RO 55, W4AAD 43, W4AFM 39, W4OV 30, W4FR 23, W4AAO 15, W4SP 13, W4AFS 11, W4KJ 9, W4ABQ 6, W4CW 180.

HUDSON DIVISION

EASTERN NEW YORK — SCM, H. J. Rosenthal, W2QU — W2LU made a trip to New York to arrange to become Unit Commander of a New Naval Reserve Unit to be formed in Schenectady. W2BJA and W2CBB made the BPL due to the Sweepstakes. W2CJP is working hard to get a net started to handle police traffic. W2CTA is working stations in England on 3500 kc. An unknown station from Troy handled 54 messages, but forgot to sign the report. W2BLU reports working 38 states during the winter. W2ALI reports the formation of the Mid-Hudson Radio Club in Poughkeepsie. W2OP is the proud owner of a fountain pen won in the Army-Amateur National QSO contest. W2BSH says the building of his MOPA is a bigger job than electing a Democratic President. W2CGO reports working 2 Aussies with a 15-watt MOPA job. W2AYK has been appointed Unit Control Station of the Naval Reserve Net. W2CL was forced to discontinue his schedules due to poor conditions on 14 mc. W2UL has finished a new receiver and reports all signals coming in QSA 5 now. W2AJD is building a new 100-kc. temperature-controlled standard to better enable him to act as Official Observer. W2ANV is back on the air again. W2ACD has rebuilt completely and is carrying on his Army schedules again. W2ACY reports hearing VS6AH and AC2BX regularly and is gunning for a QSO with them. W2BIQ is working stations in South America regularly. W2QU is on the air at W2CAT, the station of the Naval Reserve Armory.

Traffic: W2LU 305, W2BJA 226, W2CBB 140, W2BSH 104, W2CJP 109, W2CTA 62, unsigned 52, W2BLU 42, W2ALI 25, W2OP 21, W2CGO 16, W2AYK 14, W2CL 13, W2UL 10, W2AJD 8, W2ANV 7, W2ACD 7, W2ACY 6, W2QU 24.

NEW YORK CITY AND LONG ISLAND — Acting SCM, Wm. J. Warringer, W2BFQ — If no report received soon from the following ORS, their certificates will be

cancelled: W2APV, W2AFO, W2OV, W2ARQ, and W2BCB. A request that he be placed upon the inactive list will save the appointment of any ORS who finds he has not time to devote to traffic handling. W2BGO, the SCM, is back on the air on 3650 kc. 'Phone men handling traffic or not are requested to report so that this report may give you credit for your work. ORS will be issued to any who can qualify. Manhattan: W2SC has a flock of schedules. W2BXW reports W2BNS is back after a five-year layoff. W2BDJ has decided to make hams out of his BCL neighbors. W2BNL is the 50/50 station — half time on 'phone, other on CW. W2BBY now sports a blue A.R.L.L. pin. W2BZN's gnat power transmitter was heard by a VK. W2AOU makes his first QSO an "8." W2BQK worked VK during Sweepstakes. Brooklyn: W2APK is doing fine work with Von Luckner's yacht, DAIV. W2CCD is making WAC's out of foreigners. W2PF is now WLNI on 6990 kc. W2BIV is overworked. W2BO is doing fine work as OO. W2BEV has schedules every day. W2AZV is hihatting the boys since his sojourn at NAH. Long Island: W2ASS tells the world DX is picking up. W2AIQ continues to do excellent work on off-freq. 'phones. W2BVL Nassau Radio Club is getting to be a real outfit. W2BDN swipes his ma's writings paper to send in report. W2AVP has QRM from exams. W2HO will be an ORS by the time this is in print. W2CHY is experimenting with variable MU tubes. W2CWJ wants us to give the 'phones a break. How in heck can we, if they don't report. W2CIT handled eight messages on 'phone. W2BRW has a crystal 'phone going. W2CE ditto — 500-watts power. W2BMB is reported to be handling lots of traffic on 'phone. W2BTO is looking for an ORS. Bronx: All four ops at W2CYX have been busy on tests. W2LW fails to make any remarks as usual. W2AQO worked an "FAR." W2FF handles traffic in inverse ratio to his size. W2VG is doing spring cleaning. W2BPQ is still alive but not kicking. W2AET hopes to soon give Gallic and Winchell a run for their money. W2AFT is looking for recruits for National Guard so he can get a dress uniform gratis.

Traffic: Manhattan — W2SC 211, W2BXW 35, W2BDJ 35, W2BNL 34, W2BBY 8, W2BZN 3. Brooklyn — W2APK 84, W2CCD 62, W2PF 34, W2BIV 33, W2BO 27, W2BEV 27, W2AZV 8. Long Island — W2ASS 68, W2AIQ 55, W2BVL 45, W2BDN 31, W2BQK 14, W2AVP 12, W2CIT 8, W2CE 6. Bronx — W2CYX 69, W2LW 51, W2BPQ 30, W2FF 6, W2VG 3.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — W2MQ has been appointed on OBS, W2BA and W2LV have taken up their work as OOs. W2WR is receiving fine comments on his new CC transmitter. W2JF is still working reliable schedules. W2AOS is still on active duty for the U.S.N.R. W2DX has moved to New Haven, Conn. W2CWK had a good score in the Sweepstakes. W2AGX is stepping out to all parts of the world. W2CJX lost 20' off his main mast in a recent storm. W2AMR is building a 50-watt crystal outfit. W2DV received several reports from Germany on his 3.5-mc. signals. W2CFQ is another going thru the rebuilding stage. W2BPY had lots of fun in the tests. W2MQ will be heard shortly on 1750 kc. W2BKE and W2DDQ reported direct to Hartford. W2CFY would like a contest for ORS only. W2CEX ran up a fine total in the tests. W2AIF said it took five stages to get going on 14 mc. W2BYX is trying to get a 7-mc. Zepp to work on 3.5 mc. W2AI reported for the first time in ages. W2CPA is having fine results with his type '10. W2CFV, ex-W8AWN, sent in his initial report for this section. W2BJZ is getting disgusted with results on 14 mc. W2ADP reminds us that Bergen County has an active group in W2BAP, W2CJO and W2BPV.

Traffic: W2WR 2, W2JF 49, W2AOS 24, W2CWK 244, W2AGX 5, W2CJX 4, W2AMR 6, W2DV 6, W2BPY 63, W2MQ 158, W2BKE 6, W2CFV 64, W2CEX 336, W2BYX 8, W2AI 174, W2CPA 14, W2CFL 35.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9BOQ leads the ORS gang again. W9EEW reports nice total this time. W9CJH has been just covered up with work. W9DFR is doing some FB DX. W9BBS is looking forward to the convention at Grand Island. W9FAM was very busy helping line things up for the convention. W9BHN intends to keep plugging away. W9EHW is doing his very durndest to get the A-A schedules lined up. W9DTH says too much jam on the 3500-kc. band. W9BQR is still trying to connect with the A-A State Control Station. W9DI is very busy with school work. W9DHA sends in his first report.

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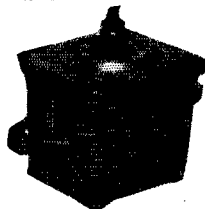


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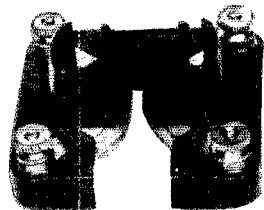
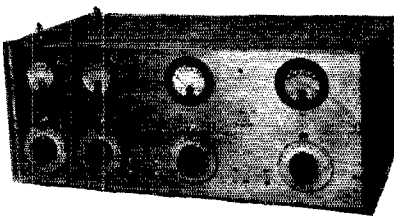
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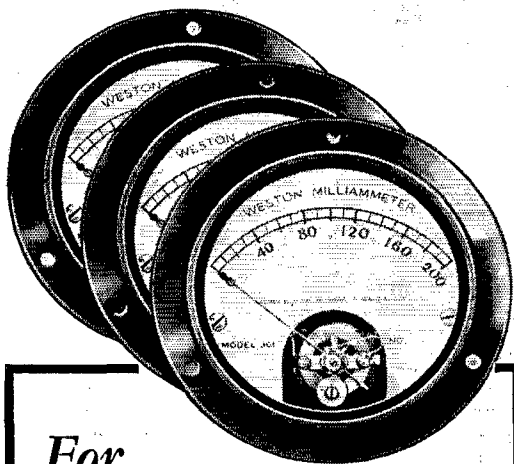
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W9BNT slides in with a total of 321. FB! W9BJI reports again. W9DHC is busy waking up the gang over in his part of the State. W9EDI reports 30 mags handled. W9GKZ makes a good report. W9EWO and W9CUY report. Thanks, OMs.

Traffic: W9BOQ 35, W9EEW 34, W9CPJ 32, W9DFR 30, W9BBS 25, W9FAM 29, W9BHN 14, W9EHW 5, W9DTH 4, W9BQR 2, W9DI 2, W9DHA 5, W9BNT 321, W9BJI 13, W9DHC 65, W9EDI 30, W9GKZ 44, W9EWO 11, W9CUY 26.

IOWA — Acting SCM, H. W. Kerr, W9DZW — Our RM, W9EJQ, tops the list again, with our new SCM, W9FFD, in second place. W9ACL reports hams growing faster than weeds in Davenport. W9DBW says the Iowa City University Club transmitter is ready to go on 3562 kc. W9DNZ's ORS is renewed. W9FZO logged 17 Europeans one Sunday. Thanks to W9BTL for traffic report. W9EFU has nice total. W9EOP has a new call at home, W9GMX. W9AHX is now on with a type '10 in Hartley circuit, also is on 3500 and 1750-kc. 'phone. W9EIV radios a report. W9BPG was a little late; but come again, OM. W9FVY leads the Des Moines gang. W9DTM is with us again. If you want to know how to raise money for a new mast write W9FYC. Hi! W9AWY was heard in New Zealand. Keep those reports coming W9BJP. W9DIB put up a new V. F. Hertz. To W9BFL: we want the report even tho small, OM. W9DIB's report for previous month was received late, but appreciated. Our old friend, W9CS, kicks in after handling messages for the gobs at Colon, Panama. Just as we mail this report notice is received of the election of George D. Hansen, W9FFD, Salix, Iowa, as SCM, so send your next reports to him. We commend him and wish him well. Ames Short Course and Midwest Division Convention for Iowa on May 8 and 9: Prof. Jansky, Jr., George Grammer, Lt. Haydn P. Roberts, Fred Schnell, and other notables will be there. C U at Ames.

Traffic: W9EJQ 261, W9FFD 162, W9ACL 138, W9DBW 128, W9DNZ 122, W9FZO 95, W9DZW-78, W9BTL 73, W9EFU 62, W9EOP 46, W9AHX 43, W9EIV 37, W9BPG 35, W9FVY 30, W9DTM 26, W9FYC 24, W9AWY 19, W9BJP 17, W9DIB 14, W9BFL 12, W9CE 18.

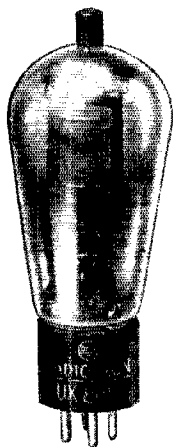
KANSAS — SCM, J. H. Amis, W9CET — W9BNU makes the BPL and also leads the section. W9GHI has worked all YK districts. The contest made a nice total for W9EXY. Your SCM received the surprise of his life in receiving a report from W9DNG and W9CCS, who have opened up with a 250-watt MOPA in Lawrence. W9FLG, our RM, is building a new AC receiver. W9CKV reports a nice total by radio via W9FLG. W9ESL has been appointed RM for the 'phone men with the thought of having regular traffic routes and a nation wide hook-up for Trans-Con traffic. W9CFN had fine luck during the tests. W9CXW is a new reporter with a couple of type '45s with 200 volts on the plate. W9JA is the station of the Kansas Agriculture College at Manhattan. W9CET sold his AC receiver and has just finished another. W9HL keeps a schedule with W9FLG each Sunday. W9DEB has acquired an OW and the best wishes of the entire section go to both of them. W9BQV changed from Hartley to TNT with better results. W9NI is the call of the Kansas National Guard Army at Topeka.

Traffic: W9GHI 240, W9BNU 318, W9EXY 100, W9DNG-W9CCS 96, W9FLG 96, W9CKV 54, W9ESL 52, W9CFN 33, W9CXW 30, W9JA 19, W9BQV 12, W9HL 19.

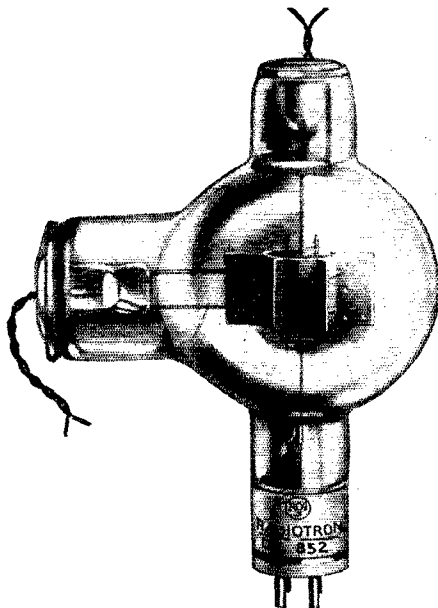
MISSOURI — SCM, L. B. Laizure, W9RR — St. Louis: W9ATX hasn't been convinced that traffic can't be handled on 14 mc. W9DZN works at KGTR. W9PW is QRL with U.S.N.R. work. W9FTA, RM, is very QRL. W9DYJ is looking for a glass case for his newly won cup. W9ECI handled storm traffic for A. T. & T. W9AMR reports from Chicago, Kansas City; W9BMA hit the BPL again. W9BMT in on the shelf for a while. W9AOG was in on the DX contest. W9AKZ has been on when able. W9RR was out of town most of the month for U.S.N.R. parties. General: W9BJA, OO, hit the BPL this time. W9AIJ sent in a report for himself and W9FSL, a new station. W9DHN has been using all bands. W9CJB is getting lots of foreign QSOs. W9FVM organized a U.S.N.R. unit at Monett and nearby towns. W9GNM is a new station at Mount Vernon. W9BGW is up for promotion in the U.S.N.R. W9ENF sent in a blanket report for Joplin. W9ASV and W9ENF visited W9AWE and W9DCD. W9GLY is a new station in Joplin. W9EYG is on again for good, if he can get his license renewed. W9ASV is waiting license renewal. W9EPX has been QRL with new installation work at KFRU. W9FJV kicked in with a long report of his unsuccessful visit to the Scm's

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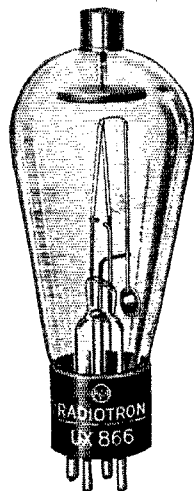
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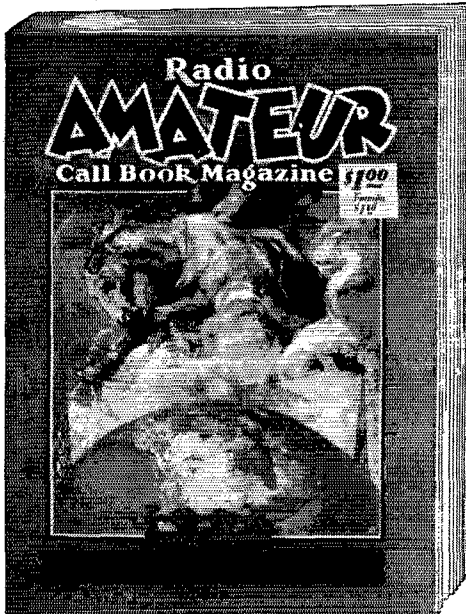
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shack. W9FJV reports poor response to his efforts in the AA net. What's wrong, fellows? W9CKV remembered the SCM with a QSL card inquiring about U.S.N.R. work.

Traffic: W9ATX 27, W9DZN 4, W9PW 65, W9FTA 20, W9DYJ 24, W9ECI 139, W9BMA 391, W9AOG 10, W9AKZ 10, W9FSL 18, W9AJJ 5, W9DHN 6, W9CJB 81, W9FVM 52, W9BGW 216, W9ENF 8, W9EYG 15, W9ASV 54, W9BJA 347, W9RR 6, W9CFL 35, W9NP 205.

NEW ENGLAND DIVISION

VERMONT—SCM, Clayton Paulette, W1IT—We are very glad to welcome back ex-W1ARY, who is now W1EG at the UVM at Burlington. W1CGX is high traffic man again this month. W1ATF takes second place. W1BD turns in his usual FB report. W1BAS, who is ex-W1BCK of Brattleboro, is back on the air. W1BJP is away from home quite a lot lately. W1AXN, our new station in Richmond, turns in a traffic report. W1SV has a new dynatron, which he calibrated from W1XP's transmissions. W1AOA is back on the air. FBI W1IT has a new AC receiver.

Traffic: W1CGX 318, W1ATF 147, W1BD 138, W1BAS 60, W1BJP 22, W1AXN 21, W1EG 14, W1AOA 13, W1IT 5, W1SV 16.

