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<td>*334-V</td>
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The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

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

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the 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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EDITORIALS

THIS issue of QST reaches members on the eve of elections for director in half of the A.R.R.L. divisions. It is the time of year when we members of the League must do a bit of serious thinking for the welfare of our organization. "These elections," as the printed announcements say, "are the constitutional opportunity for members to put the man of their choice in office as the representative of their division."

Too many of us, we fear, are ignoring a certain responsibility of A.R.R.L. membership. Civic affairs frequently suffer because many citizens shirk their responsibility at election time. Surely we are deeply enough interested in our amateur radio and its organization to warrant the expenditure of some constructive thinking once in two years. As we see it from headquarters, there are too many members of the League who make no effort to get a man of their own choice nominated for director, who make no effort to boost a candidate who is their idea of what a director ought to be, who don't even bother to vote in the elections, but who don't hesitate to complain at almost everything their directors do and who indiscriminately throw brickbats at a director they couldn't be troubled about nominating, electing or advising. If these members, instead of "kicking" over what an already-elected director does, would put this same amount of energy into looking over the men in their division, picking out a really good one, backing him with some work and effort, and generally take part in League affairs before the election, everything would be much sweeter.

The reader, as an individual member of the League, ought to make it his business to back and vote for a candidate who stands for the things the member wants to see in A.R.R.L. That is the basic idea in our system of government. That gives the greatest available assurance that the director thus chosen will be representative of majority opinion on important amateur topics in his division. "These elections are the constitutional opportunity for members to put the man of their choice in office as the representative of their division."

It is of the utmost importance, too, that the League have good intelligent direction. It is vital to the life of amateur radio in this country. The next two years are really of tremendous importance in our future. This future, this welfare of amateur radio in the years to come, depends upon the quality of the judgment which our Board of Directors can bring to bear on our problems. It is up to you members, then, to send good directors to the Board, men chosen not so much because they suit your prejudices on certain amateur problems as because they can add to the depth of vision of the Board — men whose ability you respect, whose judgment you will be willing to trust when they assume their responsibility of directing the work of our League.

Remember that the Board "runs the League" but that you select the members of the Board. Theirs is a heavy responsibility but so is yours. Our League is now a large organization, its affairs are of considerable magnitude. The success of the idea of "representative government" in this League would seem in the long run to hinge upon the willingness of each member to give serious thought to the abilities of the directors in whose hands he places the future of his organization. A.R.R.L. "rates" the best direction we members can give it — men of experience, knowledge, wisdom, intelligence and vision!

K. B. W.
A Complete Push-Pull C.W. Transmitter at Low Cost

By George Grammer, Assistant Technical Editor

It's an easy job to build up a low-power transmitter of the conventional pattern using a Type '10 tube as an oscillator with a pair of Type '81 rectifiers working from a 550-volt transformer. It's likewise easy to put together an oscillator using a small receiving tube and a few "B" batteries or a "B" eliminator for plate supply. The first outfit will cost around $80.00 (list prices) complete with tubes and the necessary accessories, even without allowing anything for the two or three meters which ought to be included in an amateur transmitter — but it will "get out" and get plenty of DX with any kind of intelligent handling. The second one is satisfyingly cheap — but the power output is so low that the station is practically out of the running if competition from other stations is bad.

The tendency toward a sort of standardization among broadcast receiver manufacturers, remote though such a movement would seem to be from amateur radio, has resulted in a lowering of prices on the tubes most commonly used, notably the Type '45 and the Type '80, and concurrently a fairly low level of prices on power supply equipment designed to be used with those tubes. The immediate effect of this, so far as the amateur is concerned, is to help bring together the two extremes cited in the first paragraph. It is not yet possible to build a transmitter using a Type '10 tube for the same price as the "B" battery outfit, but it is possible to build a transmitter with as much power output as the '10 will give, the cost of which will be about half-way between the two.

This transmitter, illustrated in the photographs, is built almost entirely of receiving equipment which is readily obtainable; and the cost of all the necessary parts, including the key, is approximately $45. A milliammeter to read plate current, the use of which is roundly recommended, will add seven or eight dollars more to the cost. In these examples, of course, the prices given are list, not those which are quoted by bargain houses. It is certainly true that by judicious buying it is easily possible to reduce the cost of the set to $35 or less.

And the set is not a toy or another flea-power outfit — it is intended for practical communication, and will do anything the typical Type '10 outfit sketched at the opening of this story will do — and perhaps do it better. It will put just about the same amount of power into an antenna that the '10 outfit will — and with better frequency stability. The push-pull circuit takes care of the latter.

When the Type '45 tube was first introduced it was labelled "not intended to be used as an
oscillator,” and most amateurs, remembering bitter experiences with the Type '50, were inclined to believe it. Whatever the intentions may have been, however, the fact is that the '45 is a very good oscillator, exhibiting none of the characteristics which made the '50 infamous. Having made this statement, we suppose that by the time this QST is out a week we’ll have at least seven letters telling us we’re all wet, because the writers personally tried out the tubes with only a thousand volts on the plate and they (the tubes, of course) blew up. If that happens all we can do is write back, “So they ought.” It is a fact, however, that a number of the tubes have stood up for continuous runs with 400 volts and more on the plates without showing any signs of an early demise or losing their ability to oscillate, Strange to say, the '45 at 400 volts and less gives more output than the '10 with the same plate voltage. This was found to be invariably true in a number of test set-ups in the laboratory. But don’t get the idea on that account that the '45 is a better tube than the '10 — it won’t stand the voltage that the '10 will by any means. The point we wish to bring out is this — two '45’s in a push-pull transmitter with about 350 volts d.c. on the plate will give as much output with as good frequency stability, as one 'Type '10 with 100 volts d.c. on the plate (the usual voltage from a 550-volt transformer with a good filter and normal load on the tube). And the cost is a whole lot less. The latter point is the important one. Aside from that, the r.f. portion of this transmitter can be used with a pair of Type '10 tubes as well as with '45’s, with quite an increase in output if the '10’s are run with the normal power supply used with those tubes.

BUILDING THE TRANSMITTER

Getting down to constructional details, the circuit will be recognized to be essentially that of condenser, the tubes and their sockets, the grid coil and mounting, the grid leak, and finally, the binding post strips for connections. The photo of the under side of the transmitter baseboard shows the radio-frequency choke coil in the positive high-voltage lead, the filament center-tapped resistor, the filament by-pass condensers, and the wiring to the connection strip. The layout shown is about the most logical for a push-pull transmitter, and allows connections to be symmetrical. In fact, the transmitter is laid out in exactly the same way as the schematic diagram in Fig. 1, except, of course, that the connections have been brought out to the end of the board instead of one side of it, as the schematic diagram would indicate. The wiring underneath the baseboard has been kept as near to the center of the board as possible to keep it away from
strong r.f. fields. The center-tapped resistor across the filaments is connected at the midpoints of the wires joining the filament connections on the tube sockets. A homemade strip of thin brass holds the wires, which are No. 14 rubber covered, in place. The r.f. choke coil in the plate lead is connected to a brass bolt which comes through the baseboard, and should be installed as near the plate coil as possible, but at right-angles to it.

The grid coils are wound on rigid insulating forms 1" in outside diameter, and no spacing is used between turns. These coils, together with the plate coils accompanying them, are shown in another photograph. The coils are mounted on General Radio Type 274-BP plug assemblies, and the socket is a Type 274-BP plug assembly. These assemblies are very convenient, although a dollar or so can be saved by using G.R. jacks and plugs and mounting them on bits of hard rubber or bakelite in a similar fashion. In winding the coils it should be remembered that a change in the wire size, or even a change in the type of insulation on the same size of wire, will make necessary a different number of turns. If the diameter of the wire, including insulation, is smaller than that given, less turns will be needed, and vice versa. The correct number of turns is easily found if a plate milliammeter is available, and the adjustment will be described later. Be sure that the same number of turns is used on each side of the center tap. When the coil is completed it should be "doped" to prevent loosening of the turns and to keep out moisture.

Connections between the grid coil socket and the grid posts on the tube sockets, and also between the tuning condenser and the plate posts on the tube sockets, are made with ordinary bus wire, since these wires do not have to carry heavy currents. The connections between the tuning condenser and the insulators which support the plate coil, however, must be made of the same size of copper tubing used for the plate coil, because these connections are part of the tank circuit and heavy currents flow in them. In placing the tuning condenser and the insulators be sure that both of the copper-tubing connectors are the same length from the connections on the condenser to the insulators, to make certain that the tank circuit is symmetrical.

The insulators which hold the plate coil are spaced 4½ inches between centers. The coils are wound to fit on the insulators, and the spacing between turns can be judged by an inspection of the photograph. The 3500-ke. coil is wound on a piece of pipe with an outside diameter of 2½ inches, while all the other coils are wound on pipe 1½ inches in outside diameter. Each of the plate coils must have an even number of turns so that the clip for the center tap can be placed on the under side of the coil. A brass machine screw is run through the baseboard midway between the insulators holding the plate coil, and a nickeltipped battery clip is connected to the screw by a short length of flexible wire. When the coil is fastened to the insulator the clip is placed on the center turn.

The antenna coils are wound on 1½-inch pipe, one end of the coil being brought out so that the axis of the coil will line up with the axis of the plate coil when fastened in place. Be sure to wind both antenna coils in the same direction. If wound in opposite directions the fields will "buck," and the antenna will not take power from the transmitter. The antenna coils shown have seven turns each, but the exact number to use will depend on the type of antenna system employed. These coils will be satisfactory with a Zeppelin antenna on all bands if the feeders are between 45 and 50 feet long.

The coils will keep a pleasing bright finish if they are carefully cleaned and lacquered. Before winding each coil, the necessary length of tubing should be thoroughly scoured with steel wool. After the coil is finished and the spacing between turns adjusted correctly, it should again be touched up with steel wool and then scrubbed with a rag soaked in alcohol to remove grease. When dry, Duco lacquer, preferably thinned out considerably to the thinner which comes for that purpose, should be painted on with a small brush, making certain that the entire surface is covered, and then allowed to dry thoroughly before the coil is put in service. If the coils are not...
lacquered they will oxidize in a day or two. This is particularly true of the plate coils, which get appreciably warm in operation, and if not lacquered will turn a muddy brown color in a very short time.

In building the transmitter be certain to use exactly the same values for the circuit elements as are specified in Fig. 1. They are the ones which were found to be best after a considerable period of experimentation.

**THE POWER SUPPLY**

There is nothing unusual about the power-supply unit, except that the output voltage is somewhat lower than that commonly employed in low-power transmitters. The high-voltage winding of the power transformer furnishes 350 volts each side of the center tap, which is rectified by the Type '50 tube, and then fed into the filter. The latter is a brute-force arrangement, using a double-section dry electrolytic condenser and a 30-henry choke. Each of the condenser sections is rated at 8 µfd. and will stand 500 voltspeak. The peak voltage of the transformer output is safely within this rating.

An actual test of the power supply unit showed that the no-load voltage delivered by the rectifier and filter was between 450 and 500, dropping to about 350 volts under a load current of 100 milliamperes, the normal current taken by the transmitter when delivering power to the antenna.