WESTERN MASSACHUSETTS—SCM, Leo R. Peloquin, W1JV—Thanks to all ORS for their cooperation. Several good stations have applied for ORS certificates and indications are that our ORS total will be doubled shortly. All traffic handled in our section should be reported to the SCM on the 16th of each month, whether ORS or not. Cards for this purpose will be furnished by the SCM on request. W1ASY and W1ZB make the BPL. W1BNL continues to handle a goodly share of traffic. W1ATK is rebuilding. W1BVR is back to his old love, "the Hartley circuit." W1JV is still looking for a place to hang his antenna. W1AIF worked two sixes on 3715 kc. W1APL is breaking in two new hams. W1BIV has joined the U.S.N.R. W1ASU is kept busy with U.S.N.R. work, club activities and grinding crystals for the gang. W1BWY is building a new 50-watt MOPA outfit. W1BSJ is building a new television receiver. W1BKS now has a 1-KW tube on 14 mc. W1BRD blew his type '01A, so bought himself a type '10. W1CCH is in line for an ORS ticket.

Traffic: W1ASY 167, W1ZB 156, W1BNL 59, W1AIF 57, W1BVR 48, W1JV 52, W1ATK 35, W1APL 17, W1BIV 15, W1ASU 15, W1BWY 5, W1AJD 2, W1BKS 23, W1BRD 15, W1CCH 17.

MAINE—SCM, G. C. Brown, W1AQL—John Singleton, W1CDX, of Portland, has cast his hat in the ring as an opponent to your present SCM in the coming election. John will make a fine man for the job, if he wins the election. W1AFA is high man this month. W1ATO is a close second. W1EF's deliveries put him in the BPL. Director Best reported by radio and makes the BPL with his deliveries. W1BEU reports that several of the boys in the Elm City have applied for licenses. "RM" Singleton reports QSO with Honolulu. FB. W1ANH says most of his traffic came from the Sweepstakes. W1BLI reports working new stations at Oldtown, Orono, Rockland and Livermore Falls. W1BFZ is busy with the National Guard Radio Unit. W1KQ is on with crystal now. W1ACV has built a new AC receiver. W1QH bought a "Chevy," and is moving his equipment from his shack, which will be used for a garage. W1BFA reports complaints from BCLs. W1CEQ and W1BWB send in their second reports. W1AYK sends in his first report and states that he is RM1c, at NBD. He also says that another operator there is on the air with the call letters W1AHR. W1AKR is going out for an ORS ticket. W1FQ has changed his street address and has his outfit going FB in his new location.

Traffic: W1AFA 195, W1ATO 170, W1EF 150, W1BIG 105, W1BEU 73, W1CDX 64, W1ANH 55, W1BLI 37, W1AQL 30, W1BFZ 18, W1KQ 14, W1AKR 14, W1CEQ 14, W1BFA 13, W1ACR 10, W1BWB 9, W1FQ 5, W1AYK 8.

RHODE ISLAND—SCM, N. H. Miller, W1AWE—It sure is FB the way reports are coming in. W1MO is high man this month. W1BUX, formerly of the Eastern Mass. Section, is now located in Providence and turns in a nice total. W1CAB is back again using a type '10. W1GV has a good signal on 3500 kc. W1AQV is a new ham of Eden Park who is on 'phone. W1BLJ, W1AFO, and W1GR are all active on 3500 kc. W1ARK is building up a new MOPA job per QST. W1EX of Rumford is on again. W1EF says his crystal is still perking. W1AMD, W1BOP, and W1BML.

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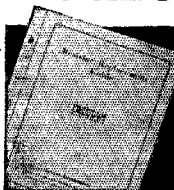
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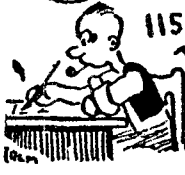
still push out the broadcast stuff at WIDZ-WJAR. WIAUV is remodeling his transmitter. WIAMJ is busy fixing BCL sets. WIAWE was not on much due to a defective rectifier tube. WIAKA has a nice signal on 7 mc. Ex-ICFL is coming back on the air. W1BDQ was seen buying new parts. WIID has a nice 'phone as has WIBXL. W1CPV has a new mast. WIASZ reports W1BTP as most ready to go on the air. W1AAD says his YL is causing lots of QRM. W1BQD spends 90% of his time experimenting. W1AGI-W1CEI has a new super-het. W1SY is rebuilding a small 'phone set. Don't forget to report on the 16th of each month, even though you have no traffic report. Let the world know you're on the air in Little Rhody.

Traffic: W1MO 38, W1GV 29, W1AAD 27, W1BUX 25, W1CAB 10, W1AWE 5, W1BQD 5, W1CPV 4, W1ASZ 2. EASTERN MASSACHUSETTS—SCM, Miles W. Weeks, W1WV—W1ASF and W1ALA head the traffic list and make BPL with W1CCP, W1ME and W1CHR. W1KH, W1ASF, W1HE and W1WV maintained contact with several Newfoundland amateurs obtaining vital information relative to the *Viking disaster*. W1ASI has nearly completed his new 150-watt 'phone. W1ABG has been troubled by atmospherics on 3500. W1CCP is building an MOPA. W1KY is QRL Convention work. W1WU reports that most of the members of the New Bedford Transmitting Association have passed the exam for licenses. W1LQ almost made the BPL. W1BXB has been off the air waiting for license renewal. W1LM reports a falling off in traffic. W1CAW says all Norwood hams took part in running the portable transmitter at the Exposition at the Army. W1AFP has been trying 14 mc. W1CHR has the call W1BOV for his portable. According to W1ATX, the Norwood "QRM Club" has a 'phone night every Tuesday on 3500. W1CQN was heard in Germany on 3500. W1ANK has been sick, hence less traffic. W1ME dropped his type '52 last month and now W1ACD's has gone west so the newest ORS are having their hard luck early. W1BZQ expects to have new transmitter going shortly. W1AAL wants traffic for R. I. W1BGW is on 3500 with a type '03A. W1BOE thought it was necessary to be an ORS to report traffic. Reports of traffic can be made by any station and are greatly desired. W1AOT is also trying 14 mc. W1ALA and W1RW ran up good scores in the Sweepstakes Contest.

Traffic: W1ALA 168, W1ASF 168, W1CCP 163, W1LQ 135, W1ME 124, W1CHR 118, W1LM 84, W1CQN 76, W1ATX 75, W1BOE 74, W1WV 55, W1AFP 55, W1ACH 42, W1BGW 42, W1KH 40, W1ACD 32, W1CAW 28, W1ASI 27, W1BZQ 26, W1AAL 19, W1KY 17, W1AOT 13, W1WU 10, W1ANK 5, W1BDF 5.

CONNECTICUT—SCM, Fred A. Ellis, Jr., W1CTI—The following make the BPL: W1ZY, W1MK, W1BEO, W1AFB and W1CDS. W1ZY tops the list this month. "RP" has nothing to say for himself. W1CJD has been appointed Route Manager. Write him for schedules. W1BEO has been trying out 7 mc. and 14 mc. W1AFB reports for W1AOK. This is the second report for W1CDS and he makes BPL. Congrats. W1BDI says W1ZY and the Sweepstakes helped swell his total. W1HD has suspended schedules for repairs. W1UE doesn't like W1BDI's total to be higher than his own, so promises he won't let it happen again. W1BVW marked the 6th District on 3.5 mc. W1CTI operates in the morning between 7 and 7:45. W1CLH marked 29 districts in Sweepstakes. W1AYB had to QRT while awaiting license renewals. W1DF sends in a fine report. Let's have more like that one, George. W1APJ sends in his first report and will apply for an ORS. W1BBU lost a week of operating waiting for renewal of station license. W1OS reports after a long period of inactivity. W1BNB is trying 7 mc. W1HQ has a 14-mc. schedule with Chicago. W1QV has been QRL with Power Co. leaks and the Radio Research Club. He reports a new station, W1BXT, at Groton. W1ADW made 50 points in Sweepstakes in 1 1/2 hours. W1AMG is always glad to QSP. W1NN is Morse and control operator at W1CC. W1FL has a horizontal zepp which works out FB. W1AUB handles his traffic on 'phone. Let's hear from the other 'phone stations. No gossip from W1AQF. W1TD wants schedules on 3.5 mc. W1ZL expects to swell our traffic total next month. W1BCG is getting ready to resume active work and we believe we may hear W1BGC soon. W1CDR, Ex-1JT, is back on the air in Westport. W1BRA is on the air in South Wilton. The Conn. Brass Pounders Assn., W1CBA, had Manley of VOQH as a speaker at their regular business meeting Sunday, April 12th. W1AAD of Pawtucket is complaining that Conn. stations are refusing to QSP. Any Conn. ORS refusing

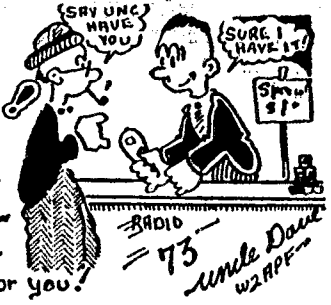
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Tested and functioning, not guaranteed, 250 tubes95
Used Wheatstone bridges \$25.00 and	45.00
Victor, 30 Henry, 150 Mills chokes, tapped	1.35
UX or UY sockets . . . . .	.12
Power Crystals, specify anywhere in the 3500 K.C. band, guar. to oscillate	4.75
Dustproof Bakelite crystal holders	1.50
Crystal blanks, finished and oscillating	2.75
Crystal blanks, unfinished	1.75
New UX-852 tubes, factory sealed cartons	28.00
Cardwell .00044 three thousand volt trans. condensers. New Cardwell midway trans. condensers 70 mmfd.	6.50
New Cardwell midway trans. condensers 150 mmfd.	2.35
Roller-Smith 0-2 1/2 amps radio frequency hot wire meter	3.50
1/2 Watt large Neon lamps, special, each	2.75
R.C.A. UX-874 voltage regulator tube, special . . . . .	.55
Dongan power transformer 300 watt 1000 volt each side of C.T. and with the following voltages: 3 C.T. 10 C.T. and one 10 and one 20 volt winding not C.T. Fully mounted. Weight 14 lbs	2.75
Ward-Leonard 10,000 ohm 50 watt trans. leaks	5.95
Five thousand ohm leaks . . . . .	.50
New Sprague 8 mfd electrolytic condensers . . . . .	.39
New Mersham 18 mfd electrolytic condensers	1.10
New design National R-3 mercury vapor, prepaid	2.00
Mercury vapor R-4 for high power Rectobulbs, prepaid And here's the R-81 Rectobulb, ideal for rectifiers up as high as 1000 volts, special	10.00
Slightly used R.C.A. UV-851 1000 watters, guar.	20.00
National var. condensers. .00045 three thousand volt with velvet vernier dials	4.40
New CeCo 230-2 volt (199 type) non microphonic.	175.00
New CeCo 231-2 volt (120 type) non microphonic.	9.50
New CeCo 232-2 volt screen grid D.C.	1.25
Sangamo .00025, .0005, .002, .001 5000 volt cond.	1.25
Enameled number 12 aerial wire, 100 ft.	1.90
Enameled number 12 aerial wire, 200 ft. coils	1.12
50 Watt sockets for 203A or UV-211 tubes . . . . .	.90
250 Watt sockets for West. Elec. 212 tubes	1.65
U.X. 231 tested and functioning . . . . .	.95
Latest Amateur Call Book	3.50
Victor A.B.C. transformers for 245 tubes . . . . .	.85
Genuine Baldwin type "C" phones, latest type, pr. . . . .	.85
Pilot or Silver-Marshall coil formers, each	2.45
National S-101 screen grid couplers	4.50
Stand-off insulators, similar to General Radio, each \$.10 or dozen . . . . .	.39
Arbophone A.C. amplifier, two units, power pack and binding post job, ideal for speech amplifiers, pair.	3.25
R.C.A. UX-250 new, ten only	1.00
Electrad large 50,000 ohm bleeder 45 mill 100 watt list \$5.50 net	10.00
	5.50
	3.00

The New National A.C. short wave 5 A.C. list \$79.50	\$46.00
National power pack for same, list \$34.50 net	19.65
Factory wiring, net	5.75
Above set when ordered complete with power pack and wiring	70.00
Aero listening monitors	10.85

THORDARSON TRANSFORMERS — LATEST TYPE

T-2385 — 550 and 750 volts each side of center	\$9.25
T-2387 — 1000 and 1500 volts C.T., 300 watts	12.70
T-2388A-1500 and 2000 volts C.T., 500 watts	17.00
T-2389A-1500 and 2000 volts C.T., 1000 watts	23.00
Microphone trans. T-2357 single button	2.95
Microphone trans. T-3020 double button	5.70
Microphone trans. T-3180 double button	11.50
Filament trans. 7 1/2 volt center-tapped T-2230	4.25
Filament trans. 12 volt C.T. T-2382, 80 K.V.A.	5.70
Filament trans. 12 volt C.T. T-2383, 175 K.V.A.	8.75
Crystals anywhere in the 160 meter band, guar.	5.00
Aluminum Panels Number 14 gauge	
7 x 10 net \$.50	8 x 1475
7 x 14 net66	8 x 1892
7 x 18 net82	8 x 24 1.20
8 x 1057	2 1/2 x 7 1/2 10.00
7 x 24 1.06	Special sizes cut to order.
Double slot-corner strip, two ft. for . . . . .	.35
Aluminum cabinets made to order	
UX-210 tested and functioning	1.20
Genuine De Forest 510 tubes, new	5.40
Used Western Electric 211E or D tubes	10.00
New Western Electric 211E or D tubes	17.50
Teleplex with four tapes, used	13.50
R.C.A. UV-211 new	22.00
2 mfd 1000 volt condensers . . . . .	.70
3 1/2 mfd 1000 volt condensers . . . . .	.90
4 mfd 1000 volt condensers	1.00
Above all unmounted but sealed in paraffin. Sturdy leads. 2 mfd 1150 volts sealed in fiber box. Beautiful job.	1.50
4 mfd 1250 volts oil impregnated condenser	3.25
All above condensers are working voltage, not D.C. rating, hi.	

ARSCO TRANSMITTING CONDENSERS WITH LARGE STAND-OFF INSULATORS

1 mfd 3500, transmitting filter condensers	\$8.50
2 mfd 3500 volt, transmitting filter condensers	14.00
1 mfd 3000 volt, transmitting filter condensers	8.50
2 mfd 3000 volt, transmitting filter condensers	12.50
4 mfd 2000 volt, transmitting filter condensers	8.50
8 mfd 2000 volt, transmitting filter condensers	12.50
16 mfd tapped at 8 mfd 1250 volts D.C.	8.50
4 mfd 1500 volts	2.00
2 mfd 1500 volts	3.50
4 mfd 1500 volts	5.75

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Powerful and sturdy! Carefully constructed of the best materials. Guaranteed for one year against any defect. Mounted. 2000 and 1500 each side of center-tap, 800 Watts, 28 1/2 lbs. \$13.25
1500 and 1000 each side of center-tap, 375 Watts, 19 lbs. \$9.65
1500 CT, 7 1/2 CT, 7 1/2 and 2 1/2 CT, 275 W, 14 lbs. \$6.45
1200 CT, 7 1/2 CT, 7 1/2 and 2 1/2 CT, 200 W, 11 lbs. \$5.85
Filament: Completely shielded in metal containers.
2 1/2V-12A — \$2.25; CT, \$2.75; 7 1/2V-6A — \$2.75; CT, \$3.20.
10V-8A — \$2.95; CT, \$3.40; 2 1/2V-4A & 2 1/2V-12A — \$2.75; CT, \$3.20.
2 1/2V-10A and 10V-5A — \$4.50; CT, \$5.25. 7 1/2 V-3A and 7 1/2V-6A — \$4.15; CT, \$4.95.
7 1/2 Volt, 3 Amp. (CT) and 7 1/2 Volt, 3 Amp. (Not CT) — \$3.65
Midget. Open frame. 1 1/2V-7A, 2 1/2V-4A, 5V-2A, or 7 1/2V-1 1/4A — \$1.10. CT. — \$1.20

EXTRA HEAVY POWER CHOKES

30 H., 300 MA., 20 Ohms, 19 lbs. \$8.65
15 H., 300 MA., 75 Ohms, 7 1/2 lbs. \$4.25

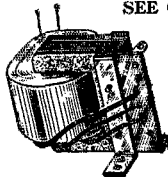
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HEAVY DUTY. Gives 750 CT., 5, 2 1/2, 2 1/2, and 1 1/2 Volts. A husky job for 245 P-P transmitter or AC set. Shielded. \$3.50
FRESHMAN. 125 Volt, 7 1/2 CT., 7 1/2 CT., and 375 Volts. Also gives grid bias, or 210, 300, sturdy. Metal cased. 7 lbs. \$1.65
FILAMENT. 7 1/2 Volt, 6 Amp. Unmounted. \$1.35

SEE OUR AD ON PAGE 92

DOUBLE BUTTON MICROPHONE TRANSFORMERS

Made by the Bristol Talking Picture Co.



An excellent input transformer for all standard microphones. Primary impedance is 100 ohms per button. Use one side for single button mikes. This transformer is equal in efficiency to others selling at many times our special low price of..... Only \$2.10

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Porcelain Bee-hive stand-off insulators, 10c. Doz., \$1.85c
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W-L, 10,000 Ohm, 50 Watt — 50c. 50 Watt CT — 45c. RCA 5000 Ohm, 50 W. — 39c. ELECTRAD 50,000, 25 W. — 82c.

GENERAL ELECTRIC FILTER CHOKES

A 5 Henry, 1000 Milliamper Choke, D. C. Resistance 25 ohms; 3000 Volt Insulation. In metal case, connections on panel. Three of these in series will give you a 15 Henry, 1000 MA Choke with a D.C. resistance of only 75 ohms. Your Choke Troubles are Over! Three for \$8.10 — Each, \$2.95
RCA Double. Each coil 30 H., 125 MA. Metal-cased..... \$1.85
RCA Single, 30 H., 150 MA., 200 Ohms. Open frame..... 95c
THORADSON: 30 H., 200 MA. — \$3.75. Double. Each coil: 15 H., 350 MA. — \$5.95. 30 H., 125 MA. Metal-cased..... \$1.95
Mounted RF Chokes, 85 Millihenry..... 35c

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Working Voltage 1 Mfd. 2 Mfd. 4 Mfd.
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1500 Volts DC..... 1.85 3.35 5.60
2000 Volts DC..... 2.85 5.25 8.35

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traffic without a valid reason will lose his appointment. The following ORS have been appointed: W1TD, W1BEO, W1BDD, W1QV; Official Observers: W1FL, W1QV. The non-ORS who have been reporting regularly will receive appointment upon application. W1ZY wins the Handbook this month with a total of 161 deliveries.

Traffic: W1ZY 505, W1MK 377, W1CJD 175, W1BEO 175, W1AKB 174, W1CDS 166, W1BDD 133, W1HD 100, W1UE 94, W1BVV 75, W1CTI 62, W1CLH 55, W1AVB 47, W1DF 43, W1APJ 36, W1BBU 30, W1OS 25, W1BNB 22, W1HQ 28, W1QV 18, W1ADW 17, W1AM 17, W1NN 12, W1AOK 12, W1FL 6, W1AUB 6, W1AQF 4, W1TD 2.

NORTHWESTERN DIVISION

IDAHO — SCM, Oscar E. Johnson, W7AKZ — W7ALY and W7ATN have joined the Naval Reserve. W7AT and W7QD have become 'phone enthusiasts. W71Y finds AC receivers the "bunk." W7AIV is having trouble with his crystal. W7AIIH is rebuilding. W7AOC and W7FB are still "plugging along." W7ACP is busy with A-A net. W7BAA has joined the A-A net. W7ABA can QSY 14-7-3.5-1.75 mc. in 2 minutes! W7AFT moves messages when he has the power. W7AIS and W7AMH are doing fine work on 3500-ke. 'phone. W7AKZ is resting after the Sweepstakes contest. W7ALW gets on now and then. W7ACO is having a bit of trouble getting started. Idaho boasts the following new hams: W7BAA, in Firth; W7BAG, in Montpelier; W7BAR, in Boise; W7BAT, in Shelley; W7BAU, in Idaho Falls; and W7BBE, in Rigby. Why not drop the SCM a line and let him know how you're getting along?

Traffic: W7ALW 2, W7AFT 26, W7AT 13, W7AKZ 50, W71Y 3, W7ACP 52, W7BAA 1, W7ABA 9.

MONTANA — SCM, O. W. Viers, W7AAT — W7FL reported direct by radio. W7HP is getting out well with his 3500-ke. 'phone. W7AMK wants one of those nice new ORS tickets. W7AKD and W7MZ, both of Kalispell, are after ORS, too. W7ASQ reports several new hams in Helena are going to be on as soon as they receive their licenses. W7CU says that he and W7BW joined the new club in Missoula. The club has a membership of 35 now. Watch our section grow, fellows! W7AKD and W7MZ are now consolidated and have a new \$75 shack for their equipment. W7AHP is also going after a MOPA. W7ASB reported on time. W7AAT sends the official broadcasts simultaneously on 3750 and 7040 kc. at 10:30 p.m., M.S.T., by the aid of a new automatic tape transmitter, and would like QSL card reports from every one and any one that copies these broadcasts.

Traffic: W7AAT 78, W7FL 77, W7AMK 67, W7HP 41, W7CU 41, W7ASQ 23.

OREGON — SCM, Wilbur S. Claypool, W7UN — W7ZD is still very consistent in ham activities. W7ED worked all U. S. Districts and four foreign countries besides his regular work in the shop in less than twenty-four hours. W7AMF reports several new stations in Coos Bay. W7QY suffered somewhat from a touch of flu. W7WR reports. W7EO is a scout master now. W7ALM has finished the new MOPA. W7PE works KA stations. The newly organized Coos Bay Amateur Radio Club is progressing very rapidly. W7AIG comments on the favorable conditions on 3.5 mc. W7AVT is a new Ham. W7APE holds up on news. W7AMQ is with us again. W7WL got the new crystal rig perking. W7IF turns in his ORS for cancellation.

Traffic: W7ZD 97, W7ED 71, W7WR 27, W7QY 22, W7AMF 48, W7AIIJ 11, W7PE 31, W7AMQ 15, W7AVT 4, W7WL 2, W7APE 32, W7AIG 10.

PACIFIC DIVISION

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — Congratulations are again in order to the traffic handlers of this section. It won't be long before we get into the "2000" class. W6YU and the SCM are working out a plan which should double the messages now being handled. W6YU nosed out W6HM this month with a fine total of 381 messages. Frank Kazmarek of W6YG was commissioned as Ensign in the U.S.N.R. W6AMM is a good PI contact station. W6ALW and W6ASE in conjunction with W6YU put on a FB Tri-Section meeting during the month. W6BAX has daily schedule with PI. W6DCP is keeping the SC section on the map. W6DBB and W6CH report for the first time. W6BMW says traffic better. W6FBU and W6FBW are on consistently. W6CEO and W6EGV of San Jose always say "QRU QTC." Next month starts the traffic contest between the San Francisco, East Bay and this

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NO COILS TO CHANGE



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Pilot Universal Super Wasp **\$79⁵⁰** A. C. Model (K-136) in Kit Form

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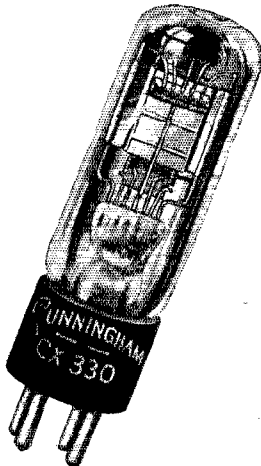
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Operating Voltages:

Ef 2 volts	Eb 90 volts
If .06 amperes	Ec -4.5 volts

Ideally suited for storage or dry cell battery operated receivers where a small filament power consumption is important. This tube can be used as a detector, audio amplifier and voltmeter tube for portable tube voltmeters. Its filament characteristics are similar to the CX-332 with which it is intended to be used in portable and battery operated receivers.

The amplification factor is 9.3, plate resistance 13000 ohms, mutual conductance 700 and normal plate current 1.8 milliamperes.

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section—let's all report and handle some real traffic—"2000 or bust" is our motto—let's make it.

Traffic: W6YU 381, W6HM 325, W6YG 265, W6AAM 140, W6ALW 124, W6BAX 78, W6DCP 51, W6LBB 65, W6BMW 52, W6CH 19, W6FBU 11, W6FBW 6, W6CEO 10, W6EGV 13, W6NX 2.

NEVADA—SCM, Keston L. Ramsey, W6EAD—About six fellows from W6CDZ's code class are ready for licenses. The first night of the U.S.N.R. in Nevada went off in fine shape. W6CDZ is the Control Station and W6AJP the Alternate Control. W6ACU at Hawthorne worked NNINIC with Push-Pull TNT and 200 volts on the plates. W6UO had schedules with W6AJP, W6ETM, W6DFR and W6PQ. W6CRF schedules W6AJP, W6CK, W6FAM and W6UO. W6BYR, our newest ham, sent in a message report. The University of Nevada Station is expected on the air by the first of April.

Traffic: W6AJP 114, W6CDZ 106, W6UO 91, W6CRF 14, W6BYR 10.

SAN FRANCISCO—SCM, C. F. Bane, W6WB—It is with pleasure that we announce the arrival of the East Bay, Santa Clara and San Francisco tri-section traffic contest. This contest is to start March 16th and end shortly before the convention to be held in San Francisco in September. W6EKC again leads the section. W6ERK makes the BPL both ways. We were pleasantly surprised to receive a splendid report from W6DOT. W6BNA has a bad case of BCL trouble. W6DZQ sends in a very nice report. W6ABB has received his license from Washington and is on again. W6ERS says that DX has picked up. W6CIS and W6ZS combined for the International tests and succeeded very well. Old W6DFR continues to smoke 'em out. W6DZZ is still suffering from his old tube trouble. W6DTZ worked day and night on the Internationals. W6CK sends in his first report, all working being done on 'phone. W6WN is installing the loud speaking system in the new Seal Stadium in S.F. W6CAL complains that all these tests are keeping him so busy that he barely finds time for school work. W6KJ has signed the dotted line with the Naval Reserve. W6BVL, a newcomer, reports for the first time. "The biggest convention ever—San Francisco, September 5th and 6th."

Traffic: W6EKC 284, W6ERK 258, W6DOT 125, W6BNA 105, W6DZQ 111, W6ABB 98, W6ERS 97, W6CIS 90, W6DFR 82, W6DZZ 60, W6DTZ 40, W6CK 40, W6WN 39, W6CAL 36, W6DK 18, W6BVL 10.

HAWAII—SCM, L. A. Walworth, K6CIB—H. E. Thomas of Kahuku has come on the air with K6CAB. He was formerly W6AIU. George Tam of the Mid-Pacific Institute has received his operators license and will soon set up a station. Wah Chan Chock, OH6ASR of king spark days, has just gone Ham again with K6AGI as a marker for his 75-watt 3500-kc. 'phone. After seven months of weary waiting McKinley Hi, K6YAL, has its license renewal and has a 14-me. CW set and a 3500-kc. low-power 'phone working overtime. K6YAJ is building a shack that would do credit to some commercials. K6AJA has finally gotten his set working as he wished. K6EGD is on the air again with more power. K6BAZ is the newest Ham in Honolulu. K6DMM says his 5-watt 'phone has been heard on the coast. K6EWB and 'CIB have ordered crystals for their 'phones. Many Hawaiian Hams report W6CNE R6 to 9 on 3500-kc. 'phone. Some W9 'phones have been heard also. K6AGL, a new Ham on Maui, sent the SCM cash for QST and ham supplies. K6COG is accredited from several sources as Hawaii's most consistent traffic station. James C. Bailey of K6EWB just returned from the mainland furlough and is wearing his Sergeant uniform once more. K6CDD has been off the air remodeling his station. The Radio Club of Hawaii seems to have hibernated during the rainy season as no meetings have been held for three months.

Traffic: K6AJA 163, K6COG 64, K6CIB 44, K6CCS 36, K6CDD 30, K6ACR 28, K6ALM 28, K6CMP 26, K6BAZ 24, K6CMC 3, K6BVP 2.

EAST BAY—SCM, J. Walter Frates, W6CZR—A total of thirty-one stations reported traffic this month. Traffic is one of the greatest and most interesting ham activities, far better than endless CQS for the same DX stations you worked last year, and therefore interest in it should be taken as a hopeful indication of renewed interest in ham radio itself. W6BPC leads the section this month. W6ATJ is in second place. He reports that W6YM at the Central Trade School is on the air. The gang at W6NM, Naval Reserve station, have a control room that looks exactly like one on a battleship. W6ALX lost his schedule with W6QP



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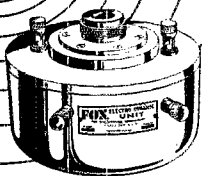
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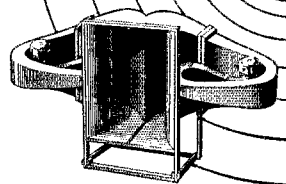
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THE AMERICAN RADIO RELAY LEAGUE HEADQUARTERS WEST HARTFORD CONN. U.S.A. RADIOGRAM		CITY OF ORIGIN HARTFORD CONN.		STATION OF ORIGIN W1KC		NUMBER 394		DATE MARCH 26		HOUR 37	
TO: CARL FRANK WIGGINS 14 HUNTS STREET N.W. WASHINGTON 25 D.C.				THIS MESSAGE WAS RECEIVED AT AMERICAN RADIO RELAY LEAGUE STATION ADDRESS: _____ PHONE: _____ CITY AND STATE: _____							
REGULARLY ADVISE PRESENT STATUS OF THE ORIENTAL TRAFFIC ROUTE RUNNING FROM THE EAST COAST TO THE OCEANIC ISLANDS. THIS OCEANIC TRAFFIC ROUTE MANAGER'S BULLETIN MAILED TODAY TO S. L. BARTZ											
RECEIVED FROM STATION LOCATED AT DATE TIME OPERATOR Sent TO STATION W0CQO EMERSON, PITTSBURGH, PA. 3/26/31 8:54 P.M. T. RP											

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AMERICAN RADIO RELAY LEAGUE

WEST HARTFORD, CONN., U. S. A.

because the latter had to go to work. W6ASH has been doing considerable traffic work on 3900 kc. W6DHS, the brother of W6DQH, reports for the first time. W6DQH has moved to Berkeley. W6EDO is back from his training period at NPG. W6CIG has been working VK, AC, VS, and KA. W6CGM was tied up for ten days trying to get an AC receiver to sing. W6RJ says that the Coos Bay Amateur Radio Club has been started at Marshfield, Ore., with 24 members. The Marshfield men are planning a big coast ham party during a big northern celebration in their place, in the early summer, and have invited all coast amateurs. W6BYS is off the air until he renews his license. W6CZN is building an AC receiver. W6AUT, RM of the northern district, says he got on last RMNITE, but couldn't raise a single RM or SCM. W6BBJ has his 14,000-cc. phone transmitter going. W6BTZ is hammering away after the traffic. W6FAJ went down to 14,000 kc. for a time and worked some DX. W6BB, the Radio Club of the University of California, is back on the air with type 10s in crystal-control rig, according to W6CAL. W6EIV has presented the club with his crystal transmitter and a few crystals. W6AIN has a type 10TPTG with 1000 volts on the plate. Hi. He says that W6BKM is the man who clicks off the DX. W6ZM, the CRM, worked some traffic during the past month. W6CBE comes in with his steady amount of traffic. W6AMY reports a new receiver in a brass can. W6RUX made a trip to Southern California. W6BZU was given honorable mention in the recent communication tests of the Army-Amateur net in this Corps Area. W6CYD is trying two type 01As for rectifiers with type 12A as oscillator. W6CFD is trying out the Fuchs antenna from his hangout in the hills. W6BI QRL lining up traffic contest. W6EBM is handling traffic by phone. W6AZH blew two type 52s. W6BMS is using 1-watt output on 3850 kc. W6EJA at Pt. Richmond announces that he may be off the air for some time, as his tanker is going on the Alaska-Seattle run. W6CDA has been off the air because of illness. He plans to enter the Veterans Hospital in San Francisco. W6EUM has opened up with a new call, W6SQ. W6DWI, W6ATT, and W6EW have been working all continents from W6EW's station in Richmond. W6AIC has just completed his 50-watt crystal outfit. The Berkeley Radio Association is well under way with a regular attendance of twenty. The Oakland Radio Club is planning a hamfest for the month of April at the California Hotel. W6BI is another RM who came on RMNITE and couldn't click with anybody. Two traffic contests got under way this month. The first is a three months contest between the East Bay, San Francisco and Santa Clara Valley Sections in which the total will be divided by the stations and the resulting figure will determine the winner. The other contest is between hams in the city of Oakland and those in the city of Berkeley in the East Bay Section. It will also be a percentage arrangement, which has been worked out by W6ZM representing the Oakland Radio Club for Oakland and W6BI representing the Berkeley Radio Association for Berkeley. W6AN is still trying to make his 3500-cc. transmitter do its stuff. W6EY plans to do things to the kilocycles this spring and summer.

Traffic: W6BPC 247, W6ATJ 103, W6NM 100, W6ALX 90, W6ASH 82, W6DHS 80, W6EDO 76, W6CIG 70, W6CGM 54, W6RJ 51, W6BYS 45, W6BBJ 42, W6BTZ 42, W6FAJ 32, W6BB 29, W6AIN 28, W6ZM 26, W6CBE 21, W6AMY 20, W6BZU 19, W6CYD 18, W6CFD 16, W6BI 13, W6AUT 10, W6EBM 9, W6AZH 8, W6BMS 4, W6CZN 3, W6EJA 2, W6CDA 2, W6BUX 6.