The power transformer is of the type often used in broadcast receivers, and in addition to the high-voltage winding has a 5-volt winding for the filament of the Type '50 rectifier and two 2.5-volt windings, one of which is used to light the filaments of the Type '45 tubes in the transmitter, the other being left idle.

All of the wiring is above the baseboard in the power supply. No. 14 rubber-covered wire is used for connections, the insulation effectively preventing short-circuits. A double-pole single-throw switch for tuning the line voltage on and off, and a cord and plug for making connections to the house current complete the outfit.

When using electrolytic filter condensers be sure to connect them in the circuit with the polarities correct. The outside can is usually the negative connection, the positives being the binding posts on top. Instructions usually accompany the condenser.

With this power supply it is easily possible to get a pure d.c. note on all bands if the transmitter is well built and properly adjusted. If the d.c. note is not forthcoming look to the transmitter itself and not the power supply — this same trouble was encountered in working out the details of this outfit and it can be overcome with a little patience.

**GETTING INTO OPERATION**

There is nothing more hopeless than trying to adjust a transmitter without the means of knowing just what effect each change made has on the frequency, note and output. Two things at the very least are necessary — a monitor and some sort of indicator for telling when the antenna is taking load. The monitor should be used in conjunction with a frequency meter, or at least should be calibrated so that it is possible to tell with certainty whether the transmitter is in the band or not. Radio-frequency ammeters in the feeder leads are useful for determining when the antenna is tuned correctly, but the plate milliam-

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**THE WIREFRAME UNDERNEATH THE BASEBOARD**

The plate choke, filament center-tap resistor and filament by-pass condensers are shown in this photograph. Note that the condenser and resistor are connected to the midpoints of the wires joining the filament connections on the tube sockets.
condenser, and if it is very far down the scale a few turns should be added to each side of the grid coil. This is, in fact, the way to adjust the grid coil in a circuit of this sort. The number of turns on the grid coil should be such that the minimum point on the plate current reading (with the antenna not coupled to the oscillator) occurs at a frequency slightly lower than the low-frequency end of the band on which that coil is supposed to work. Without some means of checking frequency it is apparent that an intelligent adjustment of the coil cannot be made.

If the transmitter does not oscillate the plate current reading will be quite high—150 to 200 milliamperes. Reasons for non-oscillation might be: grid coil turns not adjusted correctly; center tap on grid coil or plate coil not on electrical center; bad tubes, or low filament voltage. Ordinarily, however, if the circuit specifications are followed exactly there will be no trouble in getting the transmitter to oscillate.

Now set the tuning condenser at the point which gives the lowest plate current reading and check the frequency and the quality of the signal. The note should be pure d.c. and very steady, and the frequency should be very near 3,500 kc. Next choose the frequency on which the transmitter is to be operated; this will naturally be the resonance frequency of the Hertz antenna, if such is used) and tune the transmitter to that frequency.

Now set the antenna coupling coils so that the distance between each of them and the plate coil is about an inch to an inch and a half. Both coils should be exactly the same distance from the plate coil. If the Zeppelin type of antenna is used and the feeders are between 45 and 50 feet long the parallel tuning connection shown in Fig. 3 should be used. The feeders should be clipped on the two insulators to which the antenna tuning condenser is connected, and a jumper should be connected between the two insulators to which the flexible leads which connect to the antenna coils are fastened. Now turn the antenna tuning condenser until the milliammeter or bulb shows the maximum plate current is flowing. The frequency and character of the note should next be checked with the monitor, and if the former has changed appreciably a readjustment of the plate condenser to bring it back to the proper place should be made. This will also necessitate retuning the antenna condenser. If the note shows signs of ripple the antenna condenser should be tuned a little off resonance until the note clears up again, or the antenna coils may be moved a little farther away from the plate coil. The correct adjustment will be that at which the antenna takes the most load with the note remaining steady and pure—the character of the note is more important than the current put into the antenna, because high antenna current is useless unless the signal is clean and steady.

The method of adjustment on the 7000- and 14,000-ke. bands is similar, except that series antenna tuning, as shown in Fig. 1, is used with the 45-foot feeders assumed. Other feeder lengths or differing antenna types will require different handling, and as the number of combinations is rather large it is impossible to cover all of them. The Handbook shows methods of tuning with practically all types of antennas in common use among amateurs, and should be consulted for further information if the builder is not familiar with antenna tuning systems. The proper setting

of the plate tuning condenser will be at approximately 75% of full capacity on 7000 kc. and 60% on 14,000 kc.

The output obtainable will vary somewhat with the frequency, and is in the case with all vacuum-tube oscillators, but tests with a dummy antenna have shown that it can be expected to at least equal that obtainable from a typical single ' Type '10 with similar values and circuit conditions on corresponding frequencies. The stability seems to be better than the '10 will give, probably because of the use of the push-pull circuit.

The r.f. ammeters indicated in Figs. 1 and 3 will be found useful for tuning purposes, although

FIG. 2.—THE POWER-SUPPLY UNIT

FIG. 3.—CONNECTIONS FOR PARALLEL ANTENNA TUNING

The feeders are connected directly across the antenna condenser and the dip connections on the coupling coils tied together. The remainder of the circuit diagram is the same as Fig. 1. The antenna ammeters are again optional.
not altogether necessary. The antenna current values are really meaningless, and if the meters are used the transmitter and antenna tuning should be adjusted so that the current through both is the same, regardless of the actual value of that current. A scale of 0-1 ampere will be sufficient for a set of this power.

**SOME TROUBLES**

One of the worst problems encountered in building the set was that of eliminating unwanted r.f. in the power supply. R.f. wandering back into the power transformer and filter always makes itself known by roughening up the note—the blame for which is usually placed on the filter. The d.c. returns to the grid and plate in this circuit are fed in at a point of minimum r.f. voltage so that no chokes would seem to be required. This is true so far as the fundamental frequency is concerned, but unfortunately, as pointed out in the September "Uncle Jimmy" story, the second harmonic flows in these leads with much gusto unless something is done to prevent it. This happened with this transmitter and led to some rather curious results.

In an experimental "haywire" layout first built up for the purpose of testing out the '45's, a generator was used to supply plate voltage so the voltage could be readily adjusted, and the filament winding on a "B" supply furnished the filament power. The set was reduced to the bare essentials—no chokes or by-pass condensers were in it at all—and consisted of a plate coil, plate tuning condenser, two tubes, an untuned grid coil and a grid leak. A dummy antenna was used for a load. No trouble was experienced in getting a very good d.c. note on 14,000 kc. with this rig, even though no attempt was made to filter out the commutator ripple of the generator.

Next the outfit shown in the photographs was built up, but without any chokes or by-pass condensers in the transmitter itself. The 2.5-volt winding on the power transformer had no center tap, and since no center-tapped resistor was handy at the time, the filament supply used with the experimental set—which was center-tapped—was used temporarily. The power-supply unit shown furnished the plate power, however. This set performed in exactly the same way as the first one, which naturally was expected. In the meantime the center-tapped resistor arrived from downtown and was installed in the set—and then our troubles commenced. Using the 2.5-volt winding on the power transformer, the set simply would not give a d.c. note on any of the three bands—yet as soon as a separate filament supply was used the note became d.c. again.

Checking on the monitor showed that a strong second harmonic was present, and the inference was that this harmonic was getting back to the power transformer through the filament wiring and thus into the plate-supply system. With a separate filament transformer it was probably "washed out" in the line before it could get back to the plate supply. 500-µfd. by-pass condensers were then tried across the filament, and on 3500 kc. the note immediately changed to pure d.c. On 14,000 kc., however, the note was much worse with the by-pass condensers than without them. This didn't look so good, so the next thing tried was a small choke in the positive lead, leaving off the by-pass condensers. The note immediately changed to d.c. on 14,000 kc., which was highly encouraging, but back on 3500 kc. there was still a noticeable ripple, although less than without the choke. A larger choke (the one shown in the photograph) was next tried with some improvement on 3500-kc. and no change in the d.c. on 14,000 kc. No larger chokes were available, so the filament by-pass condensers were tried again, this time with the choke in the circuit, and the note was again pure d.c. on 3500 kc. But again there was some ripple on 14,000 kc.

Finally 250-µfd. condensers were substituted for the 500-µfd. size which we had been using, and this capacity proved to be large enough, in conjunction with the choke, to give the desired d.c. note on 3500 kc., and still small enough not to upset things on 14,000 kc. On 7000 kc. this combination functioned equally well. With a good-enough choke the by-pass condensers could probably be eliminated on all bands—and if a separate filament transformer is used for the oscillator filaments neither choke nor condensers are necessary. Certainly there are more things than the filter alone to be considered in getting that elusive d.c. note on high frequencies.
INCREASING POWER

The fact that Type '10 tubes can be used in the set has been mentioned previously. The power output can be considerably increased by using a pair of '10's with about 600 volts on the plate, although there is no advantage in using these tubes with the power supply illustrated — rather the opposite. It may be found desirable to change the size of the grid coils slightly to get the best results with Type '10 tubes, and the method of adjustment already described should be followed. No changes in the other values are necessary, except that a 10,000-ohm leak would allow slightly greater output. The high-resistance leak specified for the '45's is necessary because greater bias is required for efficient operation, the amplification factor of the '45 being less than half that of the '10.

The set is an excellent one for the beginner just as it is, giving as it does a reasonable amount of power output with excellent frequency stability. If higher power is desired later, the money invested is not wasted, because this outfit forms an ideal master-oscillator to feed a pair of amplifier tubes. The output is more than ample to swing a pair of Type '10 tubes with 750 volts on the plates as a neutralized amplifier, and although we have not had an opportunity to try it with larger tubes, should be capable of feeding a pair of '03-A's or '52's to give normal output. Use of the outfit as a master oscillator is highly recommended, because the effect of a swinging antenna on the frequency is eliminated, and since a separate power supply for the oscillator is available the regulation under load conditions is good. In addition, the separately-excited amplifiers will give more output and can be adjusted for greater efficiency than when the same tubes are used as oscillators.

Central Division Convention
(Ohio State)

The convention this year was held at the Dayton Biltmore Hotel in Dayton, Ohio. Officially the dates were the 30th and 31st of August; however, on the 29th several of the early comers got together in true ham fashion and held a private party the evening of the 29th and friendships were made and renewed before the actual convention. Saturday, delegates arrived from all Ohio and surrounding states and before lunch there were 150 registrations, which gave promise to be a well attended affair.

K. B. Warner and C. C. Rodimon of A.R.R.L. Headquarters appeared on the scene early and trips to the famous Wright Airport were made by some of the delegates while others preferred to visit the Van Horne tube factory or the General Motors Radio Corp.

After lunch the convention was officially opened when Mr. "Art" John, president of the Dayton Amateur Radio Assn., sponsors of this year's convention, welcomed the delegation and was followed in turn by Mayor Mcdonald. Director D. J. Angus then gave the fellows a "handshake" and introduced Secretary-Editor Warner and C. C. Rodimon, W1SZ. Short talks were then given by George Morton on "Condenser Microphones"; W. T. Walter, of Jewell Elect. Inst. Co., about "Electrical Measuring Instruments and Their Application to Amateur Radio"; E. C. Estey, of Aluminum Co. of America, told about some of the high spots in the Toronto I. R. E. Convention and also of the "Application of Aluminum to Amateur Radio"; C. H. Vincent, WS1RD, spoke on "Aircraft Radio Communication" and H. F. Breckel gave a Naval Reserve talk.