LOS ANGELES—SCM, H. E. Nahmens, W6HT—Realizing that confusion would result due to the election of a new SCM this report was held up to the last possible minute. If your report is missing it is probably still cruising around looking for the new SCM. Please address reports to 3710 E. Broadway, Apt. No. 1, Long Beach, Calif. If you will mail it not later than the 16th of each month it will simplify matters considerably and will be appreciated at this end — PLENTY. There is just one way we can put this Section on top and that is with YOUR support. Are we going to get back that Traffic Banner? ARE we? And HOW! Let's go, gang! Four men make the BPL this month and deserve plenty of credit: W6QP-W6AKW-W6AM and W6ID. From Manila, P. I., to Washington, D. C., a message was handled by W6QP. That's a record, says I with a great deal of glee, or if it aint, by cracky it oughta be. W6AKW reports three new hams in Lancaster, W6DNA-W6AUE and W6AER. W6CXW left for Japan March 19th and expects every amateur station to see. He is taking a photo album of local hams stations, gotten up by W6DZG. W6BGF is

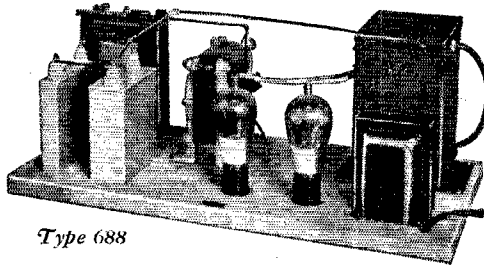
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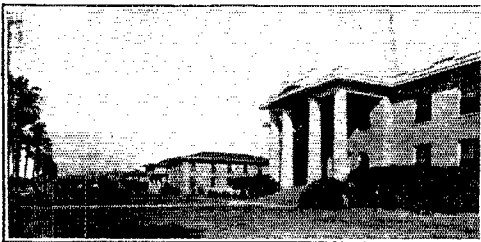
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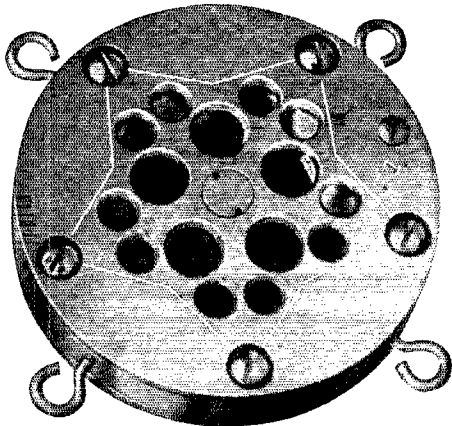
fixing up his heap for more and better 'phone. Thank goodness we won't have to listen any more to that awful groan. W6DER is rebuilding to use type '66 power supply. Now he'll get out or know the reason why. W6DQV sends in a good report. We'll miss you, OM, you're a right good sort. W6DEP, the dirty name, won all my jack in a poker game. There's just one remedy W6ESA. To get rid of that power leak move out of its way. W6BQC, the "Big Noise from Wasco," says he'll be in the BPL in a month or so. W6TE had his Rectobulbs go for a loop. So he had to resurrect the good ol' "soup." W6ON, who used to be W6AXE, reports a new ham, W6DVV. In case you fellows didn't know, the president of P. H. S. Radio Club is W6WO. W6EZG has a new quarter kw. Isn't that great? Now from ZL to HH he gets R8. W6DWW is a new ORS. Does he handle traffic — well I guess! A new long wave set has W6DZI. Now there isn't a thing he can't pull out of the sky. A schedule with CE3CH has W6EZX. So if you have traffic for Chile, shoot it his way. W6OF sure has his gall. Says he's looking for a GOOD job — Well, aren't we all? W6AFU sends in his first report. But he better keep his wave in the band, or he'll sure get out short. W6CZT who lives in L. A. has a darn good 'phone, or so they say. W6AM, who ranks with the best, worked 53 sections in the Sweepstakes contest. W6MA, who is W6AM's kid's ma, keeps a schedule with the fleet off Panama. The contests gave W6ID a load of fun. He also made the BPL, the ol' so and so. W6VH sure is a droll old cuss. Says this test message hooey is a lot of fuss. Two plate transformers, they both went west. But you should see the total W6CUH made in the test. W6BVZ increased power and hoped for the best. A power leak developed, and you know the rest. It was a big surprise to W6FJ when he worked a ham up Wyoming way. W6EWK, land sakes alive. Has a new "rock" jumpin' up and down on 7165. One hundred fifty watts output crystal control. Smaller than a suitcase, bless my soul. This is the outfit so they say of the portable layout, W6ZZA. A good hearted guy is W6DYJ but best of all he has a new QRA. Hot tripe cry!! (More blocks away.) If your transmitter clicks and the BCL wails, ask W6EAF about a filter that never fails. W6AZL, W6LNL and W6EZF all report, but send me no dope. I can't hang you, gang, if you send me no rope. W6ASM, president of the famed A.R.R.C., says he'll be on next month — well, we'll wait and see. W6AKD and W6DLI totals were received by 'phone. Ain't got no dope so caint make no pome. I'm afraid "Hooey" Strong of W6MK will be an old man with gray hair before he gets that crystal to play. W6DZF and W6ACL are two hams I don't have in my file. Why don't you get an ORS, OMs? It's sure worth while! W6HT had a flock of fun in the DX tests and contrary to all reports he is not fond of hobby hours. W6AGR has cancelled all radio activities and bids the gang "farewell." The Amateur Radio Research Club meets on the first and third Wednesdays of each month, at 8 p.m., "Under the towers of KGJF." Drop in and give 'em a treat some time. They're "researching" in Radio instead of politics now. At least that's what they say. The Pasadena Short Wave Club put on the quarterly Banquet March 21st. The Associated Radio Amateurs of Long Beach (may their tribe increase) meet every Friday night at 8 p.m. (or try to at least) in the City Hall right under the jail. Why don't you join 'em? It takes only four bits of your kale. I gathered dope this month by fair means and foul. Calling long distance 'phones made the OW scowl. Even the juggle pumper, I mean puddle jumper, was called into use, until it groaned and creaked with over abuse. But next month by gosh reports better get here on time. However, dear gang, don't expect to see it in rhyme. Unless, of course, you want it to be. But right now I must cut short with 73.

Traffic: W6QP 702, W6AKW 429, W6AM 311, W6ID 104, W6CXW 113, W6BGF 100, W6DER 65, W6DQV 60, W6DEP 56, W6ACL 52, W6ESA 46, W6DLI 43, W6EAF 40, W6BQC 31, W6TE 28, W6VH 25, W6EZF 25, W6ON 21, W6DZF 20, W6WO 17, W6EZG 17, W6DWW 15, W6DZI 15, W6EZX 14, W6OF 10, W6AFU 10, W6CZT 8, W6AKD 6, W6MA 5, W6AZL 4, W6CUH 4, W6HT 4, W6BVZ 3, W6FJ 3, W6EWK 2, W6ZZA 2, W6CVZ 86.

PHILIPPINES — Acting SCM, John R. Schultz, KAJR — This report received by radio via W6BIP: KAI AF is just back from a tour around the world. KAI CE has a pair of type '66s with a brute force filter. KAI CM made an MOPA. KAI DJ signs KAWYR at times. KAI EL is preparing for a commercial ticket. KAI HC shipped out. KAI HR has ten schedules daily. KAI RT has a low-power portable outfit. KAI SL handles traffic nicely. KAI SP works

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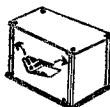
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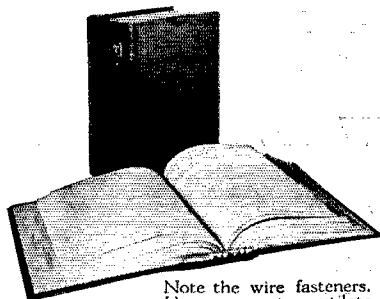
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with a Colpitts and TPTG. KA1SU has changed QRA. KA1XA rebuilt his set into an MOPA. KA1ZA is using a pair of 75-watters in push-pull Hartley. KA1DD, KA1EA, KA1JM, KA3FM and KA3LP are new hams. KA1AC will soon be on the air. KA1JR will soon apply for a WAC. KA1RC has schedule with KA1CE. KA1SL is the station of ex-W6EKE. KA1PW works DX nightly. The chief operator of OM1TB left for the states, but operator Pickering will continue schedules.

Traffic: KA1HR 1401, OM1TB 494, KA1JR 100, KA1SL 607.

SACRAMENTO VALLEY — SCM, Everett Davies, W6DON — W6BYB had his transmitter at the Flower Show in the Radio Club booth and received over three hundred messages. W6AK has a new crystal outfit. W6FW is now pushing his 50-watter with a crystal. W6AIM worked K7APW on 7 mc. W6BSQ will soon be on the air with two 50-watters. W6BEV is working east coast easily with a type '10. W6TEJ had his transmitter on display at the Marrayville radio show. W6BYB seems to be at about the top in the Sweepstakes for this section, with W6EJC, W6DGQ, and W6CCJ running close behind. W6GPF is on eighty with one KW. W6DYF and W6EOU have new Fords. W6EJC is playing with the high school's 150-watt 'phone set. W6EMK and W6DON spent a week in San Francisco trying to get a job on the yacht "Northern Light." Her call is MGKP. W6ER lost his mother and is not on much.

Traffic: W6EJC 153, W6CQE 95, W6BYB 174, W6CGJ 122, W6AIM 25. (W6CGJ 39, W6AIM 32, W6BDX 12. Jan. 15th to Feb. 16th.)

SAN DIEGO — SCM, H. A. Ambler; W6EOP — W6CTP worked China using a type '71A. W6ACJ has two schedules now. W6EPF is looking for schedules. W6CTR is building a new 'phone outfit. W6EQS says low power is the bunk. W6AXV will be on soon with a new 75-watter. W6BAM has been trying a couple of type '10s in Push-Pull. W6BAS has a new standard frequency assembly and checks regular with WWV. W6AYK has a new Hetrodyne Frequency meter. W6EZZ is back on 'phone. W6ADC is still QRL. College. W6QY is back on 14 mc. W6DNS is very QRL making radios for cars. W6DNW now has two transmitters, one on the 7-mc. band for CW, and one on the 3.5-mc. band with crystal-controlled 'phone. W6EOP worked Japan. W6EOP's mother lives only two blocks from W9BSK and messages are exchanged weekly. W6DAI is selling sets to BCLs between ham hours. W6HY is on 7 mc. W6BOW is the new call of Dr. McCormick. The PAT Club held a weekly meeting at the home of W6BOW. W6DNL has been with the fleet down in the Canal Zone. W6AJM expects to be on 14 mc. again soon. W6BFB is on with a motor generator.

Traffic: W6CTP 209, W6ACJ 30, W6EOP 14, W6EPF 7, W6CTR 4, W6EOS 4, W6AXV 1, W6BAM 1.

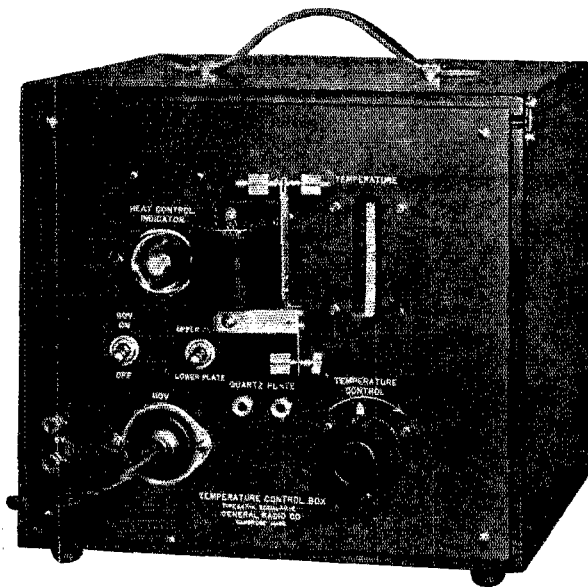
SAN JOAQUIN VALLEY — SCM, E. J. Beall, W6BVY — Just look over the total for this month — 1286. W6BRV was the traffic king, with W6FFP running second. W6AHO, W6QA, W6CLP and W6CXT can always be relied on for a good report. W6AME is trying push-pull. W6BNH got married recently. W6EXM reports a new station answering the call W6EAR. W6QA is still grinding crystals. W6BRV says the 14,000-kc. band is getting good for DX. A 50-watter is responsible for the good traffic report from W6CLP. W6COJ is working wonders with his type '45a. W6DCI is all hot for 'phone. W6BUZ also reports 14,000 kc. good. W6BJE uses sponges on cans because of mechanical QRM. W6AHO is on 'phone 90% of his time. W6FFP is the champ of the Section when it comes to contests. The SCM with twelve members of the MARC dropped in on the newly formed Radio Club at Stockton, Calif. The MARC lost their club house in the Elks Bldg., Modesto, and at this writing new quarters have not yet been decided upon. W6BVY is using two type '11D tubes to handle his schedules until the new MOPA is complete. A petition was received from Kern County asking permission to come into this section. These fellows know their antennas and bugs like nobody's business.

Traffic: W6QA 145, W6BRV 388, W6BYH 14, W6CLP 140, W6COJ 57, W6DCI 14, W6BUZ 28, W6BJE 15, W6AHO 137, W6FFU 2, W6FFP 179, W6CXT 85, W6BVY 64.

ROANOKE DIVISION

VIRGINIA — SCM, J. F. Wohlford, W3CA — W3CXM transmitted the Red Cross message on March 16th. W3HY has worked VK, ZL, K6, K4, KF, EAR, NJ, HH, CM, NN and F. W3FJ works schedules on 3900 kc. W3WO

MODERNIZE YOUR TRANSMITTER



Install a good temperature-control box and hold the temperature on your quartz plate to 0.1°C . The unit shown here is equipped with mercury thermostats and has room for two crystals.

It is ideal for the better amateur and for monitoring purposes in the broadcast station. The price is \$150.00.

Write for details, mentioning whether you are interested in amateur or in broadcast uses.

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THE NEW VARIABLE-MU TUBE

New in Design...Advanced in Principle...Efficient in Performance

EVERY radio experimenter and engineer will be vitally interested in this newest invention — the Arcturus Type 551 Variable-Mu Tube.

Seldom, in the rapidly changing radio industry, has one tube embodied so many vital advances vastly improving operating efficiency of any receiver — with practically no changes in existing circuits.

By using a new principle, this tube eliminates the need for double pre-selectors, dual volume controls, and "local-long distance" switches. Even with signal input voltages increased 25 times, operation is free from distortion. Receiver hiss is reduced, and maximum cross-talk divided by 500. Learn how these remarkable results are obtained. Write for special bulletin describing the Arcturus Variable-Mu Type 551 Tube. Arcturus Radio Tube Co., Newark, N. J.

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For Amateurs, Commercial Stations and Dealers



THE STANDARD OF COMPARISON

POWERTYPE crystals are recognized as the best.

No off frequency operation with
POWERTYPE CRYSTALS

FULLY GUARANTEED BY A RELIABLE COMPANY

Ground by experts and calibrated from precision standards. Crystals for amateurs ground to approximate frequency and calibrated to better than 1/10 of 1%.

1715-2000 kilocycle band	\$10.00
3500-4000 kilocycle band	12.50
7000-7300 kilocycle band	20.00
One inch oscillating blanks	4.00
Plug-in dust proof mounting as illustrated above	6.00
Twelve inch minus 10 to plus 110 degrees Centigrade thermometers	3.00

Grinding instructions furnished with crystal blanks.

550-1500 kilocycle band — calibrated at any temperature plus or minus 500 cycles desired frequency complete with plug-in dust proof mounting — \$45.00. Constant temperature heater oven less crystals \$150.00.

We do any kind of special crystal grinding for any frequency.

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It is important that amateurs stay within the limits of their assigned frequencies. Operate with the knowledge and assurance of being on the frequency you claim to be. The only sure way is crystal control. Our calibration is not guesswork, but is made with laboratory precision instruments. Consider these things when buying a crystal — they are important! Many amateurs have found this out too late.

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Consult us on your problems.

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Blank Home Recording Records 6" \$.45, 8" \$.65, 10"	\$.85
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Weston Pattern 476 0-150 volts A.C. list \$10.00, special new in original cartons	\$5.00
R.C.A. New U.X. 866 tubes	\$10.85
Pyrex 7" aerial insulators	\$1.05
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Attenuator network, T system, 60 db in 3 db steps, 500 ohm line, units \$27.50. Adjustable gap, open type chokes, actual inductance at the D.C. rating. 30 Henry at 100 MA, 13 lb. \$9.75, 200 MA, 20 lb. \$11.50, 380 MA, 32 lb. \$16.50, 600 MA, 40 lb. \$21.50, 1 amp. 130 lb. \$58.00, 1.5 amp. 310 lb. \$88.00, 2 amp. 530 lb. \$145.00, 20 Henry at 200 MA, 18 lb. \$9.50, 380 MA, 25 lb. \$12.50, 600 MA, 34 lb. \$18.50, 750 MA, 42 lb. \$20.00, 1 amp. 105 lb. \$48.00, 2 amp. 410 lb. \$115.00, 10 and 5 Henry chokes in stock — get our complete bulletin showing choke design and gap adjustments.

TRANSFORMERS — (See our April ad).

ONE DAY DELIVERIES

HILET ENGINEERING CO., ORANGE, N. J.

rebuild transmitter. W3AEW is building 500-watt crystal job for 7 and 3.5 mc. W3AAJ finds time to handle some traffic in addition to the great amount of work that is done handling the Route Manager job. W3AMB has finished the frequency measuring equipment for his station. W3CFL has crystal on 3500-ke. band and two type '45s in PP on 14,000 kc. W3ARU has his OO stuff working, so watch your step! W3AVR, a new station at Charlottesville, is just getting started with low power. W3JKU had YLitis, but think it's all over now. W3TNI is still convalescent from recent illness. W3AER is rigging up 500-watt for 100% modulation for 'phone on 3500 kc. W3WMM is working 14 mc. mostly. W3II is back on the air after getting married. W3AWY has moved to Portsmouth. W3AGY says when he has finished plowing that fifteen acres of stumps and rocks he'll be back on the air with the gang. W3BDZ is still operating 'phone after midnight. W3ZA has dynatron calibrated and will give any ham his frequency, if requested. W3BZ has finished his dynatron. W3BGS is still working them all over the lot with his low power outfit. The Virginia Net on Sunday afternoons seems to be the ideal thing for the hams in and around the state. If you have any grouch that you want to get off your chest that you think should be handled at the Board meeting in May, write your Director about it now.

Traffic: W3XXM 605, W3HY 312, W3FJ 286, W3WO 256, W3AEW 156, W3AAJ 104, W3ARU 102, W3AMB 25, W3CFL 53, W3CA 8.

WEST VIRGINIA — SCM, D. B. Morris, W8JM — Three hams made the BPL this month: W8OK, W8TI and W8ANV. W8BTU sends in a fine report. W8CLQ reports regular contacts with West Coast stations, both 'phone and CW on 3500 kc. W8BOK still knocks them cold with his crystal-controlled 3502-ke. 'phone set. W8DPO says "conditions not so hot in the Interation DX contest." W8HD reports being heard by YL-2BV and G6FY on the 3.5-mc. band. W8BWK also reports tough luck in the DX contest. W8BIZ wants W. Va. schedule north. He is on 7100 kc. almost every night from 7 till midnight. W8BOW said "too much school." W8CAY is being moved to the Armory in Charleston, where it will be used by both National Guard and Naval Reserves. W8CDV has his new type '66s working for his type '52. The West Va. Amateurs' Assn. held its monthly meeting at the Hotel Grafton, March 1st. By dropping a card to W8BOK full information can be received on the next meeting. All hams welcome. The SCM would appreciate hearing from Ex-W8VZ.