After dinner the gang assembled and listened to talks by F. R. Finehout, E. Springer, J. R. Martin and F. H. Schnell. Schnell of Radio and Television Inst., Chicago, did not have a chance to finish his talk, so it was finished with illustrated slides after the banquet on the following evening. After adjournment Saturday evening, informal chats were held here and there around the hotel with all hands entering in and gradually overcome by the strenuous day.

Sunday morning a good attendance was noted at the Traffic Meeting. This meeting was presided over by Director Angus and several points that were heretofore hazy were cleared up to the satisfaction of all those present. After this spirited meeting those present assembled out doors and had a group photo taken.

During the afternoon most of the fellows took the trip out to Mason, Ohio, to give WLW-WSAI the once over. The 'phone men were in their element at this Mecca.

All assembled back at the hotel for the great event of the convention — the banquet. The final registration was 201 and when all were seated at the banquet tables there were about 250 present. After a delicious dinner, entertainment and the general hilarity had settled down Director Angus acted as toastmaster and all hands entered in and gave a hand to the Program Committee and D.A.R.A. for one mighty fine convention. Mr. Warner talked on amateur matters and regulations. This was followed by talks from C. C. Rodimon and H. F. Breckel. Mr. Schnell then finished his talk on a superheterodyne receiver. After the prize drawing of some seventy prizes and the 'phone and c.w. men had a general open meeting the curtain was lowered on one more of these amateur conventions which are getting to be more and more cosmopolitan. Mr. L. E. Furrow, WSIX, and his helpers on various committees are to be congratulated on the enjoyable meetings and get-togethers.

— C. C. R.
A SENSITIVE, selective and rugged high-frequency receiver capable of power output sufficient to operate a loudspeaker need not be much more bulky than the usual ham receiver having lesser qualifications, and the receiver described in this article demonstrates just how one can be built. Although the set is extremely compact, measuring but 12" long by 5 1/4" high by 6 1/4" deep, it contains six tubes in a circuit combination having unusual and attractive features. The receiver was designed with the peculiar problems of high-frequency reception in mind and none was overlooked during the six months required for the set's development. The result is a receiver that has excellent selectivity, although free of the usual critical adjustments, and delivers loud-speaker performance on any frequency between 37,500 and 1500 kc. (8 and 200 meters).

The set is designed for d.c. operation and comprises a stage of tuned radio-frequency amplification preceded by an aperiodic coupling stage, a special two-tube detector, and two stages of audio.

The circuit of the receiver is shown in Fig. 1 and the arrangement of the components is shown in the illustrations.

The antenna coupling stage uses a Type '22 tube with its grid circuit untuned and its plate circuit impedance coupled to the tuned grid circuit of the following r.f. stage. The tuned r.f. amplifier also uses a Type '22 tube.

The most unusual circuit feature of the receiver is the detector arrangement. This consists of two tubes, one of which acts as the oscillator and does the regenerating while the other functions only as a detector. This circuit arrangement

COIL TABLE

<table>
<thead>
<tr>
<th>Freq. Range</th>
<th>Diam.</th>
<th>Wire Size</th>
<th>Number of Turns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L1, L2, L3</td>
<td>L1, L2, L3</td>
</tr>
<tr>
<td>37.5 to 15 mc.</td>
<td>1&quot;</td>
<td>No. 16, No. 23</td>
<td>5, 3, 5</td>
</tr>
<tr>
<td>18.7 to 10 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 16, No. 23</td>
<td>7, 5, 7</td>
</tr>
<tr>
<td>10.7 to 6 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 16, No. 23</td>
<td>11, 8, 9</td>
</tr>
<tr>
<td>6.5 to 4 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 20, No. 32</td>
<td>16, 11, 10</td>
</tr>
<tr>
<td>4.35 to 3.3 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 22, No. 32</td>
<td>24, 14, 12</td>
</tr>
<tr>
<td>3.6 to 2.3 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 22, No. 32</td>
<td>30, 20, 15</td>
</tr>
<tr>
<td>2.4 to 1.8 mc.</td>
<td>1 1/2&quot;</td>
<td>No. 22, No. 32</td>
<td>37, 27, 16</td>
</tr>
</tbody>
</table>

The 1" diameter coils are wound on tubing of this size mounted on the bottom of a UX tube base. The 1 1/2" forms are No. 131 Silver-Marshall. All coils are wound in the same direction with the tickler windings at the filament ends of the grid windings and spaced 1/4" from the latter. There is no spacing between turns. The wire may be enamelled covered, cotton and enamel, d.c.e. or d.s.c.

was suggested in the Experimenters' Section, QST, March, 1930. The regeneration tube is a
Type '01-A and the detector tube is a Type '00-A. Regeneration is controlled by a 200,000-ohm variable resistor in the supply lead to the makes possible the operation of the detector tube at the values of plate voltage and grid-leak resistance which give greatest sensitivity and at

regenerator's plate. The separation of the functions of detection and regeneration has several outstanding advantages which make the use of an additional tube worth while. The arrangement the same time allows the adjustment of the oscillator for best regeneration and oscillation. This cannot be accomplished so readily with a single tube used as an autodyne detector because the conditions for best detection are not usually those for greatest regeneration and smoothest oscillation. Elimination of the detuning which usually accompanies adjustment of the regeneration control is also accomplished. This makes possible the accurate calibration of the receiver. Moreover, the hissing background peculiar to an oscillating detector is almost entirely absent. This is especially advantageous when both stages of audio are used for loud-speaker reception.

This detector arrangement can be built into sets using single-tube autodyne detectors by making slight modifications in the detector circuit. Commercial receivers such as the a.c. and d.c. Pilot Super-Wasp are especially suited to such modification.

The detector is followed by two stages of audio-frequency amplification, the first being resistance coupled to the plate circuit of the detector and the second transformer coupled to the plate circuit of the preceding stage. Both audio stages use

FIG. 1 — THE SEPARATE TUBES FOR REGENERATION AND DETECTION MAKE THE CIRCUIT "DIFFERENT"

| L1, L2 and L3 | See coil table. |
| C1 | No. 317 Silver-Marshall condenser with 3 rotary and 2 stationary plates. |
| C2 | Same as C1 but with 4 rotor and 8 stator plates. |
| C3, C4 and C5 | .01-µfd. fixed condensers. |
| C6 and C7 | .001-µfd. fixed condenser. |
| C8 | .00001-µfd. fixed condenser. |
| R5 | 20,000-ohm Centralab regeneration control. |
| R6 | 2-meg. leak. |
| R7 | 10-meg. leak. |
| C9 | 6800-ohm 3-terminal control. |
| VT1 | Type '01-A regenerator. |
| VT2 | Type '00-A detector. |
| VT3 | Type '22 high frequency audio amplifiers. |
| J1, J2 | Filament control jacks. |
| RPC | 60 turns No. 32 a.c.e. enamel wound on 3⁄4" diameter form. |
| V | Filament voltmeter, 0-6 or 0-0 volts d.c. |

THE SPACE BEHIND THE PANEL IS COMPLETELY UTILIZED

The screen-grid tube in the center compartment is the antenna-coupling tube. The tuned r.f. stage is in the compartment at the right. The left-hand compartment contains the detector unit, the regenerative tube being the one at the right and the detector tube the one at the left. The two audio amplifier tubes are in the center compartment. The coupling lead between the tuned r.f. stage and the detector compartment is run beneath the base. Battery connections are made to the Yactley terminal plate.
Type '12-A tubes. Each stage is equipped with a filament-control jack so that one stage can be used for head-set reception and two stages for loud-speaker operation.

CONSTRUCTION

Mechanical design has been given just as much attention as the electrical features with the result that the receiver not only performs well but may be depended upon to continue doing so despite the more or less rough handling which any ham receiver must sometimes withstand. The apparatus is assembled on a heavy aluminum panel and sub-base which fit into the aluminum case. The aluminum panel is 12" long by 5¼" high by ⅜" thick and has mounted on it the two tuning condensers, the voltmeter, telephone jacks, the filament rheostat, and the regeneration control resistor. Particular care must be taken to insulate from the panel both filament control jacks (J1 and J2), the Centralab resistor (R1) and the r.f. stage tuning condenser (C1). The detector tuning condenser (C3), which is at the right, and the filament rheostat (R2) should not be insulated from the panel.

The unit is now ready for mounting of parts on the sub-panel. The layout of parts is shown in the illustrations. In the rear view of the assembly the compartment in the center contains the screen-grid antenna coupling stage and audio tubes. To the right, separated by a ⅛-inch thick aluminum shield, is the tuned radio frequency stage. The audio transformer is mounted half in each compartment.

On the left, also separated by ⅛-inch shield from the antenna coupling compartment, is the two-tube detector compartment, the detector tube being the one at the left. This layout of parts was thoroughly tried out, and to avoid tube coupling this arrangement was found the most satisfactory.

Sub-panel sockets of the rigid type are used throughout and allow all wiring to be on the underside of the front panel, as are most of the condensers, resistors and chokes.

The plug-in coil sockets are raised 1¼ inches above the sub-panel, keeping the coils insulated as much as possible from other parts. A Yaxley No. 600 cable connector takes care of all battery leads. Any similar cable connectors having seven or more leads might be used. Care should be taken in wiring to have wires as short as possible, and to ground the "A+" and "B-" by the shortest path to the sub-panel.

After the unit is completed the next step is to construct a cabinet. Aluminum ⅛-inch thick was chosen as the ideal material. A piece of sheet iron is used as a stronger bottom. The two ends are cut first; one left, one right. Both are 6¼ inches by 6¼ inches, each being bent ½ inch up from the 0¼-inch side to form a 90-degree angle,
making them the same height as the panel, or 5 3/4 inches. The back is then cut 11 3/4 inches by 6 3/4 inches and is also bent to form a right angle 1/4 inch up on the long side, making it 11 3/4 inches by 5 3/4 inches.

Angle brackets cut out of brass 1/16 inch thick are used to fasten the back and sides. These brackets are first fastened to the rear section at the extreme edges by 6/32 round-head screws. Then the sides are fastened to the back so the edges come flush with the outside, using 6/32 round-head screws.

The complete set of coils

The coils are arranged in pairs, the ones with two windings being the detector coils and those with the single winding the r.f. coils.

The bottom section can now be made, and added to the two sides and back. It is made of sheet iron 1/16 inch thick and is 11 3/4 inches by 6 3/4 inches and is fastened to the two sides and back by 6/32 round-head screws with the bends of the side and back sections on the underside of the bottom section.

The top of the cabinet is constructed of three pieces of 1/16-inch (thick) aluminum, cut to the following sizes: 1 inch by 12 inches, 2 inches by 12 inches, and 3 3/4 inches by 12 inches. These are placed in the following way, covering the sides and back section: 1 inch by 12 inches, along the back lapping over the sides and back; 2 inches by 12 inches, along the front lapping over the sides, but even with the front edges of the side sections; the third piece, 3 3/4 inches by 12 inches, is fastened to the back strip by hinges, making a hinged lid which is very convenient for changing coils or tubes.

The ground binding post is fastened to the metal cabinet. The antenna binding post is insulated from the cabinet and a flexible wire connects it to the grid of the antenna coupling tube. The cabinet is then completed, and makes a very rigid, and compact container for the chassis.

After the assembly and wiring is completed, a thorough test is always a good "safety first" idea. It never pays to just say, "I think I have everything O.K." The simplest test method is by the use of a 4 1/2-volt "C" battery and a voltmeter. Proceed in the usual manner, noting particularly the following: Test all leads and terminals for any possible short circuit to the metal chassis or panel. Test all connectors that are grounded, and make sure they are grounded. Make a thorough examination of the condensers, C1 and C2, making absolutely sure that the movable plates do not touch the stationary plates in any position. A possible short at a point like this may prove very disastrous, especially in C1.

Operation of this receiver is as easy as that of any two-dial receiver. In this circuit each control, radio frequency and detector tuning, shows the same amount of sharpness, a feature in itself giving extreme selectivity. The tuning is as sharp as that of the average superheterodyne circuit — and that's sharp! This sharpness is absent in many short-wave tuned radio frequency receivers, especially in the radio frequency stage. When the radio frequency stage is really sharp, incoming signals do not have the slightest tendency to hang on but really cut off as either dial is moved slightly. The receiver should not squeal or make any disagreeable noises while being tuned, but as both dials are brought into tune a slight "pluck" or "swish" — as is evident in a B.C. superhet — will be heard, disappearing upon the retarding adjustment of the regeneration control. Tuning is most satisfactory when the regeneration is just enough to show that the radio frequency stage and the detector stage are in resonance.

All amateur bands cover a large space on the dials. The 14,000-kc. band occupies 30 divisions, the 7000-kc. band 23 divisions and the 3500-kc. band 70 divisions.

The New England Division Convention

(Maine Section)

The Third Annual Maine Section Convention was held at Portland, Friday and Saturday, August 22nd and 23rd, under the very able auspices of the Portland Amateur Wireless Association.

Early morning of the 22nd found various members of the Convention Committee dashing hither and thither, busily engaged in "getting things organized" for the official opening of the first day's session. The registration booth was set up at the Eastern Hotel, and preparations for signing up the delegates were made. An amateur station was installed in the Sun Room of the hotel under the supervision of W1ATO, and was operated under his call. The Sun Room was a very popular

(Continued on page 80)
A Modern 50-Watt Radiophone Transmitter*

By Howard A. Chinn and Paul S. Hendricks †

During the past year it became evident that a modern radiophone transmitter for operation on the amateur and experimental frequencies between 3000 and 17,000 kilocycles would be an useful addition to the equipment of the Round Hill Research Laboratories which are sponsored by Colonel E. H. R. Green and under the direction of the Massachusetts Institute of Technology, at South Dartmouth, Massachusetts. The apparatus was desired for communication with field parties, itinerant aircraft and for experimental work in connection with the transmission and utilization of standard audio frequencies.

After a careful survey of the many transmitter circuit arrangements possible, it was decided to design and construct a transmitter having a carrier output of fifty watts and capable of high percentage modulation with a good overall audio frequency characteristic. If it was found desirable or necessary to obtain a greater output power a linear radio frequency amplifier could be added at any time. The complete arrangement of tubes finally adopted is outlined in Fig. 1.

The radio frequency circuits consist of a Type '10 oscillator, a Type '65 buffer amplifier and a Type '11 output amplifier. The oscillator tube is arranged to be used as a crystal controlled tube if a quartz plate of the desired frequency is available or as a self-controlled oscillator when this is not the case. While the 7?/2-watt oscillator tube is capable of supplying enough energy to excite the 50-watt power amplifier directly without an intermediate stage of amplification, it is very difficult to maintain a constant frequency output from such an arrangement when the output tube is being modulated. An isolating or buffer-stage, employing a screen-grid tube is, therefore, used between the oscillator and the output amplifier. All tubes in the radio frequency circuits are thus operating at the same frequency.

Three stages of speech amplification employing two Type '12-A and one Type '50 tube are necessary so that a two-button carbon or a condenser microphone of the type common in broadcasting stations can be used. The condenser microphone itself usually has at least one stage of amplification incorporated in the microphone stand and this brings the output level of this unit up to that of the two button carbon microphone so that they are interchangeable. Both of these microphones, while capable of faithful electrical reproduction of the sound impinging upon the diaphragm, have a very low output level as compared to that of the ordinary single button microphone. If this latter type were to be used exclusively, a single stage of transformer coupled amplification would probably suffice to supply the grids of the modulators with the necessary audio frequency energy. A pair of UV-845 tubes connected in parallel is used to modulate the Type '11 radio frequency amplifier. This combination, with the particular circuit arrangement used, permits a high degree of modulation with relatively little distortion. A complete schematic diagram of the transmitter is given in Figs. 2 and 3.

The transmitter may be keyed for c.w. telegraph transmission by the usual methods.

The entire transmitter, exclusive of the power supply equipment and modulator reactors, is built into a single unit having an overall length of 48 inches, height of 14 inches and depth of 18 inches. The framework is of 1" x 1" whitewood

* Contribution from the Round Hill Research Division of the Massachusetts Institute of Technology.
† W1AXV-W1XP, Round Hill, South Dartmouth, Massachusetts.
having a deck of \(\frac{1}{2}\)" thickness mounted three inches up from the bottom, thus providing a space for the by-pass condensers, resistors, etc., as shown in the photograph of the under side of the set. The front panel is made up of four separate units of standard 7" x 24" x \(\frac{3}{16}\)" bakelite stock. The framework is made smaller than the panels so that the complete unit can be enclosed by a cover of \(\frac{1}{2}\)" wallboard. Both the framework and the wallboard cover are stained walnut and given two coats of shellac.

THE RADIO FREQUENCY SYSTEM

The radio frequency oscillator is a type Type '10 tube which may be crystal controlled by plugging into its grid circuit a suitable quartz plate, or it may be operated as a self-excited Hartley oscillator by omitting the crystal and connecting the grid blocking condenser to the lower end of the tank coil \(L_5\). This operation is quickly accomplished by a plug arrangement. The filament tap is placed on \(L_6\) at the point for proper operation as a self-excited oscillator and does not need to be changed when operating with the crystal. The plate power is obtained from a 1000-volt source and is reduced to about 250 volts by means of the series resistor \(R_{11}\). It was found that this low plate voltage was more than sufficient to provide adequate output to excite the grid of the buffer amplifier tube. A milliammeter \(M_5\) indicates the plate current of the oscillator tube. The tank circuit of the oscillator, as well as that of the buffer and the power amplifier, is composed of a 250-µµfd. National transmitting variable condenser \(C_{10}\) and an inductance wound of \(\frac{1}{4}\)" copper tubing. These inductances are each fitted with two G.R. plugs in parallel at each end to make the coils readily interchangeable. Two plugs in parallel at each terminal have been found quite satisfactory to handle the amount of power used in this transmitter.

The screen-grid Type '65 buffer stage is coupled to the oscillator by means of the midget variable condenser \(C_{10}\). A variable condenser is used in this position so the magnitude of the excitation voltage on the grid of the buffer tube may be adjusted to the desired value without necessitating a variable tap on the oscillator plate circuit coil. The plate voltage of 500 volts for the buffer tube is obtained from the 1000-volt source through the series resistor \(R_{11}\). The screen voltage is obtained by using a potentiometer arrangement which is provided by the resistors \(R_{12}\) and \(R_{13}\). This method of obtaining the desired screen voltage from the plate supply has been found much more satisfactory than the use of a series resistor, as sometimes recommended. The screen or plate current may be read by plugging a milliammeter into jacks \(J_8\) or \(J_9\) respectively.

To take advantage of the isolation afforded by the screen-grid buffer tube between the oscillator and the power amplifier, it is necessary to provide adequate shielding between these circuits. For this a shield of 35 mil sheet copper is provided for the portion of the circuit which comprises the oscillator output and the buffer input circuits. It was found that this was all the shielding necessary to effectively prevent disturbances in the power amplifier circuits reacting upon the oscillator. This copper shield, as well as the copper tubing inductors, were polished and given a coat of clear lacquer to keep them bright and to prevent a possible increase in the radio
frequency resistance when the surface became oxidized.

The Type '11 output power amplifier is excited

The radio frequency return, or high voltage tap, is then placed on the tank inductance at the point for proper operation of the tube, which is usually in the neighborhood of two-thirds of the way from the plate end of the coil.

Coupling to the antenna system, when using a quarter wave antenna and ground, is accomplished inductively by means of the 10-turn coil which is built into the set. This same coil is satisfactory when coupling by means of any two-wire feeder system and may also be used to couple a single-wire feeder inductively, by connecting one end of the coil to ground. The single-wire feeder system may also be used by tapping directly on the tank inductance, usually a turn or two towards the plate end of the coil from the filament tap. Inasmuch as series plate supply is used, it is advisable to put a blocking condenser in series with the feeder wire to keep the plate voltage off the antenna system. Series plate supply is consistently used throughout the transmitter because of the likelihood of trouble occur-

plate voltage for the power amplifier is obtained through the modulation choke L and series resistor R. This provides the amplifier tube with 750 volts and permits an arrangement whereby a high percentage of modulation is possible. The resistor R must be by-passed for audio frequencies and for this purpose a 15-mfd. high voltage condenser C, is used. A 300 milliampere meter M indicates the current being taken by the plate of the tube.

The Type '11 being a three-element tube, it is necessary to provide a means of neutralizing

ring with radio frequency chokes that may operate poorly. These different feeder systems are used with this transmitter depending upon the operating frequency desired and the antenna that is available for the particular work.

It should be noted that care must be taken when using a single-wire feeder, that the entire system does not operate as an ordinary antenna-ground combination. This can be easily checked by noting whether the current distribution on the feeder wire is uniform over its entire length. In order to determine this, a low reading
thermo-ammeter (0.25 or 0.5 ampere) may be clamped onto the feeder wire at various places along its length and although the meter will not indicate the true current because of the shunting action of the short piece of wire that it spans, the reading should be alike anywhere on the feeder. If this test is tried at four points each one-eighth of a wavelength apart, beginning at any convenient point on the feeder, and the current is found to be equal at all these points, in all likelihood the current distribution is nearly uniform along the entire feeder.

Antenna-tuning condensers were not built into this transmitter because at Rhoud Hill it has been found more convenient to mount the necessary condensers on the wall at the lead-in-insulators for the various antennas. Thus the antenna or feeder tuning condensers are associated with the antenna and not with the particular transmitter being used.

The radio frequency chokes in the grid circuits of the tubes are the G.R.S millihenry type. For use in the plate circuits a very satisfactory choke was found in the form of a machine wound inductance which is 1½" thick, has an outside diameter of 1 ½" and is wound of No. 33 wire. The completed choke is thoroughly impregnated with paraffin to exclude moisture. These "pies" were secured from an old Baird spark coil, one of which will keep an amateur supplied with r.f. chokes for several years. To prevent the various audio and radio-frequency currents from wandering into places where they do not belong with the resulting probability of singing or "motor-boating" action, the circuit has been provided with ample by-pass condensers which are placed in the circuit both electrically and physically to provide the shortest alternating-current paths feasible.