Traffic: W8OK 281, W8ANV 125, W8TI 98, W8BTV 68, W8CLQ 46, W8BOK 38, W8DPO 28, W8HD 26, W8JM 20, W8BWK 13, W8BIZ 11, W8IB 10, W8BOW 7, W8CAY 5, W8CDV 4, W8ATE 4, W8AYK 3, W8DRL 2, W8QR 2.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — W4MR has returned to Greensboro after an absence of nine months. W4EG is trying to get two type '03A's to put current into his Zepp. W4RX took an active part in the DX contest. W4AKC is back on the air with a new rig. The report cards of W4AEL and W4ZH looked like copies of the International Prefixes. W4AGO keeps pounding away. W4ZB has portable W4ZZF and W4AOK. W4AIB is building a crystal-controlled 50-watt for 7000 kc. W4EC has portable W4PBO. W4ABW can't get his MOPA to perk right. W4JR wins the traffic total prize this month, if anybody in N. C. offered one. W4AAE was active in the Sweepstakes contest. W4DQ reports that W4AGF and W4BV have built MOPA's. W4TU hooked a VK. W4TR has decided to attempt some 14-mc. work. W4AA says that he is keeping a 75-watt on 7106 kc. W4GG tells us that DX signals have been falling pretty thick around Asheville. W4ABV is still with us. W4AK has a new MOPA. W4ANU does not get out so well with his Hartley. W4UI sold out. W4QS is well pleased with his December QST AC receiver. The State College Radio Club has the call W4ATC. W4PBD drops us a traffic report for the first time.

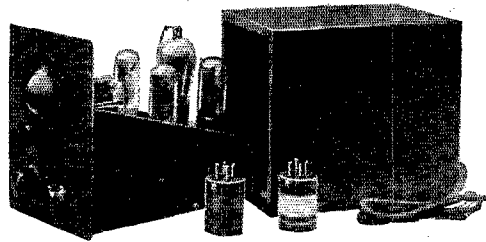
Traffic: W4JR 240, W4AEL 131, W4TR 94, W4ABW 76, W4ZH 75, W4AAE 72, W4DW 67, W4ZB 58, W4ABV 38, W4AA 32, W4EG 19, W4AIS 15, W4AGO 12, W4PBO 10, W4PBD 5, W4RX 5, W4TU 5, W4AKC 4, W4DQ 2, W4GG 1.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ — W7AAH reports a new ham, W7AXK, at Buffalo, Wyoming. W7ALI again reports to W7AAH by radio. W7HX has been under the weather. W6BTX and the other Salt Lake City hams are trying to organize a U.S.N.R. unit. W7AEC, Pinedale, Wyoming, hopes to have some schedules soon. W6DPO has been busy at school. W6BVB

Sensational All-Purpose Receiver

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! This is a combination Short Wave and Broadcast Receiver for Battery Operation, utilizing 4 new super-sensitive 2 v. tubes. It employs 1 — 232 screen grid R F, 1 — 230 detector, 1 — 230 1st audio and 1 — 231 power audio. Sold with S. W. coil (24 to 53 m) and Broadcast Coil (200 — 550 m) its range may be extended anywhere from 11 to 1000 m by the purchase of additional plug-in coils. It is admirably adapted to aeroplane, auto and police work because of its lightness (9 lbs. net) and portability. It measures only 6" x 8" x 10" deep. You will be astounded at its marvelous performing qualities. Price complete with 2 coils, cabinet and cable, less tubes — \$36.70 list.

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40-75 meters	\$17.50
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1 in. Tested blanks, 200-400, 400-600 meters	3.50
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(A Calibration furnished with each crystal)

Sections of any practicable dimensions made to order
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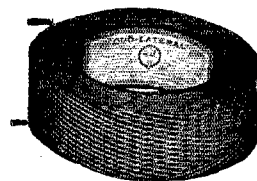
Radio operators are officers aboard ships. Well paid, pleasant work, travel. You can qualify in a short time in our well-equipped school under expert instructors.



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We introduce for the first time, our new line of power transformers. Completely shielded. Excellent regulation. Note the very low prices.

Type	Wattage	Output Voltage	Filament Voltages	Price
A	200	600-0-600	7½ ct. and 7½ ct.	\$3.75
B	250	750-0-750	.....	4.95
C	350	1000-0-1000	.....	6.25
D	500	1500-0-1500	.....	9.50
E	750	2000-0-2000	.....	13.00

FILAMENT TRANSFORMERS. An efficient, sturdily constructed job. All secondaries center-tapped. Completely shielded and mounted. Deduct 10% from these prices if no center-tap is wanted.

Voltages	12 Watts	25 Watts	50 Watts
2½	\$1.25	\$1.95	\$2.50
2½ and 2½	1.50	2.25	2.75
7½	1.25	1.95	3.25
7½ and 7½	....	2.25	3.95
10	....	....	3.40

MICROPHONE TRANSFORMERS: for double and single button microphones. Excellent quality, fully shielded. Special \$1.40

RCA VICTOR Power transformers. 150 Watts. Supplies 650 Volts center-tapped, 2½, 2½ ct., 1½, 1½, and 5 ct. Reduced to \$2.25

COLUMBIA 30 Henry, 200 Mill chokes. Very rugged. Specially priced. \$2.50

COLUMBIA Double chokes. Each section 30 Henry, 200 mill. A real heavy duty job. Special. \$4.75

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GRID LEAKS: Hardwick, Hindle, wire wound, for all tubes up to 250 watts. 10,000 ohms, 1" x 6", 95c; 5000 ohms, 65c.

QUALITY TUBES: Made to stand the gain. Free 15 day replacement. Type X281 — \$1.50; X210 — \$2.05; X250 \$2.15; X224 — \$1.05; X222 — \$1.85; X171A — 70c; X280 — 70c; X245 — 70c. All tested for oscillation.

COLUMBIA TRANSMITTING FILTER CONDENSERS Newer and better. Extra heavy duty and with a REAL replacement guarantee. Note the low prices.

Capacity	700 d.c.	1000 d.c.	1500 d.c.	2000 d.c.
1 mfd	\$1.10	\$1.50	\$2.40	\$3.90
2 mfd	1.75	2.40	3.85	6.40
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WEST NEELECTRIC 1000 Volt condensers. 1 mfd. 75c

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There was never a better resistor for experimental work than TRUVOLT. Adjustable clips for exact voltages.

Write Dept. Q-5 for new 36-pg. catalog

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Pacific Coast Ham Hdqtrs.

RADIO SUPPLY COMPANY

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Sum lines!

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And remember—All mail orders out the same day received.

Get our catalog—Everything for the amateur
(W6FBI located in building)

reports again. W7AWZ is a promising new ham in Douglas, Wyoming. W6DPJ makes the BPL both ways. Applications for Official Observer appointments are solicited from any who have accurate frequency measuring equipment, as off-wave operation is still very prevalent.

Traffic: W6DPJ 422, W7AAH 58, W7ALI 48, W7HX 46, W6BTX 32, W7AEC 16, W6DFO 15, W6BVB 2.

COLORADO—SCM, E. C. Stockman, W9ESA—

There is a contest on among the members of the AROD for the best dynatron frequency meter. Three prizes will be awarded based on the merits of the meters to be exhibited at the regular meeting of the club, May 8th. An announcement has been received that the R.I. is the proud Daddy of a junior op. Congratulations, OM, and also to Mrs. Earnhart. A new Navy Amateur net is being formed in this Section, and all fellows interested should communicate with W9BCW. The Army Amateur net is working out FB on Sunday morning schedules. The SCM would like to receive some applications for OBS. W9DNP is the newly appointed Official Observer. W9ASD and W9BNK have new MOPAs.

W9CVE sends in a good report after an absence of several months. W9GBQ, the Route Manager, will be glad to arrange schedules for any of the fellows. W9CDE's traffic total is increasing. What's the matter with the Pueblo gang? W9BVC reports good work on 'phone. W9DCA and W9DRQ are now in operation at Fort Collins. W9FRQ has schedule with K6DV. W9DNT reports two new stations at Greeley, W9PO and W9GLP. W9FXQ has returned to Denver—he has portable call W9GNZ. W9CSR is still working on the new receiver. W9FXP is building a new combination transmitter-receiver. W9APZ is getting good results with 135 volts on 3500 kc.

Traffic: W9DNP 414, W9ESA 132, W9EAM 106, W9CVE 100, W9DCA 68, W9AAB 64, W9BNK 32, W9FXQ 32, W9FRQ 19, W9CBQ 16, W9ASD 14, W9CDE 14, W9FXP 8, W9APZ 4, W9DNT 3.

SOUTHEASTERN DIVISION

ALABAMA—SCM, Robert Troy, Jr., W4AHP—

W4AG makes the BPL on deliveries. W4AKM won a fountain pen in the A-A QSO contest. W4DS sends in a nice report. W4AAQ entered the International contest. W4LM is working hard earning a living. We welcome a new ham at Kellyton, W4ASM. The SCM had a visit from W4CB. W4AHP is very busy with non-amateur activities. W4AJR is on occasionally. W4RS is getting out very well on 'phone and CW. W4EF is working DX on 'phone. W4FC is back on with a TPTG. W4FY is getting back on the air. We enjoyed a visit from W4QM and W4FY.

Traffic: W4AG 168, W4RS 47, W4DS 58, W4AAQ 7.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS—SCM, J. C. Hagler, Jr., W4SS—

The fellows certainly are sending in reports in fine style, and I thank each one for his cooperation. W4PJ made contact with N. Africa and Spain in the DX contest. W4AJH was also in the DX contest and worked VO, EAR, and VKs. W4AAY is trying out a 3500-kc. 'phone. W4DV sends in a nice traffic report. W4AOR refuses to let me lose a cent on the post card, so he puts a good report on it and sends it back. The Columbus, Ga., gang has formed The West Georgia Radio Club. W4BW says that some old timers are getting back on the air over in Macon. W4ATF is getting out FB with 600 volts on a type '50. W4MA is a new ham in Temple, Ga. W4QE forwards the report from CMSYB which he received by radio. W4PM was the first station worked by W4MA. W4KV, Radio Aide to the Signal Officer of the 4th Corps Area, sends in a good report. CMSUF is building a 14-mc. 'phone. W4GB has worked almost all States east of the Miss. River on 'phone. W4AJ wants ORS and OO. W4ACH and his visitor, W4ABP, send in a report and tell of a new ham in Marietta, Ga. W4WB says the Macon Amateur Radio Club has 10 or 12 members and more coming in. W4JD is changing jobs and will be off the air for about three months. W4HN and W4QZ got the Ga.-S. C. 'phone net going fine and hope to establish one in N. C. also. Our 'phone net works Sunday mornings at 6:30 a.m., E.S.T. The members call themselves the "Early Birds," and hope to catch all the best worms. W4GT is building a new MOPA. W4AHT says that W4DN has moved to Atlanta. CM8BY will be on watch Tuesday evenings at 8 p.m., E.S.T. W4AMG is still working his brother, W9AMV, on schedules. W4QZ has put in an application for 14-mc. 'phone. W4ADD has daily schedules with his brother in Jacksonville. W4KX tells of a new Ether Buster in Thomasville, Ga., W4ASZ. W4WZ has been re-

QST Oscillating Crystals

"THE STANDARD OF COMPARISON"

AMATEUR BANDS:

How does YOUR signal compare with the accepted IDEAL signal? May we suggest our product to attain this IDEAL signal? HERE'S HOW:

One item of great importance is the *frequency stability* of your set. Does it *stay on one frequency*? If not, our *power crystals* will solve that problem. SCIENTIFIC RADIO SERVICE crystals are *known to be the best obtainable*, having ONE single frequency and highest output. With each crystal is furnished an accurate calibration guaranteed to *better than a tenth of 1%*. *New prices for grinding power crystals in the amateur bands are as follows:*

1715 to 2000 Kc band. \$15.00 (unmounted)
 3500 to 4000 Kc band. \$20.00 (unmounted)
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BROADCAST BAND:

Power crystals ground in the 550-1500 Kc band accurate to plus or minus 500 cycles of your specified frequency fully mounted for \$55.00. In ordering please specify type tube, plate voltage and operating

temperature. All crystals absolutely guaranteed regards to output and frequency and delivery can be made within two days after receipt of your order.

CONSTANT TEMPERATURE HEATER UNITS:

We can supply heater units guaranteed to keep the temperature of the crystals constant to *better than a tenth of 1 degree centigrade* for \$300.00. Two matched crystals, centrod to your assigned frequency in the 550-1500 Kc band with the heater unit complete \$410.00. More detailed description of this unit sent upon request.

ATTENTION AIRCRAFT AND COMMERCIAL RADIO CORPORATIONS:

We invite your inquiries regards your crystal needs for Radio use. We will be glad to quote special prices for POWER crystals in quantity lots. We have been grinding *power crystals* for over seven years, being *pioneers* in this specialized field, we feel we can be of real service to you. We can grind *power crystals* to your specified frequency accurate to plus or minus .03%. All crystals guaranteed and prompt deliveries can be made. *A trial will convince you.*

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If not you had best act promptly. These copies are in great demand. They won't last long — particularly the complete yearly groups.

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"QRQ"

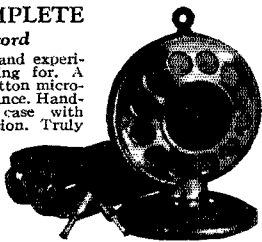
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Increase your speed and *step up to a better position*. CANDLER SYSTEM will help you. Scientific methods. Result of 20 years research and experience by world's most successful developer of Morse and radio operators. Eliminates all "hit-or-miss" in telegraphing.



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 World's Foremost Code Specialist personally directs you.

ADVANCED COURSE for Operators.

Trains brain, muscles, nerves to coordinate in doing fast, accurate work. Corrects "Glass Arm" and faulty sending. Develops concentration, confidence, and increases sending and receiving speed to a remarkable degree.

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building WTCO. W4OT just returned from Sarasota, Fla. W4ST is coming on again with a type '10 in a High "C." W4WQ says that W4IU is returning to the air soon. W4WN is building a 250-watt 'phone set. W4MJ is rigging up his Zepp "Sky Hook" for 3.5 mc. W4KU is on every night from 7 till 10 p.m. pounding away on 3790 kc. QRM from sleeping and learning how to teach physics keeps W4MN from pounding brass except on Monday nights. W4ZW is sporting a new BC license. W4ZW and W4LL visited W4PM. W4UC went over to see the gang at Fort McPherson. W4AZ is a Lt. in the Communication Section U.S.N.R., and had 10 days active duty as Asst. Dist. Communication Officer at the Charlestown Navy Yard. W4AEV is putting in an MOPA with a 50-watt power amplifier. W4ADS is coming on with a 3500-kc. 'phone. W4AY was out of town for a month. W4AAZ is on mostly at noon. W4BO put up a 55-foot pole for his antenna. W4AQN is getting good results from a low-power 'phone outfit on 3500 kc. W4LR is joining the A-A Net. W4OX's Jr. op is 9 months old now. W4IJ has much QRM from college and the YLs. We are still looking for an active amateur to be RM. Some of you brass-pounding hams speak up and let's get things humming. ORS Certificates have been sent out to the following stations: W4PJ, W4AJH, W4AAY, and W4DV. W4ATZ is a new ham in Augusta. We also greet W4AMM in Savannah and W4ARO in Cedartown. W4DX is just a beginner, as he started in 1913, and is Pres. of the Ham Club in Columbia, S. C. W4MN is Secy.-Treas. W4AQB sends in his first report. W4ABU has been busy at the Arsenal in Augusta.

Traffic: W4SS 117, W4KV 57, W4AJ 33, W4DN 33, W4PJ 28, W4PM 27, W4DV 23, W4CT 21, W4AFQ 19, W4AJH 19, W4AOR 15, W4AOX 13, W4AAY 11, CM8YB 20, W4HN 11, W4JD 11, W4ACH 10, CM8UF 5, W4GB 5, W4BW 4, W4WB 4, W4AQB 3, W4MA 2.

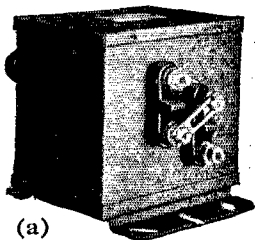
WESTERN FLORIDA—SCM, Edward J. Collins, W4MS — W4QR is going to have a "WAC" certificate on his shack wall before long. W4SC, the "FNG" station, has been kept on the air by Corp. Wiggins. W4AAX, our big 'phone man, is still getting out FB. W4ACB has at last installed remote control. W4ALH has been working Hawaiians, Englishmen and Aussies. Hope all you fellows can arrange schedules with W4KB and his YF. He is our member of the Chair Warmers' Club. W4AFT is rebuilding to MOPA. W4DP is heard regularly. W4AQY is waiting for his type '81s to arrive. W4A00 is an exW9 and will be on shortly with a 1750-kc. 'phone. W4ADY was heard, and we sure are proud to know he is at last on the air. W4RK has reached the fifth stage, but we hear that the new YF is interested in the code. Congrats, OM. W4AAB and W4ABF report they are building a 100% MOD 'phone. W4UW-W5N0 wants to arrange a schedule to keep in touch with his mother at Cottage Hill, Fla. How about it, gang? W4ASV is a new ham. W4ALJ has been having trouble with key thumps. W4VR will be on shortly. W4PN has been having battery trouble. W4QK is waiting for his type '81s, too. W4QU is on regularly. W4MX is about to change QRAs. W4FV was very active in the International Contest. W4ART is a new ham call at Enslly. W4ARD-W6FCY is getting out FB on 7000 kc. W4ABJ is on with very low power. W4MS has a 3500-kc. crystal that he intends to operate on 7120 kc. The XYL at W4MS is causing a 3500-kc. 'phone to be built, since she had a QSO over W4AAX's 'phone at the Hamfest. Let's see more reports next month OMs and don't forget to apply for that ORS appointment.