All tank circuit inductances are wound of 14" copper tubing and have an outside diameter of 3 ½". The spacing between turns varies for the different sets of coils. To make the large coils rigid mechanically it was necessary to clamp the turns with a pair of ½" x ½" notched oak strips, running the entire length of the coil and at right angles to the turns. The number of turns in the various coils, together with their frequency ranges, are tabulated below:

<table>
<thead>
<tr>
<th>FREQUENCY RANGE (KILOCYCLES)</th>
<th>2000-5000</th>
<th>5000-8000</th>
<th>12,000-17,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillator: Turns L4</td>
<td>22</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>L4 Spacing</td>
<td>1/16&quot;</td>
<td>½&quot;</td>
<td>5.16&quot;</td>
</tr>
<tr>
<td>Buffer: Turns L8</td>
<td>22</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>L8 Spacing</td>
<td>1/16&quot;</td>
<td>½&quot;</td>
<td>5.16&quot;</td>
</tr>
<tr>
<td>Amplifier: Turns L7</td>
<td>22</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>L7 Spacing</td>
<td>1/16&quot;</td>
<td>½&quot;</td>
<td>5.16&quot;</td>
</tr>
</tbody>
</table>

In the photograph of the front panel the meters from left to right are: A 0-100-milliammeter M1 which is attached to a cord and plug, to be used for measuring the microphone, grid and plate currents; a 250-milliampere meter M3, in the plate circuit of the modulators; a 15-volt a.c. meter M5, for the filament circuit; a 100-milliampere meter M6, for the oscillator plate current; a 300-milliampere meter M4, for the power amplifier plate circuit; and a 1.5-ampere thermo-meter to measure the radio frequency output current to the feeder or antenna. The left hand dial of the group of four large dials controls the oscillator tank condenser C10. The knob which operates the small vernier condenser V5 is just above this dial and to the left. The vernier condenser is necessary in this transmitter in order that the frequency may be adjusted precisely to the particular value called for by the experimental license being used. For operation in the amateur bands where precision setting of the frequency is not essential except when operating near the edge of the band, the vernier condenser is not necessary. When crystal control is used the vernier condenser is of no particular value. The second dial from the left is the buffer tank condenser, the next the power amplifier neutralizing condenser, and the right hand dial controls the amplifier tank condenser.

The photograph looking down on the set from above is with the rear of the transmitter at the top of the illustration. At the back of the set and immediately to the left of the center cross member of the frame is the oscillator tube V4 with the plug-in crystal holder, or the alternative—a grid condenser C1, to the left of the tube. The filament, grid and plate by-pass condensers are grouped closely about the tube socket thus facilitating short leads. The plate circuit r.f. choke is mounted to the right of the tube and the frame center cross member. The copper-shield box which is divided into two compartments is at the center of the set and is shown just forward of the oscillator tube, with the lid removed. In the left hand compartment of this box is placed the oscillator tank circuit inductance L4. The variable tank condenser C10 is between the coil and the front panel. This condenser is connected to its dial by means of a short fibre shaft which helps to overcome undesirable "body capacity effects." The smaller compartment at the right hand end of the shield contains the buffer tube V6, the r.f. coupling condenser C16, the grid r.f. choke and the grid and filament r.f. by-pass condensers associated with this tube. Immediately in front of the buffer tube is the tank circuit inductor L6. Below this is mounted the tank circuit condenser, hidden from view by the coil. The jacks, into which this inductor plugs, are supported directly by the condenser frame on brass strips, thus making very short and heavy tank circuit leads. When the set is in operation a cover fits snugly over the shield box and a flange on the underside of this lid fits over the compartment wall to effectively isolate the two compartments. Small holes in the lid directly
over the tube provide sufficient ventilation for this compartment.

To the right of the shield box is seen a dial underneath which is the r.f. condenser \( C_1 \).

The photograph of the bottom of the set shows this clearly and also indicates the positions of the variable condensers

![Diagram of radio-frequency unit](image)

**FIG. 2. — SCHEMATIC CIRCUIT OF THE RADIO-FREQUENCY UNIT**

- \( J_1 \) — Screen-current jack for buffer stage
- \( J_2 \) — Plate current jack for buffer stage
- \( C_1 \) — 1-\( \mu \)fd. by-pass condenser, 1000-volt
- \( C_2 \) — 6.8-\( \mu \)fd. Sangamo receiving type
- \( C_3 \) — Two 0.001-\( \mu \)fd. Sangamo receiving type in series
- \( C_4 \) — Filament by-pass condensers, same as \( C_1 \)
- \( C_5 \) — 0.001-\( \mu \)fd. grid condenser for Hartley oscillator
- \( C_6 \) — 2-plate midget variable
- \( C_7 \) — 2.2-\( \mu \)fd. National double-spaced transmitting condenser
- \( C_8 \) — 2-plate 1000-volt filter condenser
- \( C_9 \) — 100-\( \mu \)fd. midget coupling condenser

- \( C_{10} \) — 200-\( \mu \)fd. National double-spaced, coupling condenser
- \( C_{11} \) — 5-plate National double-spaced neutralizing condenser
- \( L_1 \) — G. H. radio-frequency choke
- \( L_2 \) — Plate circuit r.f. choke (See text for details.)
- \( L_3 \), \( L_4 \), \( L_5 \) — See coil table
- \( L_6 \) — 20,000-ohm, 50-watt fixed resistor
- \( R_1 \) — 10 turns of \( \frac{3}{4} \)" copper tubing, \( \frac{3}{4} \)" outside diameter, spaced \( \frac{3}{4} \)"
- \( R_{10} \) — 0.05-ohm U. R. rheostat

The specifications for the meters, etc., are given in the text.

The four variable condensers which are controlled by dials on the front panel are on approximately the same level as the deck. Consequently it is necessary to cut the shelf away to mount these condensers in place.
CST
November, 1930

The current for the carbon microphone is obtained from the same battery that supplies the filaments of the first two speech amplifier tubes. A 200-ohm potentiometer, \( R_b \), connected across the filament supply permits the microphone current to be adjusted to the desired value. It is important to note that a good carbon microphone is easily ruined by suddenly opening the battery circuit several times, as would be the case if switch \( S_b \) were operated when current was flowing through the microphone. The inductive "kick" caused by the collapse of the transformer field produces sparking between the carbon granules of microphone buttons and ultimately leads to a "packed" transmitter. A condenser \( C_a \), across the battery switch \( S_b \) will help to protect the microphone to a limited extent in the event that the switch is operated before the microphone current has been gradually reduced to zero by means of the potentiometer \( S_b \). The current in each microphone button is measured by plugging the milliammeter \( M_2 \) into either jack \( J_1 \) or \( J_2 \). The pilot light \( K \) associated with this circuit serves to indicate whether or not the battery circuit is closed.

The plate circuits of the three speech amplifier tubes are provided with jacks to permit the insertion of the milliammeter \( M_2 \) in the circuit to check the operation of the tubes. The grid current of the last speech amplifier and that of the modulators may be determined in a similar manner. The plate current of the modulators is read on a meter permanently connected in the circuit.

The modulation reactors \( L_3 \), are each 15 henry, 200 milliamperes chokes, two units being used merely because it was easier to obtain the desired inductance at the existing current density in this way. These chokes were mounted externally to the set itself to prevent any mechanical or electrical feedback. The plate supply for the two UV-845 modulator tubes is obtained from the 1000-volt source through these reactors.

In the photograph of the front panel the plug attached to the milliammeter \( M_2 \) is shown in the lower row of the two microphone current jacks. The lower row of jacks permits the measurement of the various grid, plate and screen circuit currents as has been mentioned. The knob to the left controls the microphone current potentiometer and the one to the right controls the audio-amplifier gain. Above and between the two knobs is the pilot lamp \( K \), and above the second jack from the right is the battery switch \( S_b \).

The apparatus of the audio frequency system is seen at the left end of the view showing the interior of the set from above. The row of equipment along the left edge, reading from front to back, consists of the microphone input transformer, the first Type '12 amplifier, the first interstage transformer, and the second Type '12 amplifier; then across the back of the set; the second interstage transformer, the Type '50 amplifier and the grid impedance \( L_3 \) for the modulators. The large choke in front of the Type '50 tube is \( L_1 \) the plate circuit coupling inductance for this amplifier. The mica grid-coupling condenser \( C_9 \) is mounted between the choke and the tube socket. The two UV-845 modulator tubes are at the right. The two knobs to the right rear of the modulators are the filament rheostats \( R_6 \). Several by-pass condensers are seen in this part of the circuit.
view but most of those used in the audio circuits are on the under side of the deck. The remainder of the equipment is associated with the radio frequency circuits and has already been described.

The view of the under side of the deck shows the additional by-pass condensers together with the series plate circuit resistors \( R_{10} \) and \( R_{11} \), and the filament rheostats \( R_{4} \).

The wire used for connecting most of the apparatus, excepting the radio frequency circuits, is automotive lighting cable. This wire is stranded, has a rubber covering and an outer braid of varnished cambric. It is particularly well adapted for use where the wires are run through holes in metal shields or around sharp bends because its tough covering is not easily injured.

**Power Supply Equipment**

A 1000-volt, 400-milliamperc motor-generator set supplies the plate voltage, and an 11-volt 15-amperc transformer heats the filaments of all the tubes in the transmitter with the exception of the first two speech amplifiers. A 1250-volt plate supply would be more suitable for this service and on occasion this transmitter is operated from a rectified plate supply giving this voltage. The filament transformer is provided with a primary rheostat that permits the secondary voltage to be adjusted to 10 volts for the Type '11 and the UV-845 tubes. The additional drop necessary to reduce this voltage to 7.5 volts for the filaments of the Type '10, '50 and '65 tubes is obtained by means of the series resistors \( R_{1} \).

A common center tap resistor is used for the return of all grid and plate direct currents and this resistor must be sufficiently large to handle approximately 100 milliamperes. The grid bias voltage for all the tubes both in the audio and radio circuits, excepting the first two speech amplifiers, is obtained from a common tapped bias battery of 180 volts. This battery is located on the shelf below the transmitter and is connected to the set by means of a five-wire cable and plug which connects to the group of terminals which are numbered 10 to 14 inclusive.

The filament, plate and grid voltages for the first two audio amplifiers are obtained from batteries which are placed on a shelf directly below the transmitter and connected to it by means of a six-wire battery cable and plug that connects to the group of terminals numbered 4 to 9 inclusive.

**General**

The method of tuning and operating this type of transmitter has been explained many times in recent articles in this publication and will not be discussed here.\(^1\) The checking of the performance of the set is aided considerably by the provisions that have been made to read the current in all the important circuits. A monitor\(^2\) to check for possible frequency modulation and a modulometer to measure the percentage of modulation and to check the overall operation of the transmitter are quite essential to obtain best operation.\(^3\)

The transmitter is preferably operated with crystal control of the frequency, in which case it has been found that the carrier frequency remains constant even with 100 per cent modulation of the output. When the oscillator is used as a self-excited Hartley circuit care must be exercised not to over-modulate as there is likely to be a tendency to modulate the carrier frequency as well as its amplitude. This is particularly true when operating in the vicinity of the 14-mc. band. This difficulty may be overcome by using a separate plate supply, such as a "B" substitute, for the oscillator tube.

For convenience in operating the set, the microphone input circuit has been extended from the transmitter to the operating desk by means of a three wire cable in flexible conduit. To prevent radio frequency pick up in this cable a choke is connected in each lead as it leaves the set. The chokes used consist of 90 turns of three strands of No. 26 d.c.e. wire in parallel on a 1/2" wooden dowel. Each wire then forms a choke of 90 turns, one of which is placed in each lead. The audio input circuit and the control pair may be extended as far as desired if proper precautions are taken with the audio circuit and thus the transmitter may be remotely controlled from any desirable point.

A relay with its contacts connected between terminals 18 permits the oscillator to be started at will by merely closing the switch that operates the relay. Thus the power supply may be left running and the transmitter stopped when it is desired to receive, by operating one switch.

In conclusion particular attention is called to the fact that the mechanical layout and the wiring of such a set are very important, particularly when the audio and radio circuits are so close together and provided with so little shielding. It would, perhaps, have been better to build the audio and the radio circuits in separate units and to place them at a considerable distance from each other. In this transmitter it was necessary to connect the cases of all transformers, chokes, by-pass condensers, etc., to a common ground wire in as direct a manner as possible.

This radiophone transmitter has been in continual use at WIXV-W1XP for the past year and has given very satisfactory service for every use to which it has been put, including amateur communication from W1AXV, as well as communication to airplanes and airships, and the transmission to distant laboratories of standard frequencies in the audio frequency spectrum from W1XP.

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2. QST, Nov., 1929.
3. QST, Aug., 1929.
THE correct way to begin this story is: "Once upon a time there were two transmitting amateurs talking," but since it is an up-to-date story, it really begins like this: "Tweet-twit-tweet-twit, tweet-tweet-twit-DAWW-DI-DAWW DI-DAWW-DI-DAWW — ZIZZZ — ZIT-ZTI-IT-IT-ZITZZZZ-BRRRRROUGH-Click."

"Sounds fierce tonight, doesn't it?" exclaimed Lee, as he pulled the switch on the receiver.

"Sounds like most of the c.w. fellows have taken up the 'phone idea and have all gone in for one hundred percent modulation," replied Ed.

"Bay, you know so much, why are those signals so darned broad?"

"Why, you ought to know that, even if this is your first week on the air in two years. It's because of what some fellow at Headquarters terms wohhulation; that is, frequency modulation. You see, the oscillator is so easily influenced by variations in input and variations in load, due respectively to a poorly constructed power supply and an unstable antenna." Lee reached up on the bookshelf and took down his Handbook.

"Then what a fellow needs for a first-class signal is an outfit that is steady in every part, in order to get steady output?" Ed. queried, craning over Lee's shoulder to look in the book.

"Yeah, that's it, all right. Oh, here we are, page 102 in my edition of the Handbook. 'Unsteady Signals' is the heading, and believe me, it gives you the right dope. Just look that over for a minute."

Silence fell — no one hurt.

"Yes, this is fine to tell you what might be causing the unsteady signals, but how does a fellow get away from any chance of having it in the first place?" Ed. shut the Handbook with a bang.

"Of course, I might tell you to read the whole Handbook, and when you got done you would know — and then again, you might not. How does a fellow get away from any chance of Q5X in the first place? That's a large order, but here's what dope I can give you, and what I have learned from experience." Lee pulled out pencil and paper and started.

THE POWER SUPPLY

"We'll say this outfit is going to be a Type '10 transmitter. I think that covers about 50 percent of all ham stations in the U. S. A. I'll start with the power supply. Of course, for good regulation this must be amply large. If it is to be r.a.c., then the transformer must be a good husky one. If motor generator, then it should be of considerably larger rating than the maximum of power to be taken from it. And the motor should be a constant-speed affair, so that as the load is applied it will not slow down. We needn't bother much with the m.g., though, as it isn't so popular as r.a.c. anyway. R.a.c., that's getting to be an insult — when a fellow tells you your note is 'r.a.c.' Still, I'm willing to bet that 90% of the sets in the U. S. A. use it, so why not call it r.a.c.? I think it must be because the fellows naturally associate r.a.c. with the worst sounding signals on the band. Maybe they think it means 'raw a.c.' Hi!"

"I think it must be because most fellows envy the motor-generator equipped stations," Ed. threw in.

"Well, it doesn't matter, but r.a.c. supply is the cheapest, and can be made the best. The most important thing is the rectifier. One thing is sure; we have the advantage over the fellows in the game back in 1928, and before, since we have cheap mercury vapor rectifiers available, which they didn't. Now take these Type '61s, or the '6EX Rectobulb, or any number of other makes. They all provide a real rectifier which doesn't strangle your output with high resistance. Naturally they have to be kept within their rating, but their rating is plenty high, compared to the old tube rectifiers. Of course, for a Type '10 the Type '81 tube is fairly good, for it will stand 750 volts on the plate, and with a moderate amount of current being drawn, with good filter, will deliver 500 volts without blushing.

"Occasionally a fellow can pick up a mercury arc tube, which is what I consider about the best. One doesn't worry about rectifier filaments with an arc. Of course, there is considerable experimentation to be done before one gets the thing to tip correctly, but after that, everything's all set. And believe me, the output from a mercury arc

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* 227 North Fourth Street, Rockford, Ill.
is limited only to the transformer’s ability to stand the gaff; that is, for amateur work.

“Let’s take the filter next. Did you notice that article in QST not long ago on filters? Oh, no, I forgot, your reading has been rather curtailed, being so busy. Well, anyhow, it was to the effect that amateur filters should use more chokes and less condensers, in order to save the mercury-vapor type rectifiers. After the key is let up on the transmitter, the condensers figuratively just open their mouths and gasp down all the juice. Of course, when the rectifier tubes aren’t of ample rating to take care of this, they are strained to the limit. It doesn’t take long to ruin them at that rate. The article went on to explain how the choke stored up energy but not at such a rate as the condenser, and exerted good filtering action, but not so much at the expense of the rectifier. It’s a good one to read.

“And then March QST had an article on electrolytic condensers. The sum of the findings seemed to be that around 2 µfd. of capacity was sufficient for filter on any good c.w. outfit. I don’t know whether that is entirely sufficient; personally I prefer four mikes. Still, I know one fellow who produced as beautiful a DX note as anyone could ask for with only two mikes.”

Here Ed. took possession of the pencil. “Your points then, on the power supply are: One, a good big transformer; two, a good rectifier, preferably mercury vapor; and three, good filter of, say, two mikes each side of a choke. Is that all right?”

“Why, yes, Ed., that hits the bell. Perhaps some one would object to the four mikes and one choke. An alternative would be a low value double choke, that is, about 18 henries each choke, one mike on the input side, one in the middle, and one or two mikes on the output. That’s my ideal. Of course, all must have good high-voltage rating, and the chokes should be able to carry far more current than will ever be necessary — for best results.” Lee stopped a minute and sketched out the filter. “Here, keep this.”

“Say, you forgot the filament supply. Or maybe you intended that to be on the plate transformer, eh?”

“No, I just forgot it. Of course, the mercury vapor tube rectifier filaments must be lit by a good transformer, and the transmitting tube as well. Personally, I believe in separate transformers for each — for better regulation — although the two filament supplies could come from the same transformer. But I never want the plate and filament supplies on the same transformer. I’ve seen too much grief come from that.

“You see, it is impossible to vary the filament voltage independently by changing the primary voltage with the filament and plate windings on the same transformer. And then, too, the insulation isn’t nearly so good, especially for the high voltages now used. And it is really almost ridiculously easy to wind a new secondary on some small transformer for filament supply, to say nothing of being able to buy them very cheap.

“The center-tap on the filament supply is important. If the transformer winding isn’t center-tapped, and accurately, use a center-tapped resistor. One of two hundred ohms is O.K. — or a 200-ohm potentiometer. I don’t like the lamp type of center-tap unless good automobile headlight bulbs are used; they are more uniform in resistance than the Christmas tree kind usually are. Some of these mercury-vapor tube rectifier circuits require no center-tap, however.”

“Of course, voltage control is important, and that is where the separate filament transformer comes in at its best. It is an easy matter to find some resistance wire that will cut down the primary voltage to make the secondary the correct value, but a rheostat in the primary is harder to obtain for secondary control. And then either two rheostats are needed, or a resistance center-tap, which is not so good. A good rheostat in the primary is just the thing.”

“Well, that about finishes the power supply, doesn’t it — or can you think of anything else?” said Ed.

THE TRANSMITTER

“No, I guess the oscillator comes next. I think we can disregard all circuits for common use excepting the Hartley and tuned-grid tuned-plate.

“First, shall we use series or shunt feed? I’ll take both circuits right together. Now in the Hartley circuit, series feed requires a split coil radio frequency choke, in fact, one isn’t even needed usually, but is used merely as a precaution, see? The high voltage ‘plus’ is fed to a part of the circuit which isn’t hot. And so the r.f.
hasn’t much chance to leak back through the power supply. Get it?"

"You bet, G.A., old man."

"Well, here’s Diagram 1, the shunt fed Hartley; Diagram 2 is the shunt fed t.p.t.g., and Diagram 3, the series fed t.p.t.g. Of the three, the Hartley is the simplest, the series fed t.p.t.g. seems to give the most r.f. output per amount of input, and the shunt fed t.p.t.g. is merely shown for convenience, since there is no real need to even try it. It works all okay, though, in case you do want to try it."

Ed. considered the diagrams carefully. "Well, that looks all right to me. I used the Hartley all the time I was on the air before, but I suppose these others are just as good."

"Yes. The only difference seems to me to be that the Hartley draws a bit more current without the antenna coupled, but that may be my individual results. And the circuit had the same parts as the t.p.t.g. I used to have (and used for 18 months) and the same coils."

"Oh, say, Lee, why all this stuff about small coils and big condensers? When I was on before, everything was the edgewise wound dope; now copper tubing seems to be the rage."

"Simple enough. Take the Hartley circuit in front of you. You can readily see that there is capacity between each pair of elements in the tube, can’t you? Well, then, if the shunt capacity across the coils—which is made up of tuning condenser, and three tube capacities—is small, the tube capacities will be a larger percentage than if the total capacity were large; understanding of course that the tube capacities do not change appreciably while we are changing the tuning condenser. However, if we have the old style set with small tuning capacity (50 µfd. was plenty of capacity in those days, I remember) the small change in tube capacities due to heating would be a relatively large change if the total shunt capacity was large, as nowadays—350 µfd. say for 7 me. hand. Get it?"

Ed. considered a minute. "Yes, I think so. Oh, sure I do."

"Well, then, to have a stable oscillator, we need plenty of capacity, which means small inductance. But then we run into a snag. We have extremely high currents then, and believe me, radio frequency currents sure do some heating. We must use heavy inductance for the Type '10, preferably, quarter-inch copper tubing. And remember that all connections to the condenser in this tank circuit must be just as heavy as the inductance, or the strain goes on these parts. It is best to use the same size tubing for connectors. If plug-in mounts are used extreme care must be used to have them heavy enough to carry the current without heating. The best I can think of would be of solid brass with a ¼” hole drilled for the coil and a setscrew to fasten it in. Old dial bushings do equally well, if mounted solidly on insulators. The setscrew can be equipped with a large head or thumbnut."

"I’ll use the dial bushings for mine, I’ve a half-dozen old dials home I’m just considering throwing away. Their bushings will be just the thing.” Ed. pencilled a note on the paper."