Traffic: W4ALH 34, W4AAB 24, W4ABF 20, W4FV 17, W4MX 10, W4QR 10, W4ACB 8, W4ALJ 2, W4SC 5, W4MS 3, W4AAX 1, W4ARD 9, W4QU 4.

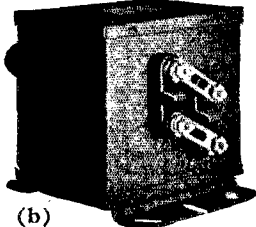
WEST GULF DIVISION

NORTHERN TEXAS—SCM, Roy Lee Taylor, W5RJ — W5WW has been piling in plenty of DX during the recent tests. W5HY is interested in Army-Amateur work. W5CF received a "heard card" from Siberia. W5QU wants schedules with West Texas and New Mexico on 3.5 mc. W5BII reports a new ham, W5IZ, at Dodd City. W5AUL is now signing W5BSN. W5RJ recently paid the West Texas gang a visit. W5ARV worked Chile and England. W5BAD wants all the fellows interested in traffic to drop him a line, so that he may have information to help him in lining up schedules on all bands. W5LY wants more foreign reports on his signals. W5ALA is also requesting foreign reports. W5BAM is trying his luck at DX. W5AGQ wants the VK's to look for his R10 signals on 7 and 14 mc. W5GZ reports school QRM. W5AZP reports QRM from OW and WORK. W5BND is getting out FB on 3.5-mc. 'phone.

Our new Circuit Diagram on this equipment will enable you to obtain results not obtainable before. It is free. No obligation. *Send for it today.*

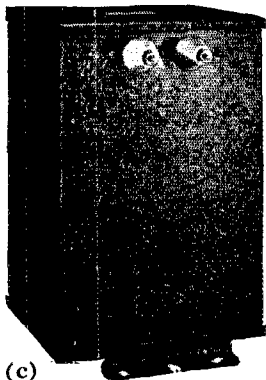


(a)



(b)

Above, Thordarson's Filament Supply Transformers — (a) Primary Coils connected in series for use on 220 volt 60 cycles (b) Primary Coils connected in parallel for use on 110 volt 60 cycle current. At left, Thordarson's Filter Reactor.



(c)

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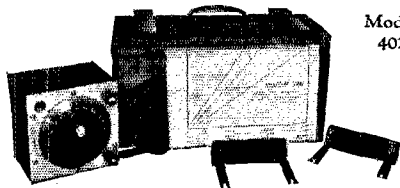
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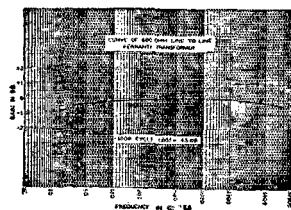
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W5BNO worked 5 foreigners at two sittings. Ft. Worth has two new hams, W5AIW and W5QY. Abilene reports two new ones also, W5PO and W5GO.

Traffic: W5WW 398, W5HY 300, W5CF 104, W5QU 104, W5BII 92, W5AUL 90, W5RJ 35, W5ARV 20, W5BAD 9, W5ALA 8, W5LY 6, W5BND 4.

NEW MEXICO — SCM, Leavenworth Wheeler, Jr., W5AHI — W5AUW reports a nice batch of traffic, making the BPL both ways. W5ND is back on the job as A-A State Net Control. W5AHI places in the BPL for the eighth consecutive month.

Traffic: W5AUW 373, W5AHI 227, W5ND 4.

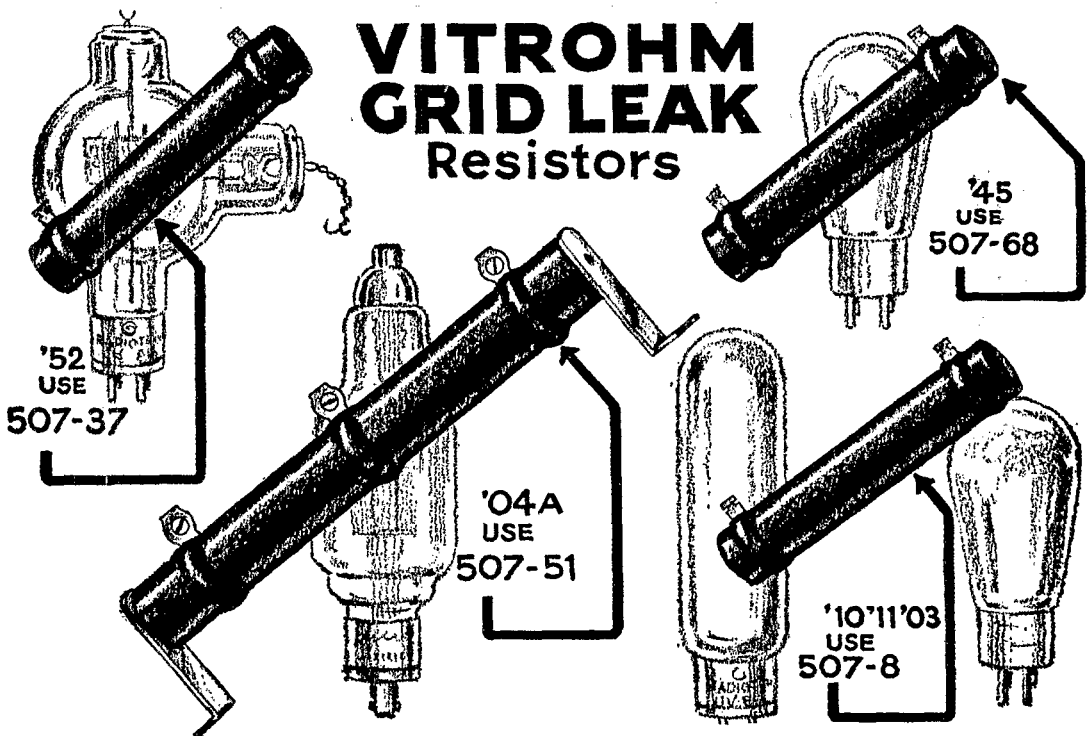
SOUTHERN TEXAS — SCM, H. C. Sherrod, W5ZG — Houston: W5TD now boasts a zepp which has replaced the voltage fed hertz. W5BHO is on 3500 kc. most of the time and is using 'phone. W5EI is getting out nicely using a current fed hertz and a 50-watter. It is with regret that we hear of the illness of DeBardeleben, W5PK. Hope you are OK by the time you read this, OM. W5BTD is on occasionally. W5DJ is on his way to Brazil, and will be on the air signing PY5DY. He will be on between 6900 and 7000 kc. W5BKW has consolidated with W5TG, and both now boast 250-watt stations. These rigs will be controlled by a smaller transmitter operating in the 1750-kc. band. It is rumored that W5WL has a case of y-litis. W5VA is still working on the 500-watt crystal rig. Galveston: W5AVC is working intermittently. W5AUX is on 7000 kcs. with crystal control. W5BQJ is on with an MOPA, using a 50-watter in the last stage. A newcomer in Galveston is putting a good 'phone signal out on 3500 kc., namely W5AHL. W5AFF and W5BTK are on occasionally. A mighty live radio club has been formed in Galveston with Berg as president and Scharpwinkle as vice-president. Flatonina: W5AJD is heard regularly. Rosenberg: W5PU has been QSO LU4DQ, K7AAS, and OA4Y. College Station: W5AQY is keeping schedules with W5HY at 5 p.m. every other day. San Antonio: W5UX is heard now and then. W5AYR sent in a mighty welcome card "just to tell that there was a new ham in S. A. El Campo: W5ACT sends in a nice report. Say, fellows, isn't there anyone else in El Campo but W5ACT? W5SY went back to TPTG and a type '52. W5ACK is still pounding away. Bay City: W5ABH is the sole representative. Williams now has the portable call W5KM. Not a single report from Corpus Christi this time. How come? Many in this section are not reporting who could and should. Come on, fellows, and do a little more than think about reporting. Reports should reach the SCM between the fifteenth and the nineteenth of the month. Address your SCM either care of KXYZ or at 4315 La Branch St., Houston.

Traffic: W5ACT 10, W5AYR 28, W5AQY 45, W5TD 38, W5PU 8, W5BHO 14, W5EI 33, W5BKW 18.

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5BKE of Kerreville, Texas, and W5ZL were visiting in our state this month. W5VQ makes the BPL again. W5AMC, W5BOE and W5PL are new ORS. W5OJ makes the BPL. W5ASW is one of our new Official Observers. Our good 'phone station, W5PP, turns in a nice total. W5ABO plans to move on to about 5 acres so his set won't give the BCL QRM. W5ALF has a 250-watter under construction for the 7000-kc. band. W5AAV went back to 14 mc. for the first time in four years. W5BPF has a 75-watter on the air. W5KV is a new station in Okmulgee. W5AIV is building a push-pull rig with a couple type '10s. W5ALD is perking right along. W5BPM got his MOPA perking. W5BIM is handling some traffic. W5APY is a new ham in Shawnee. W5CB is rebuilding to crystal control. W5NF is using a type '10 now. W5BEE is trying to persuade a 14-mc. 'phone to work. W5AYF is building a crystal rig with a type '52 in last stage. W5BSK is on 7 mc. with a type '71A. W5GW is a new ham in Tulsa. W5MM has a new super-het. W5QL is perking as nicely as ever. W5SW is on now and then. W5GF is about ready for 3.5-mc. 'phone. W5AYN has a type '52 MOPA transmitter on the air using an MG as plate supply. W5BPF made his first report.

Traffic: W5VQ 445, W5AMC 296, W5PL 200, W5OJ 162, W5ALD 188, W5PP 67, W5BOE 82, W5AHV 26, W5BPM 18, W5GF 15, W5ALF 12, W5BIM 6, W5AYN 6, W5BPF 1.

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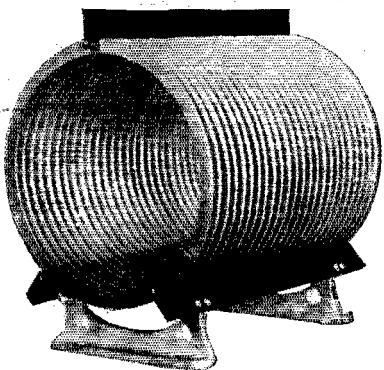
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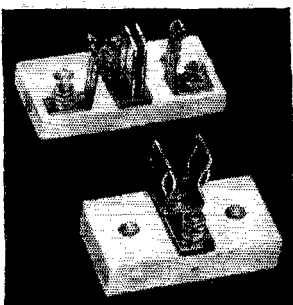
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CANADA

Again all Divisions forward very favorable traffic reports. Ontario leads all others by wide margin. VE3GT deserves special mention for his consistent traffic handling and fine totals during the past few months.

It has been suggested by several in reference to ALL CANADA NIGHT that the opinion of the Canadian Amateur be expressed to me in connection with the following points: (1) Best time suitable to ALL CANADA. (2) Best frequency. (3) Low or high frequency end of band specified. The reason for the above is a desire for more efficient contacts. It would be nice to feel that any Canadian could look forward to one night on which inter-Canadian contacts could be assured.

CANADIAN GENERAL MANAGER
ALEX REID, VE2BE

MARITIME DIVISION

NOVA SCOTIA — SCM, A. M. Crowell, VE1DQ — DX honors for the month go to VE1DQ, who worked OH5ND and OH5NG on his 14-mc. crystal-controlled 'phone. Great credit is due VE1AL for his fine work during the heavy tie-up in telegraph and telephone lines caused by the heaviest sleet and wind storm in the history of the section. VE1BN also helped, and the C. P. R. telegraph thought it necessary to run a special wire to VE1AZ's house to help deliveries. (F. B.) VE1AX and VE1CC at the Halifax end stuck to the job and many important orders were handled for the M. T. & T. VE1DR sends in nice report. VE1DW is giving 3500-ke. 'phone a try. VE1AK is putting out the usual fine 'phone signal on 3500 kc. VE1CO's 14-mc. 'phone has been reported F. B. via VE3BT and VE1DQ. VE1BL, VE1CC, VE1AS, VE1AX and VE1DQ have started organization plans for local club. All active stations are again urged to drop a card to the SCM in order that he may credit your station with the work you are doing.

Traffic: VE1AL 35, VE1AX 35, VE1BN 32, VE1AZ 20, VE1CC 18, VE1DQ 10, VE1DR 3.

NEWFOUNDLAND — Acting SCM, E. V. Jerrett, VO8Z — The Amateur Radio stations of Newfoundland again proved their worth when they handled many rush and emergency messages during the recent *Yiking* disaster at the icefields. FBI VO8AW recently visited NYC. VO8C did good work during the emergency. VO8J reports the birth of two new stations on South Coast. VO8MC was very active during the recent contests. VO8L was a very important link in the recent break. VO8WG reports by wire that he has taken out a new License. This time it is a Marriage License. Congrats, OM. VO8M is a new station, QRA Port Albert. VO8AE is on seven days in every week. VO8Z lost his 3.5-mc. Hertz in a recent gale.

ONTARIO DIVISION

ONTARIO — SCM, C. D. Lloyd, VE3CB — VE3AU, VE3CD, VE3DB, and VE3HC report for the first time. VE3GT takes his customary place at the top of the list. VE3ZZ is doing something beside sleeping, too. VE3FD and VE3ET have a number of schedules. VE3CE and VE3CQ rigged up a low-power outfit for the Central Technical School exhibition, Toronto, and handled a lot of traffic. VE3HL is on the air consistently. VE3ET sends in a chatty letter. VE3XC remarks: "Asia, where art thou?" He needs it for W.A.C. VE3DW is improving his station with new equipment. VE3GK is very much on the job. VE3HB is changing his QRA. VE9AL is all set to step out with a 14-mc. 'phone. VE3AD took in the hamfest at Detroit. VE3DA is working on three bands. VE3BC has turned his hopes to DX for a while. The VE3DD-3CB combination is working along in the same old way.

Traffic: VE3GT 706, VE3ZZ 199, VE3CE 59, VE3AD 57, VE9AL 40, VE3HL 39, VE3GK 31, VE3DA 31, VE3DD 29, VE3ET 24, VE3CD 12, VE3DW 11, VE3FD 10, VE3AU 8, VE3HB 7, VE3XC 6, VE3HD 54.

QUEBEC DIVISION

QUEBEC — SCM, Alphy Blais, VE2AC — VE2CO is preparing his exams. VE2EM is on 'phone and has a schedule with VE1AX. VE2CA was busy with the contest.

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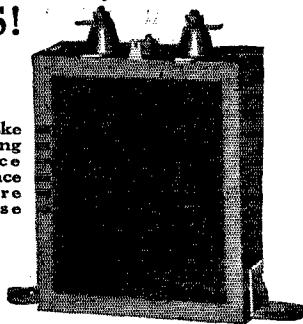
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Mfds.	Size		Mfds.	Size	
1	2 1/4	—1 1/4—2 1/4	1	4 1/4	—1—6
2	6	—1 1/4—2 1/4	2	4 1/4	—2—6
4	4 1/4	—2—6	4	4 1/4	—4—6

OPERATING VOLTAGE— 1500 VOLTS DC TEST VOLT— AGE—4000 VOLTS DC			OPERATING VOLTAGE— 3000 VOLTS DC TEST VOLT— AGE—10,000 VOLTS DC		
Mfds.	Size		Mfds.	Size	
1	6	—1 1/4—2 1/4	1	4 1/4	—4—6
2	4 1/4	—2—6	2	4 1/4	—8—6
4	4 1/4	—4—6	4	9 1/4	—8—6

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MORRILL AND MORRILL Sole U. S. A.
Distributors
30 Church Street, New York City

SIEMENS' TRANSMITTING CONDENSERS USED THE WORLD OVER

!!! HELP !!!



This Xtal Unit must be given a name

PRIZES to the winners of this RADIO RELAY CONTEST

To the originator of the name chosen will be sent one XTAL ground to band frequency mounted in our latest scientifically designed holder as shown above.

To the amateur whose message originated the greatest distance from Springfield, Mass., goes second prize of one Xtal unmounted.

RULES: Your message must be received via some Ham station within 100 miles radius of Springfield, Mass.

Text of message must contain the following words:
Station enters Xtal Contest with name "....."

Ur. call
signed
Ur. initials

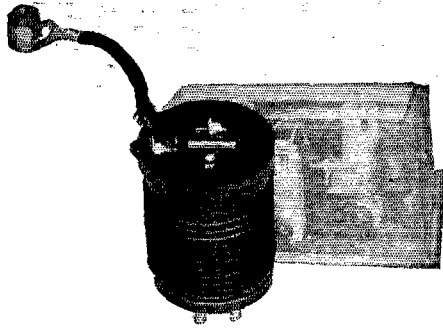
Contest closes May 31.

All messages received will be acknowledged by mail with date of receipt, relaying stations and name you chose for our Xtal unit so you can check the accuracy of your relay transmission.