FIG. 2. — "Well, here’s Diagram 1, the shunt fed Hartley: Diagram 2, the shunt fed t.p.t.g., and Diagram 3, the series fed t.p.t.g."

The High-C type of oscillator circuit derives much of its frequency stability from another consideration. The dynamic stability (stability with rapid changes in plate voltage, etc.) is due to the low ratio of load impedance to tube plate impedance. This follows from the equation for frequency of oscillation:

\[
\omega = \sqrt{\frac{1}{LC} \left(1 + \frac{R}{r_p}\right)}
\]

The dynamic variable is the plate resistance of the tube, \(r_p\): By making the load resistance, \(R\), small in proportion to \(r_p\), the effect of variations in the tube’s plate impedance is greatly reduced, as far as frequency variation is concerned. A High-C plate tank circuit therefore is effective in reducing both the frequency variations due to tube heating (mechanical instability) and those caused by variations in tube plate impedance (dynamic instability). — EDITOR.
Use G. R. insulators for mounting them, then. You can get them cheap. I mean those small ribbed stand-off insulators used for mounting all sorts of parts. They are fine business for plug-in mounts of any kind. To go back to the size of the condensers and coils to be used. For the 3500-ke. band I believe about 400 $\mu$fd. of capacity is desirable. On 7000 ke., from 300 to 350 $\mu$fd., and on 14 mc., perhaps 250 $\mu$fd. though I have found this too high for a reasonable input, and have used as low as 150 $\mu$fd. with fair results. To determine the size of coil, I would reduce the input to a low amount and put clips on the coil instead of the regular mountings, and just reduce the number of turns until the amount of capacity required to tune the coil to the top of the band was close to the above amounts. It isn't at all critical to find the size coil required by this method. Just as a starter, 12 turns of tubing wound on $2\frac{1}{4}$" form seem to be about right for 3500 ke. work. For 7 and 14 mc. six and four (or three) turns, respectively seem the right values."

"How about the tuning condensers?" Ed. queried. "You know I have a bunch of old-timers home I hate to throw away. I guess I must have a half-dozen Cardwells, General Radios, and even some of the old Acme Low-Loss. You know, the kind with the celluloid covers?"

"You bet I know. Why, they are just as good as anything. In fact, I consider them the best, except for their bulk and the fact that they cannot be mounted very well on a breadboard. The rotor and stator plates are soldered into one unit, something worthwhile, and the dustless feature helps considerably. Besides, the capacity is 500 $\mu$fd., which is just what is needed. However, the Cardwells will make a neater looking job."

"Guess I won't throw 'em away then. They're hard to make connections to, however — at least to the stator."

Lee considered a minute. "Yes, I believe they are, but it can be done. Just make a couple of connections, one to each side. Well, to get on with the set."

"Use a good UX-type socket. Anything but a 'floating' socket is O.K. Look out for possible flashovers though, and pick one with connections far enough apart."

"The plate blocking condenser in the Hartley should be of about 500 $\mu$fd. capacity. However, I have used values up to .003 $\mu$fd., and down to 100 $\mu$fd. and found that the larger value (above .0005) worked just as well, but that the smaller ones increased the input quite a bit. The grid condenser isn't critical, but a value in the neighborhood of 250 $\mu$fd. is fine. For the tuned-grid tuned-plate circuit I found 100 $\mu$fd. enough for good results in both the plate and grid circuits. Larger capacity is usually all right, though. For filament by-pass most any old thing is O.K, providing it is .001 $\mu$fd. or so and the voltage break-down is fairly high. I have had trouble with some small receiving condensers here, where the stress is considerably less than in the plate circuit. However, good receiving condensers will stand up in the filament circuit of a Type '10 outfit. The plate and grid condensers should be really good, though. I find mica-type receiver condensers stand up, but the margin of safety isn't really enough. Two in series should be just right."

"Hold on a minute, let me write those down." Ed. was silent for a minute while he wrote busily. Then, "What about the grid leak?"

"I was just coming to that. Ten thousand ohms is just the size for a Type '10 oscillator. I have used all the way from 5000 to 12,000 ohms with little difference in output, but the 10,000 size seems best; over that, the circuit isn't so stable because the bias is too great. The gridleak in my t.p.t.g. you might notice, is across the grid condenser with an r.f. choke in series to keep r.f. out of that side of the grid coil — found it wouldn't work without the choke there. However, any good receiving choke stands up there all right. Speaking of r.f. chokes — I haven't said anything about them yet, have I?"

"No, hop right along, that used to be a sticker," said Ed.

"It still is. A fellow named Lidbury wrote an article back in 1927 in the Experimenters' Section in QST. Just wait a minute." Lee looked in his file of QST's. "Yes, here it is, October, 1927."

"Let me look it over to-night, will you?" Ed. reached for the magazine.

"Sure, take it along. The main thing is that he recommends very small diameter chokes, and his tables are all for No. 18 wire. However, I have found several receiving chokes to work fine. The Silver-Marshall No. 277, and the Sisson Helical Wound No. 85 are both good. A layer wound, or rather scramble-layer-wound, seems to work in most cases. Just cut and try on the same foundation as Lidbury gives."

"Well, that covers everything, I guess, doesn't it? Oh, no, what about arrangement of parts? I don't seem to be very good on that."

"Well, a number of good lay-out arrangements have been shown in QST as well as in the Handbook. As a rule they follow the schematic circuit diagrams pretty closely, especially the t.p.t.g. outfits. A good arrangement for the Type '10 Hartley with a Cardwell tuning condenser is the High-C set described in August, 1928, QST, and in the sixth edition of the A.R.R.L. Handbook. The inductance can be placed behind the tuning condenser with the tube socket on top of the condenser or the inductance can be on one side of the condenser with the tube socket in the rear. The main idea is to make the leads between the tuning condenser and the inductance
plenty heavy and not too long. The other leads should not be all jammed together. I have found that when the leads were cut too short and everything was crowded, r.f. currents worked in where they weren't wanted and more difficulty was experienced than with apparatus quite widely separated.’’

Ed. looked at his watch.

“Let’s move on to the antennas. It’s getting late.”

**ANTENNAS**

“Well, for practical work we have a choice of a lot of antennas, but the three we can really spend time on are the split Hertz (antenna-counterpoise) system, the single-wire feed Hertz and the Zeppelin. I won’t go into detail on the lengths, because there is plenty of dope in QST and the Handbook. But just a word on the lead-ins, etc.

“With the Zeppelin, a primary consideration is to keep the feeders from swaying. Use light spacers between them. Heavy spacers have too much inertia and the wires swing but the feeder spacers stay in place. Quarter-inch wood dowels well boiled in paraffin are the best spacers. Use good strain insulators. Make the mast good and strong, well guyed, and have one end of the antenna tied fast. The halyard on the other end should go through the pulley and have a really heavy weight tied on the lower end. That works fine at my shack. The old mud bushing is passé.’’

“There’s that five-dollar word again; seems to be a pet of yours, popping out every once in a while. Well, Old Man, think you have done me a lot of good tonight. I’m going home and read over what you wrote here, and believe me, I’m going to put out a real sig from now on.” Ed. rose, Lee reached over and tuned in a station on the receiver.

“Peep-pip-pee-pip, peep-peep-pip-pPep.”

“Boy, isn’t that pretty! And not a bit of QRM!”

**The Vanalta Division Convention**

“GOOD to the last drop!” And, in this case, there certainly was nothing wrong with the last drop. The coffee manufacturer who popularized this slogan never will know how near he came to describing the Vanalta Division Convention held at the Chamber of Commerce Hall, Victoria, B. C., on the 30th and 31st August. Use your imagination as you will, if you did not attend it you can never realize how this holiday, so well managed by the Victoria Short-Wave Club, could have been so pleasant. Not only was it favored by being held on Canadian soil, but it had as well a beautiful setting in lovely Victoria and was attended by the most genial group it has been the pleasure of the writer to meet.

After registration during Saturday morning, the delegates assembled at 3 p.m. to hear Mr. Louis R. Huber, W3DOA-W9SU, Midwest Division Director representing A.R.R.L. Headquarters, describe the major problems confronting the amateur fraternity to-day and tell how the Board is meeting them. Mr. J. King Cavalsky, VE5AL, S. C. M. of British Columbia, then presided over a general discussion, following which the fellows hob-nobbed over pipe and cigar.

Imagine it! — an A.R.R.L. banquet starting on time! Yet this one did it at 8 p.m. and, what is more, was broadcast successfully by CFCT!”

(Continued on page 86)
The Milkotron
As Told to the Old Connecticut Yankee
By Woody Darrow, W3JZ*

It is with the greatest of pleasure that I assume my new duties of insulting engineer to the technickle staff of QST. It all started at the Worcester Convention. Jim Lamb, who is the Chief Tech, and George Grammer, next in command, was both complainin' about how hard the work on QST was. Some of the questions asked was so hard that they couldn't answer them, so I says I'd be glad to take a job as insulting engineer to the technickle staff at the nominal salary of $1.75 per alum. My job meant less work for Jim and George, so they both agreed it was a good thing. Along came the cheek and double check from K. B. Hebee, and Hiram, and I was sent to Piscata, New Jersey, to meet Freddy Link and Johnnie Knight (W2ALU) at the de Woods Radio Co., who in turn pass me over to H. Rouclere (W2AWI), who is in charge of the Engineering Department, where all the bright ideas come from. Mr. Rouclere was a tall, slender chap, with blue eyes and dark hair. He was such a modest fellow that I could hardly believe that he was the man who had invented the Milkotron, the new tube that was to revolutize radio by annihilating the skip distance phenomena.

I looked at Mr. Rouclere and he looked at me, and we might have been looking at each other for days if Mr. Rouclere hadn't up and said, "Hello!" To which I replied, "Fine, thanks"—and the interview was under way. "Are you troubled by fading signals, skip distance effects, low antenna current, static-itus, heart burn, weak ankles, or halitosis?" asked he. I hated to admit my weakness so I up and says, "Says you." This didn't stop Mr. Rouclere; he continued by telling me to fill out coupon at the bottom of page 99 of this QST and mail it to the nearest drug store, or drop it in the waste basket. It really didn't matter, as even my best friends wouldn't tell me.

Frankly, I was amazed at the technickle knoll of this lad and I begged him to tell me more of the outstanding sensation of the decade — The Milkotron — which had helped to alleviate the suffering caused by skip distance phenomena.

"Well, first off, there is 'Not a Bull in a Carload,'" he began.

I told him bulls never bothered in any way, as most of my trouble was caused by parasites.

"This tube may be had in any capacity up to

and including 500 quatts and in any distance range desired, plus or minus five miles," he continued. "The new principles involved in governing the distance at which signals from a transmitter employing this tube may be heard have been kept in a sealed metal receptacle inside the tube cooing tanks at W2XCD. But due to the fact that the tube persisted in heating up, somebody opened the tanks and removed the obstruction which made it possible to present this information to the select circle of QST readers."

I could tell from the way he talked, and the fact that he worked in a tube factory, that Mr. Rouclere would have to be pumped. His know-

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* 3023 Germantown Ave., Germantown, Philadelphia, Penn.