For attention, say "Xtal Contest" after CQ-ing.
1715-3500 KC, \$5.00 each. Mounted in holder, \$10.00 complete.
500-1500 KC, within 250 cycles at specified temperature, \$40.00.
100 KC crystals for frequency standards, etc. Prices on request.

Work guaranteed or money refunded

PRECISION CRYSTAL LABORATORIES
P. O. Box 326 Springfield, Mass.



Special Band Spreading Coils

These new specially designed coils permit a spread of 50 dial divisions on the 20, 40 and 80 meter amateur Bands, using the Standard NATIONAL SW5 THRILL-BOX. Also available on special order for other bands.

Just another reason for the outstanding superiority of the THRILL-BOX.

Send 50c in stamps or coin for new 64-page Short-Wave Handbook. Bulletin No. 146T



NATIONAL

A.C.—SW5. THRILL-BOX

NATIONAL CO., INC., 61 Sherman St., Malden, Mass.

Type 866



MERCURY VAPOR RECTIFIER

\$5.00

Filament voltage..... 2.5 Volts
 Filament current..... 5 Amperes
 Max. Peak voltage..... 5000 Volts
 Max. Peak current..... 6 Amperes

All tubes fully guaranteed

NEON GLOW STICKS..... \$2.50

We also repair Power Tubes

CANATSEY NEON TUBE CO.

512-14-16 Wyandotte St.
 KANSAS CITY, MISSOURI

The NYL VE2CA had her first taste of DX. VE2CL had rectifier trouble. The SCM was heard in Australia on 28-mc., and expects to meet the gang in Montreal next June. Our CGM, VE2BE, and the Asst. SCM, VE2AP, have been busy with work of the greatest importance to Canadian Amateurs. VE2AV wants to know if anybody in town is interested in 1715-kc. 'phone. VE2BO has closed down till exams are over. VE2CP is not so very active on account of approaching examination periods. VE2AP is too tired at night to do much brass-pounding! VE2CX, R. Prissick, is a newcomer. VE2CJ, an old-timer, is on again. VE2BY is very busy trying to remove noise from the power lines in the BCL sets of Montreal.

Traffic: VE2AC 406, VE2CA 52, VE2EM 13, VE2CO 6, VE2CL 8, VE2BO 37, VE2CP 75, VE2AP 126, VE2CX 8, VE2BE 28, VE2BB 88.

VANALTA DIVISION

ALBERTA — SCM, G. F. Barron, VE4EC — VE4DT busts into the lead this month. VE4EI QSO'ed Oregon on 3500-kc. 'phone. VE4CY is going to use PP-MOPA next month. VE4HM schedules VE5EM (VGSR) in the Arctic. VE4EY wants some hot traffic schedules. VE4DX changed from Hartley to TPTG. VE4EW gets out better on 3.5 than on 7 mc. VE4EA is using a 50-wattter now. VE4GD is building a 100% modulated 'phone outfit. VE4GX will soon be back with us. VE4IO is on 3.5 mc. VE4IT has finished rebuilding. VE4CJ and VE4CG are QRL revamping. VE4HQ is on 3.5-mc. 'phone daily. VE4FG and VE4EX are busy operating the area station, VE4DO. VE4RA has an AC Pilot Super-Wasp receiver. VE4GK reports working his first VK.

Traffic: VE4DT 76, VE4EI 45, VE4EC 24, VE4GD 9, VE4DX 10, VE4HM 7, VE4CY 5, VE4EY 3, VE4GK 17. BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — VE5AM is doing plenty on 14 mc. VE5FI is on with a fifty. VE5AC has changed his location. VE5AL cooked his tubes in the midst of a heap of traffic. VE5DQ is getting past the city limits. VE5CO has become a DX hound. VE5EC says that 14 mc. is getting better. VE5CB has a six tube transmitter under construction. VE5HP is rebuilding his shack. VE5CE is using crystal on 7 mc. VE5CJ doesn't get on very often. The Victoria Short Wave Club is expected on shortly with the call VE5DI. VE5BR still shows the way in traffic and schedules. VE5BL holds forth on 1750 kc. using voice and key.

Traffic: VE5AC 3, VE5AL 66, VE5AM 2, VE5BL 54, VE5BR 115, VE5EC 17, VE5CB 2, VE5DQ 2.

PRAIRIE DIVISION

MANITOBA — SCM, A. V. Chase, VE4HR — VE4IC leads in traffic. VE4BQ, VE4DJ, VE4DY and VE4IC took part in the Fourth International Relay Contest. VE4BU is now located at Slave Falls. VE4FP has gone back to the "good old Hartley." VE4IS will be inactive for a time on account of absence from the city. VE4AG is getting out well. VE4JB is contemplating building a Push-Pull MOPA. VE4IU, a new ham, is using the Hartley circuit with a type 10.

Traffic: VE4IC 109, VE4BQ 31, VE4HR 19, VE4FP 10, VE4DK 8, VE4AG 7, VE4DJ 6.

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — VE4CV is getting his signals into "G" territory QSA5. VE4BB has been heard in ZL on 3.5 mcs. He and VE4AV have been QSO VE5EM up inside the arctic circle, frozen in, in Coronation Gulf on the RCMP schooner *St. Roche*. VE4BA reports little activity in Swift Current. VE4JG is getting reports from VK's. VE4IL is on again. VE4BA is getting out fine. VE4IH is on 3.5 mcs. VE4BE is preparing to get his 1st class ticket. VE4AT has a pure DC note at last.

Traffic: VE4CV 193, VE4BB 76, VE4BA 40, VE4IH 35, VE4BE 23, VE4GR 20, VE4AT 15.

LATE AND ADDITIONAL REPORTS

W4SK reported direct to HQs. W6ALU is keeping two daily schedules with the Philippines and turns in a splendid total. W9IH, ex-W9CIB, ex-W9EYU, took part in the International Contest. W8EAM is a new station at Paw Paw, Michigan.

Traffic: W4SK 9, W6ALU 439, W9IH 50.

Sending Is *EASY*

With the

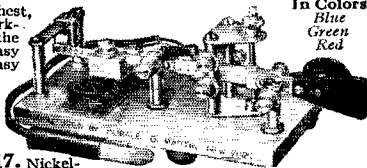
Easy-Working
Genuine Martin No. 6

New

VIBROPLEX

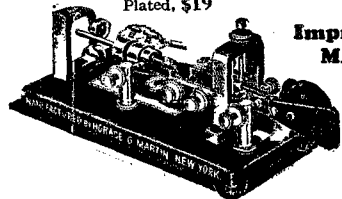
Reg. Trade Marks: Vibroplex; Bug; Lightning Bug

The smoothest, easiest-working bug on the market. Easy to learn. Easy to operate. Makes sending easy.



In Colors
Blue
Green
Red

Black or Colored, \$17. Nickel-Plated, \$19



Improved
MARTIN
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Black or Colored, \$17
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Special Martin Radio Bug — Extra large, Specially Constructed Contact Points for direct use without relay. Black or Colored, \$25

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THE VIBROPLEX COMPANY, Inc.

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Cable Address: "VIBROPLEX" New York

Super AKRA-OHM Wire-Wound Resistors

are carefully designed to insure an accuracy of one per cent and a constant permanency of calibration.

They afford an inexpensive means to build test equipment for the measurement of resistance voltage and current with accuracy, and are sold by us either singly or in kits for those who desire to build their own

Capacity Bridge

Wheatstone Bridge

Multi-range A.C. and D.C.

Voltmeters

We have prepared separate Bulletins fully describing the construction and use of the above circuits. If you will write us which ones you are interested in, we will gladly send copies without any obligation on your part.

Address Dept. C.



WHAT'S \$1 BETWEEN YOU AND SUCCESS?

You admit to yourself that you simply must have a Handbook. Overcome that inertia! It's easy to get a Handbook, and then your radio problems disappear. Here is how:

A. R. R. L.

38 LaSalle Road, West Hartford, Conn.

Send Handbook at once. I enclose \$1.

(Name)

(Street or P. O. Box)

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CRYSTALS

CRYSTALS

Accurately Ground
from

Finest Quality Brazilian Quartz

GUARANTEED TO OSCILLATE
AND FREE FROM DEFECTS

1715-2000 Kc (160 Meter Band)	\$9.00
3500-4000 Kc. (80 Meter Band)	12.00
One inch "X" or "Y" cut Oscillating Blanks	4.00

SPECIAL DISCOUNTS TO DEALERS
ON QUANTITIES

We are equipped to execute orders for cutting crystals to any shape, size or plane

We also supply first grade
Rough Brazilian Quartz

PREMIER CRYSTAL
LABORATORIES, Inc.

74 Cortlandt Street New York City

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 (5) 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 paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

PLATE power for your set, the very heart of its performance. For quietness, DX ability, life-long permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate transformers for the new 87Z rectifier, complete plate power units. Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

THE finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophone CW transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designs, built to order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Ensell Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

WHOLESALE discounts. Approved parts. \$50,000 stock. Over four pounds, catalog, circuits, data — 50c, prepaid (Outside U. S. — \$1.00). Weekly (new items, test reports) bulletins — 20 weeks — \$1.00. Experimenters 56 page house organ 25c, prepaid. Kladag Radio Laboratories (Established 1920 — over 4000 radiowise customers), Kent, Ohio.

QUARTZ is cheap, but a good crystal is the result of specialized knowledge and expert workmanship. My guarantee is unconditional. 7000 kc., \$15; 3500 kc., \$12; large oscillating blanks, \$3. Panel type dust-proof holders, \$4. W9DRD, Herbert Holister, Edwardsville, Kans.

GENERAL Electric 24/1500-volt 350-watt dynamotor, \$37.50; 24/750-volt, \$27.50. On 12-volt battery delivers 375; 18-560. With shaft extension for external drive, \$3 additional. Westinghouse 27.5/350-volt Special, \$7.50. 10-350, \$15; 6-15-volt, 500-watt, \$15. Makes a very powerful 6- or 12-volt motor. 110V d.c. to 14 volts, 7.15 amperes, \$22.50. Fine for battery charging. 500-watt 500-cycle alternators with exciters new. \$7.50. WE Headsets with helmets, \$10. Fuse 1500-volt, 300 mills, 20 for 50c. SE1012 Receiver, \$20. Without condensers, \$5, new. Henry Kienzie, 501 East 84th St., New York.

LEARN Wireless (Radio) Morse telegraph. School, oldest and largest; endorsed by telegraph, radio, railway and government officials. Expenses low — can earn part. Catalog free. Dodge's Institute, 7 Wood St., Valparaiso, Ind.

A.R.R.L. sweater emblems should be worn by all League members. They are yellow and black 5" x 8" diamond, felt letters and embroidered symbol. Only \$1.00. Money order or currency only accepted. Eric Robinson, 135 Jefferson Road, Webster Groves, Mo.

RESISTANCES, condensers, transformers, choke-coils, etc. Write for sensational low price list. Bronx Wholesale Radio Co., 5 West Tremont Ave., New York.

GENERAL Electric transformers 1100-2200-4400V each side center tap, 1000 watts. Oil filled condensers, porcelain terminals, weigh 45 lbs., 4000 volt working voltage 1.8 mfd. All guaranteed unconditionally, \$12 cash. Fred G. Dawson, 5740 Woodrow, Detroit.

NAVY standard receivers, all kinds, Dubilier 12,500 volt condensers, 220 a.c. motor 1600 volt generator with 16 volt filament generator, almost new. And others. Mariners Radio Service, 38 Park Place, N. Y. C.

CRYSTALS: Highest Quality 160 and 80 meter crystals at your approximate specified frequency, \$5.50. One inch square, carefully ground, fully tested and guaranteed. Collman and Biley, 34 West 8th St., Erie, Penna.

SPEAKER rewinding, \$2 to \$2.75. Guaranteed. Clark Brothers, Albia, Iowa.

DIRECT importers from Brazil, of best quality pure quartz crystals. Suitable for cutting into Piezo Electric Crystals. We solicit your inquiries. Diamond Drill Carbon Co., 720 World Bldg., New York City.

3000V. 6000W. double commutator motorgenerator and filament generator, 3-phase drive complete \$850.00; 2500V. 3000W. double commutator, 3-phase drive \$450.00; 2500V. 1000W. double commutator, 1-phase drive \$275.00; 1000V. 250 W. generator, 110V. A.C. drive \$85.00. 400V. 200W. generators, \$8.50; ¼ Hp. 3450 R.P.M. A.C. motors \$8.50. 110 Watt converters, 110V. and 32V. drive to 110V. A.C. with filter \$37.00. Many other units in stock. Queen City Electric, 1734 Grand Avenue, Chicago.

CRYSTALS: Guaranteed power plates, blanks, \$3. 7000 kc., \$15, 3500 kc., \$10. Write for dope on random frequency plates. Big saving. W2FM, 4606 Clarendon Road, Brooklyn.

SELL or trade almost new Teleplex with six rolls code tape. W1ALH, 11 Free St., Milford, Mass.

QSLs, samples, beautiful hand painted wall card free with order of 500 cards. T. Vachovetz, Elmsford, N. Y.

WANT N & K model D headphones. Schreiber, 914 Orange, Wilmington, Del.

WANTED — Bearcat or Wasp Electric. Swap gun or buy. H. Siebens, Storm Lake, Iowa.

SELL or trade QST from August 1924 to date. Also copy of Ballantine. Make offer. Hart, Box 576, Seattle.

SELL cheap — Kellogg broadcast microphones. WNBW, Carbondale, Pa.

SELL — 6/400 volts dynamotor excellent condition. First \$10 takes it. W9CWD, Loretto, Mich.

NEWEST thing. Code practice phonograph records. Any combination, any speed. Words, letters, phrases, seven one half inch, one dollar. Ten inch dollar fifty. Twelve inch two dollars. W9FDM, McCook, Nebr.

RADIOLA 24 portable super, with tubes, perfect condition, \$25. Hyatt portable model A, \$10. Jewell Thermocouple Ammeter pattern 64, 0-5 A. \$5. Frost desk microphone, \$4. W1WQ Great Barrington, Mass.

80 meter crystals \$5, unconditionally guaranteed. They're perfect — ask W3CXM about them. Special frequencies to order. W9ZZE, 3111 Decoursey Ave., Covington, Kentucky.

SELL — complete 7½ watt transmitter. Ready to operate, \$35. Kado, W2AFO.

CRYSTALS, 80 meter band, \$4.75. Liberal size, not chips. Dustproof holders, \$1.40. Complete line standard apparatus. Money back guarantee. R.E. and C. Laboratories, 59 S. Fine Ave., Albany, N. Y.

ESCO motor generator, output 2000 volts, 300 watts. Inset 110-220 volts, a.c., 3 unit. Used 50 hours. Perfect. Best offer. W8DOA.

COPPER tubing, pure virgin copper (99.7%) deoxidized with phosphorous and annealed. Ideal for transmitting inductances and all amateur purposes. Bends easily without kinking. Outside diameter ¾, 25 ft. \$1.75, ¾, 25 ft. \$2., 1, 25 ft. \$2.25. Rayant Specialty Co., 108 Wellesley Ave., N. Providence, R. I.

OPERATORS wanted. Communications Company, National Guard. Radio, telegraph. Two weeks camp. Beginners. Captain Dunn, 34th Street, Park Ave., New York City.

SERVICEMEN; 175 KC Quartz crystals for superheterodyne testing. Calibration within 500 cycles. \$9.00 Guaranteed. Collman and Biley, 34 West 8th St., Erie, Penna.

FOR sale — UV204A in good condition, never abused, \$50. A. B. Berresford, 515 Stewart Ave., Ithaca, N. Y.

MIKES — the Electro-Voice microphone will give your phone that broadcast station modulation. Write for details. Electro-Voice Mfg. Company, Inc., South Bend, Indiana.

TRANSMITTING and receiving equipment. Bought, sold, exchanged. R. L. Hess, P. O. Box 1283, Lancaster, Pa.

TRANSFORMER rewinding, \$4 to \$8. Guaranteed. Clark Brothers, Albia, Iowa.

SELL: 3 tube screen grid receiver, wave length 15-115 meters. Speaker and batteries complete. First \$20 takes it. E. Burkholder, 415 W. McArthur St., Corunna, Mich.

SELL — brand new Vibroplex, \$12.50 postpaid. 2 Weston thermocouples, \$15.50. Postpaid. W2AEB.

UX210s, \$1.40. Fahrer-Kluever Sales, 421 Spencer St., Toledo, Ohio.

SELL or trade — Two Esco motor generators, 110 volts a.c. 500 volts 200 mills, \$25, each. Or trade for 1250 volt or higher motor generator. W. M. Mead, Chio, Texas.

STOP! Think OM! For xtal or master oscillators, frequency doublers, speech amplifiers, modulators, or even low powered xmitters, the W.E. VT2 five watt is the berries. 550 plate 7.5 filament, \$1.50 postpaid. Guaranteed Western Electric tones, \$2.50 pair. W2CAF, 17 Bremond St., Belleville, N. J.

W8DFR "Rob-Roy" reports: "Radio Shortcut cured QSZ by quickly raising to 25. Hisped boosted to 35 easily. Recommend strongly." Other reports on request. Dodge Box 100 Mamaroneck, New York.

IMPROVED type 866 mercury tubes, firsts \$6.00 each. Seconds \$4.00 each. All new tubes. CT filament transformers for two 866s, \$2.50. Include postage. E. Ewing, Jr., 29 S. LaSalle St., Chicago, Ill.

THERMOSTATS ideal for crystal temperature control. Guaranteed. \$3.50. Eason-Meeth Lab., 71 N. Division, Grand Rapids, Mich.

SELL — powerful electro-magnet, Orville Alexander, Cairo, Mo. VOLTMETERS — Weston, direct current, 0-2000 volts, \$15; 0-2500 volts, \$18.50; 0-3000 volts \$22.50. All new in bakelite cases. Complete with external resistors. Remit \$3. with C. O. D. orders. Amateur Equipment Co., Myrtle, Miss.

QSLs, 90¢ a hundred, two colors. W9DGH, 1816-5th Ave., N., Minneapolis, Minn.

STRONGPORT course in physical culture, with dumbbells. Cost \$30. Trade for power supply for 50 watter. W9FLK, Sibley, Iowa.

RADIOGRAM and QSL cards. W8DED, Holland, Mich.

SELL — two RCA 204As, slightly used. \$25. each. RCA 106D receiver, 200-3500 meters, built-in det. and 2-step. \$20. J. R. Sabiers, 528 West Ave., Amherst, Ohio.

CASH — for tubes, transformers, chokes or what have you? H. C. Barton, LeRoy, N. Y.

SALE or trade — 204A, two 217C, 26 RCA portable and tubes, constructed 4D and tubes, 104 speaker for two 866s and ham or photo stuff. G. E. Farley, 110 S. Kensington Ave., LaGrange, Ill. W9OJ.

FOR sale — used surplus WE 212D tubes, 25 dollars, 211D tubes 10 dollars. First class tubes taken out of service in broadcast transmitter. Address: Washington Square Station, P. O. Box 43, Worcester, Mass.

WANTED — mercury arc or R3s, condensers, meters, fifty watters. A. H. Whitney, Hemet, Calif.

WANTED — transmitting equipment — high power. W8DDF.

QUARTZ plates carefully ground to your specified frequency, blanks one inch square, plug-in type bakelite holders all guaranteed to satisfy. W9CVT, 702 Shukert Bldg., Kansas City, Mo.

JEWELL — No. 64 0-2000 voltmeters, 1000 ohms per volt, with external resistors, \$14. Hilet 600 MA, 20H filter choke, 36 lbs. \$14.75. Leitch, Park Drive, W. Orange, N. J.

100 kilocycles standard frequency quartz bars. Guaranteed to oscillate at 100,000 cycles. Instructions for calibration. \$9.00. Collman and Bliley, 34 West 8th St., Erie, Penna.

SELLING out cheap! Everything new! RCA 210s, \$5; 250s, \$6; 1100 volt transformer a.c. (fil. 7.5, 7.5, 2.5, 1.5) \$4; Grebe CR-8 150-1000 meters, \$12. Xmitting parts. Write for list. Barton H. Cartozian, 1417 Sherman Ave., Evanston, Ill.

BARGAINS — Portable transmitter, range 38 to 85 meters complete with tube and key — \$40.00; Johnson's \$67.50. Double button microphone, new \$40.00; 3525 and 3550 Kcs. power crystal cost \$20.00 sell for 15.00; R.C.A. UX-250 power tube \$5.00; Cardwell 3000 volts, 00022 condensers 3.50 1500 Volts Dynamotor 24 volts input 15.00; Amrad power transformer 180-0-180, 7½, 5, volts \$3.00; "B" Battery eliminator 157½ volts \$5.00. Write: Frank J. Nunez, 5 Hanson Street, Boston, Mass.

SELL — used W.E. 211Es, \$9.50. G. Gunkel, 3321 Perry Ave., Bronx, N. Y. C.

CRYSTALS: You need 'em? We have 'em! It will pay to get our proposition O.M. Holders too. Just QSL QRG Crystal Labs., Roseland, N. J.

TRANSFORMERS — 125 watt 110 volt 60 cycle, 750 and 550 volts each side center, 125 milliamperes current, two 7½ volt 2½ ampere center tapped filament windings. Mounted complete. Rugged construction, heavy weight. Won't get hot under crated load. Fine for one or two 210s as oscillators. Push-pull or MOPA, \$8.75. Prompt shipment. Remit \$2. with C.O.D. orders. Amateur Equipment Co., Myrtle, Miss.

FILAMENT transformers for 210's or 281's, 7.5 volts center tapped. Here is your chance to get that individual filament supply for each tube insuring perfect regulation. A price within reach of everyone, \$1.00 each. Sent C.O.D. E. Hufnagel 879 South 18 St., Newark, N. J.

TUBES (6 months free replacement) Universal, first quality, UX210, 250, 281, \$2. Write for anything you need. CQ Radio Sales Co., 4832 12th Ave., So., Minneapolis, Minn.

CRYSTALS: Powerful oscillators, 80 meter band, \$4.75, 40 meter band, \$9. W1VC.

SALE: Sterling "Radio Manual" second edition. Four dollars. Dana, Cliffside, N. J.

BACK again — the mercury arc. Peer of high power rectifiers. Double duty rectifier transformers, reactors. New 10,000 volt peak 866s, 872s. See other ham ad. Rectifier Engineering Service.

POWER crystals: Guaranteed excellent oscillators. Carefully ground one inch square sections within one tenth of 1% of your specified frequency. 1715 kc. band, \$6; 3500 kc., \$7; 7000 kc., \$11. Plug-in, dustproof holder, \$3. Prompt shipment. Precision Piezo Service, 427 Asia St., Baton Rouge, La.

866 seconds, \$2.50, guaranteed 210, 281, 250s with long black plates, \$1.50 each. W2AXL, 199 Adelaide St., Belleville, New Jersey.

371W double button mike, transformers, etc., 1500 volt dynamotor, 250 watt 300 volt Escal, crystals, holders, and other laboratory equipment. W9DZM.

SELL: — Three Weston Milliammeters 0-50, 0-100, 0-200. Bakelite case, new, \$5.00 ea. Two Weston Thermo-couple 0-1, 0-3 Amps #301 \$10.00 ea. 1-R & M500 V 200 W MG good condition, \$25.00. 1-UX 865, new Fety second \$7.50 DeForest 510 new \$7.00. UX 250 New \$3.00 211-E New \$8.00 211-E used \$3.50. 205-D 5 watter \$1.50. VT2 new 75¢ ea. My dc screen grid receiver, including tubes. \$25.00 photo Dec. 1929 QST Works excellent. Prepaid. W2FL, D. C. Akers, 181 Greenwood, East Orange, N. J.

MIKE W.E. used \$4; also GR 366 filter chokes, \$5; new. UV712 \$3; power supply and speech amplifier combination. Webster, uses 210s in push-pull. New \$18. Barton Cartozian, 1417 Sherman Ave., Evanston, Ill.

OMNIGRAPHS, Teleplexes, Wasps, transmitters, tubes, receivers, Vibroplexes, microphones, meters. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

RECTOBULBS, DeForest transmitting tubes, Vibroplex, and Cardwell transmitting condensers at list. All other apparatus at big discounts. Prompt service and friendly cooperation. Foreign orders solicited. Write, Henry's Radio Shop, Butler, Mo.

WANTED navy standard SE1420 receivers. Trautwein, 38 Park Place, New York.

QSLs, message blanks, wall cards, stationery, etc. Hillcrest, Cranesville, Pa.

CRYSTALS — One inch round x cut power xtal unconditional guarantee \$7.00 Square y cut \$5.00. Finished blanks x or y cut \$2.00. W8AKW, R. L. Tedford, 1804 Waltham Ave. College Hill Cincinnati, O.

1000 volt working voltage condensers, 3½ Mfd. Made by Stromberg Carlson, a brute in size and action, only \$2.75 each. Stromberg Carlson transmitting chokes 18 henry 350 mils. 20 lbs. only \$3.50 each. 250 mil 30 henry chokes only \$2.50 each. Transmitting keys \$1.00. Audio oscillator \$3.50 with battery. 15 henry 70 mil chokes 75¢ each. All merchandise guaranteed always. Sent COD. E. Hufnagel 879 South 18 Street Newark, N. J.

CONDENSERS: Oil impregnated, fully mounted, metal cases. 4 mfd. 1500 volt d.c. guaranteed. Individually tested at 2000 volts d.c. \$2.25 each, five for \$10. W1VC, Richard Baer, 70 Ontario St., Pittsfield, Mass.

BUY, sell, or trade: All types of RCA and Western Electric transmitting tubes; any other apparatus. W9ARA, Butler, Mo.

QSL cards, two colors, \$1.00 per hundred. Free samples, WSDTY, 257 Parker Ave., Buffalo.

WANTED — transmitting tubes and equipment. Also a.c. shortwave receiver. Pay cash. Lowell Ecker, Sedan, Kansas.

ROUND power type crystals, few holders and plate blocking condensers. Sell — trade. W9DOQ, Route one, Duluth, Minn.

SELL three 852s used two hours, \$25 each, 150 watt push-pull transmitter, \$25. Want UV204As. W9ERU.

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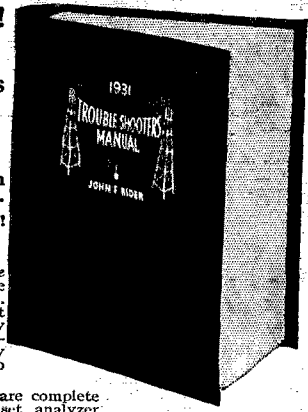
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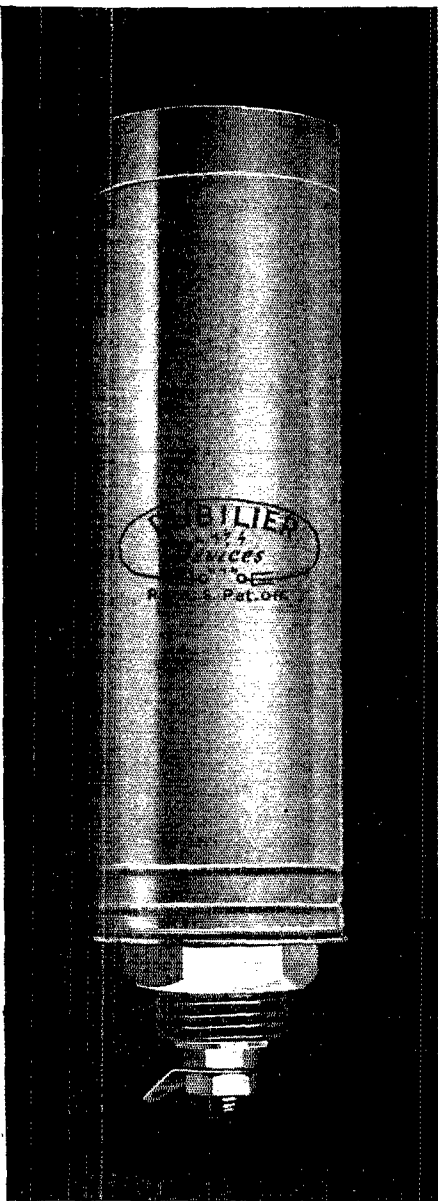
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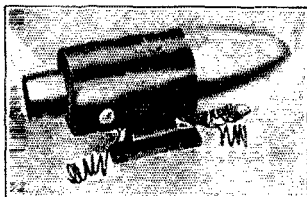
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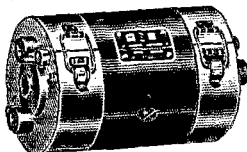
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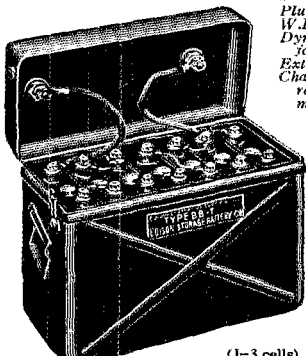


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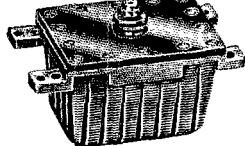
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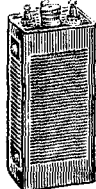
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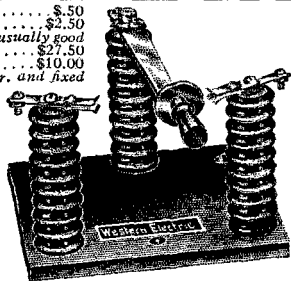


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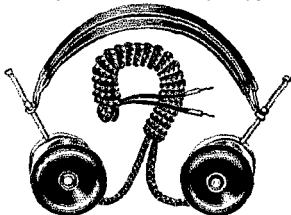


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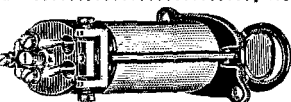
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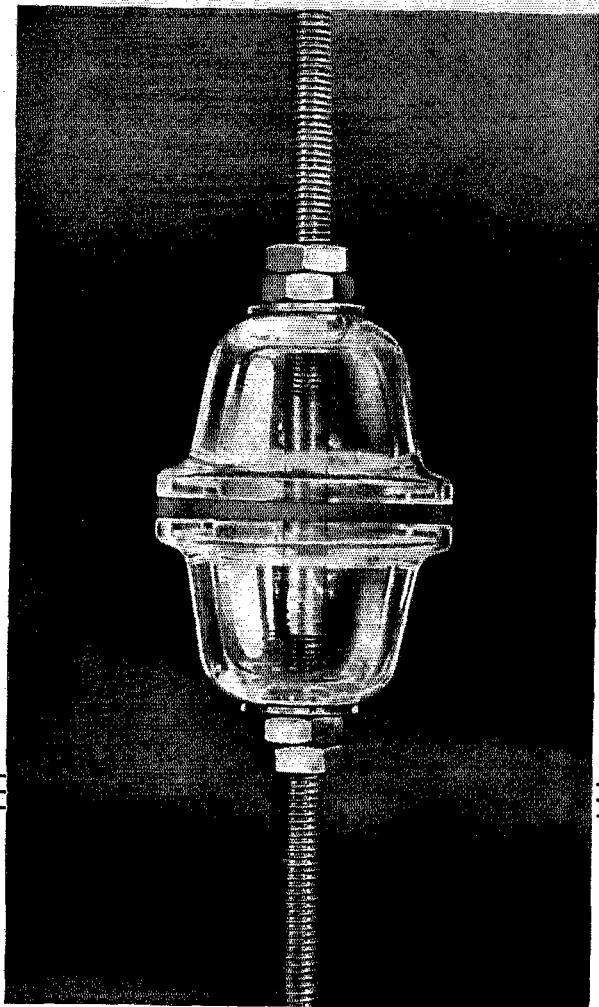
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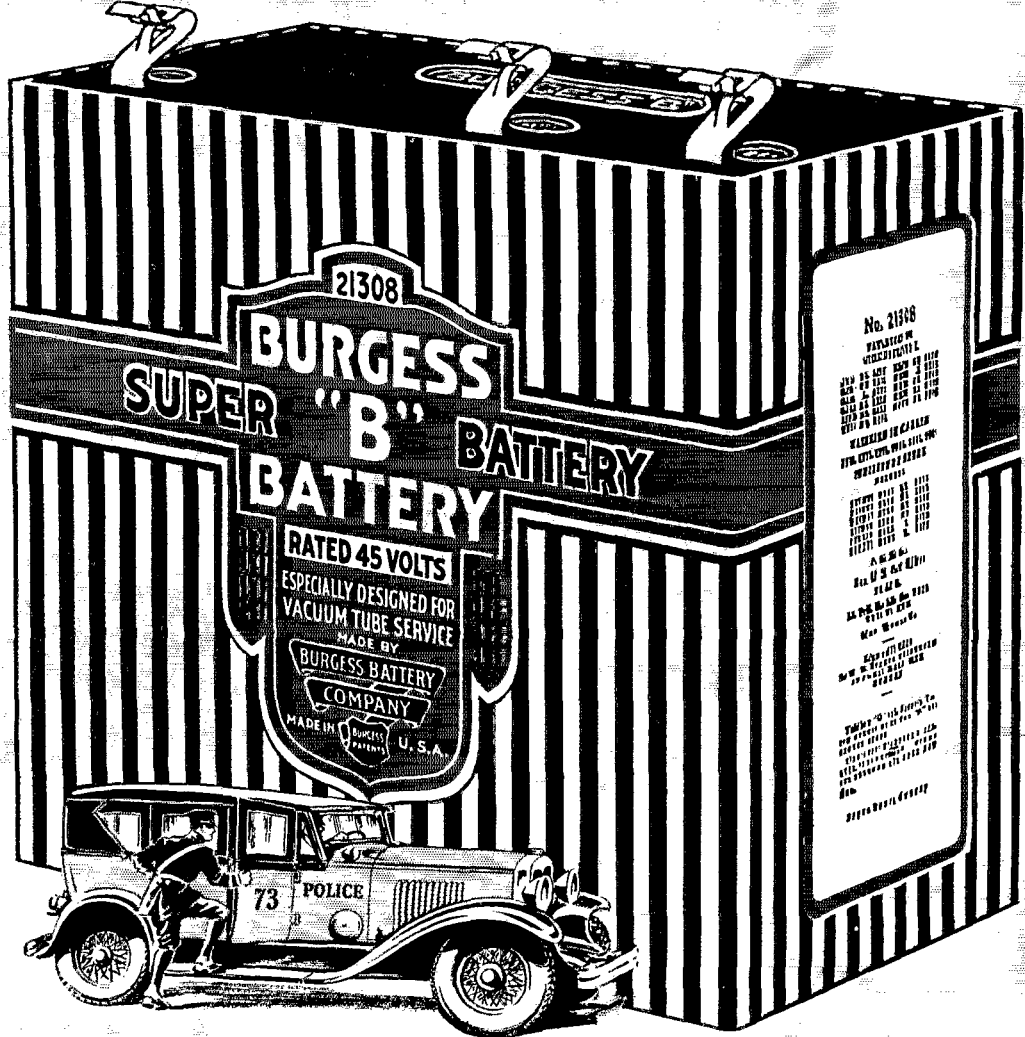
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