**A new unit of something or other, chiefly the latter.

Cf. Borden and Sheffield, "Principles and Practice of MOO-PA Transmitting Circuits."
edge proved to me that no vacuum existed so far, so I says, "Tell me more."

He continued: "The secret is merely the fact that instead of bounding our signals off the Heaviside layer and letting them get knocked for a loop out into boundless space, we utilize the reflecting power of the milky way! By depositing on the plate of the Milkotron varying amounts of desiccated cow-juice, the angle at which the produced wave is reflected from the milky way is controlled to a much better advantage."

I says, "That's a fine theory, but will it work?"

"How can it help but work? It's in de Woods and when I says a tube is in de Woods, why go any deeper?"

The accompanying graph gives the distance at which signals may be expected to come to earth again for a given deposit on the plate:

false teeth with roots embedden in the base. These teeth are slightly decayed and give off a gas which, when ignited by the electromhos (positive hanks of raw a.c.) cause the pilot light to glow in the tube, eliminating an antenna meter. The brighter the glow the more antenna current. If the tube is overloaded, the gas backs up into the teeth causing them to bite off the plate current, thus stopping the filament from burning out as the tube ceases oscillating. The Milkotron is truly the most remarkable improvement amateur radio has ever seen, and if there are any questions, either on this tube or other ham problems, send them in to the Insulting Engineer of the Technickle Staff of QST.

A New Section Created in Pacific Division

As provided in the Constitution and By-Laws of the A.R.R.L., the operating territory of the League is apportioned into Sections for the purposes of administration of the League's field organization. Action may be taken by the Communications Manager acting with the advice and consent of the Division Director concerned in the United States, its territories, and Cuba, and with the advice and consent of the Canadian General Manager in Newfoundland, Labrador, and the Dominion of Canada.

Recently fifty-eight members in the San Joaquin valley territory in the Pacific Division petitioned for the formation of a new section. The matter was discussed with Section Managers Sandham and Quenett, who each agreed to relinquish certain California counties proposed for inclusion in the new Section. Division Director A. H. Babcock gave the matter his full consideration and consent and recommended the matter to Headquarters for the action requested.

This notice announces the creation of a San Joaquin Valley Section of the Pacific Division to include the counties of Amador, Calaveras, San Joaquin, Tuolumne, Stanislaus, Mariposa, Merced, Madera, Fresno, Tulare and Kings of the state of California. All amateur operators and stations in this territory are invited to report activities regularly to a San Joaquin Valley Section Communications Manager effective with his election.

A.R.R.L. members residing in the new section have already received mail notice of its formation, together with a notice soliciting nominating petitions for a Section Manager. By the time this information is in print an election by mail ballot will be in progress, or should the Section be unanimous in choice of a candidate the election will be completed by October 15th and the address of the S. C. M. may be obtained by dropping a line to A.R.R.L. Headquarters.

--- F. E. H. ---
Volume Level Indicators

By Guy C. Omer, Jr.*

VOLUME level indicators are another member of that quite useful family, the vacuum tube voltmeters. They are almost universally used wherever speech equipment is found, be it broadcast station, public address system, or what have you. A volume level indicator would likewise prove to be a very fitting addition to the up-to-date amateur radiophone.

The great value of the volume level indicator lies in its indicating visually the instantaneous volume-level of the speech input. Not only are visual measurements more accurate and dependable than aural, but also—because the average amateur phone is a one-man station—aural measurements, during operation, are a near impossibility. By the visual indicator's use, the audio-frequency input to the modulator may be kept at the value giving the greatest percentage of modulation and yet be maintained just below the value that causes distortion.

An amateur might put in much time and spend much more building a radiophone station but, by overloading his audio amplifier and by overmodulating, ruin the tonal qualities and make his phone sound like an early "Dark Ages" model. Again, the reverse might occur. An amateur might work and work to build a modulator capable of producing 100% modulation, but by running the volume level low obtain only 80% or 40% modulation, thereby losing efficiency as well as the fruits of his labors. The best of engineering can be ruined by improper operation.

The above reason alone is more than enough to warrant the use of a volume indicator at every amateur radiophone station—and the volume indicator has other uses also. For instance, if an audio oscillator of widely variable frequency is available, a frequency run can be made on the speech amplifier, disclosing any faults that might be present.

Also, by watching a volume level indicator while speaking into the microphone, defects in delivery are shown up. An even speaking voice is to be preferred in radio, since the level can be made quite high without causing distortion. A speaking voice containing heavily accented syllables is to be avoided, for the average level must be brought down to prevent the heavily accented syllables from causing distortion. The amateur might, otherwise, never realize how irregular his voice is, but would see strange things when observing a volume indicator while speaking. By practice a good "radio voice" can be cultivated to give a high average level without causing distortion. However, accents must not be subdued too greatly as the voice must remain clear and concise.

While we are on the subject, something may be said about the use of a microphone. A microphone should not be handled while current is flowing through it but should be left suspended in some convenient position. The speaker should not be too far from the microphone, because the high frequencies, which add color, will tend to drop out. Neither, by all means, should he be too close to the microphone. Then the microphone will pick up the sounds of the breath and lip movements. It is best not to speak directly into the microphone at close range, since the air emitted from the mouth to form the sound waves will cause whistling sounds as it strikes the diaphragm and the supports of the microphone. Probably the best microphone "delivery" is to talk in normal tones and voice level, and work fairly close to the microphone and at an angle to the side.

To the experienced operator, the volume indicator reveals many other things, among which is the proper operation of the speech amplifier and

* W9EBC-W9FSC, KMMJ, Clay Center, Nebraska.
the audio circuits. Foreign noises and feedback which might be present are readily shown up together with their strength. These noises, due to their low frequency, often cannot be detected by a monitor.

COMMERCIAL TYPES

From the above, it may be seen why volume level indicators are considered so indispensable in a broadcasting station. Let's take a look into the commercial field, and see what they use.

FIG. 2.—THE JENKINS & ADAIR VOLUME LEVEL INDICATOR CIRCUIT

VT—Western Electric 109-B triode.
T—Jenkins & Adair T-34 input transformer.
R1—Jenkins & Adair 16-point potentiometer, 350,000-ohm.
R2—7-ohm potentiometer.
R3—7-ohm rheostat.
R4—60-ohm galvanometer damping resistance.
J—Jenkins & Adair 8-48 filter inductance.
C1—1-µfd. filter condenser.
S1—Input switch.
S8—Filament switch.
S4—Plate circuit switch.
J—Closed circuit jack.
G—Galvanometer.

The circuit and the constants of a widely used commercial volume level indicator, the Western Electric 518-B Panel, are given in Fig. 1. This panel is calibrated to work from a 500-ohm transmission line.

The input to the triode is controlled by the variable ratio transformer and the three-position potentiometer, thereby greatly extending the range over which the instrument will register. Grid bias is furnished by the voltage drop across the 5-ohm potentiometer and is readily controllable. The 2-µfd. condenser and the choke in the plate circuit of the triode form a filter. The galvanometer is shunted by a 30-ohm galvanometer damping resistance which allows the use of a delicate meter in the plate circuit through which high currents are flowing.

Filament current is controlled by the 272-A key and the 42-N rheostat and is measured through the 248-A jack. The filament and plate circuits are protected by the 35-E and 62-B fuses.

This unit is calibrated in decibels. Such calibration, while convenient, is not at all necessary for amateur work. The range is from ~10 decibels to +40 decibels in two decibel steps. The level is read as the algebraic sum of the readings of the meter, the potentiometer, and the rotary switch.

The diagram of the Jenkins & Adair volume level indicator is given in Fig. 2. The only major difference between this panel and the Western Electric 518-B is that in this unit the input to the triode is entirely controlled by a potentiometer. The range is from +20 decibels to ~10 decibels, also in two decibel steps.

R.C.A. and other companies manufacture volume level indicators, but generally these are closely similar to the two described.

THEORY OF OPERATION

The principles underlying the volume level indicator are well known to all of us. A voice-frequency alternating current is very complex, varying in amplitude and component frequencies. The volume level is proportional to the instantaneous amplitude of this alternating current. So, to indicate this volume level, a triode employing plate detection and working on the lower knee of the plate-current grid-voltage curve is coupled to the last stage of speech amplification. The increments of the plate current are read by a suitable meter, after being more or less filtered to make the current through the meter more closely proportional to the instantaneous amplitude of the audio frequency current. These actions are graphically illustrated in Fig. 3.

AMATEUR TYPES

The amateur usually prefers to stray from the beaten path and design his apparatus to fit his needs, so let us outline the "innards" of the volume level indicator. The essentials of a volume level indicator are:

1. A means of coupling, which will effect the speech amplifier as little as possible.
A) An impedance-resistance coupling is illustrated in Fig. 4A. This scheme utilizes the primary of the output transformer of the audio frequency stage to which the volume indicator is coupled as the impedance.

B) Where a transmission line is used to couple the speech amplifier to the modulator, transformer coupling may be used as illustrated in Fig. 4B. The primary of the coupling transformer should match the impedance of the transmission line which is usually 500 ohms. This method is used in most commercial volume level indicators.

2. A method of limiting the increments of the plate current to values such that the indicating meter will conveniently register them. This may be done:

(A) By controlling the input to the triode. This is commonly accomplished in two ways: (a) by a potentiometer, as in the Jenkins & Adair panel in Fig. 2; or (b) by varying the ratio of the coupling, as in the Western Electric 518-B panel in Fig. 1.

(B) By varying the detecting power of the triode. This is usually accomplished by varying the grid bias as in Fig. 5.

3. A triode and its associated apparatus. The triode may be a Type '99 or a Type '01-A, for battery operation, or— for a.c. operation—a Type '27. If greater variation of plate current for a given input is desired, a Type '40 would make an excellent tube. This tube is nearly similar in characteristics to the Western Electric 102-D plate power supply, which may or may not be the power supply of the speech amplifier. Also, the proper means of controlling it, such as switches and rheostats for the filament supply.

4. A filter, which in simpler installations consists simply of a large condenser shunted from ground to the plate of the triode. More elaborate panels have an inductance in series with the plate

![Diagram of a triode circuit](image)

![Filter components diagram](image)

(A) By controlling the input to the triode. This is commonly accomplished in two ways: (a) by a potentiometer, as in the Jenkins & Adair panel in Fig. 2; or (b) by varying the ratio of the coupling, as in the Western Electric 518-B panel in Fig. 1.

(B) By varying the detecting power of the triode. This is usually accomplished by varying the grid bias as in Fig. 5.

5. An indicating meter, which is usually either:

(A) a low-reading milliammeter, or

(B) a galvanometer. A very sensitive instrument should be shunted by a galvanometer damping resistance of 30 or 50 ohms.

By following the above outline, the amateur may design a volume level indicator to fit his own particular needs.

The modulometer, which no amateur radio-phone station should be without, can readily be made to put its spare time in as a volume level indicator.1 Fig. 5 illustrates a suggested way of doing this, by the addition of a small switch and a simple input circuit to be built into the speech amplifier. The type of coupling used is the one outlined under 1(A), and the method of limiting the variation of plate current to values that the indicating meter will register is that outlined under 2(B). The grid bias is now measured by the voltmeter. This voltmeter will be handy in keeping the unit in calibration. The unit could be operated from the speech amplifier power supply during service as a volume indicator, and so save the portable batteries for general use as a modulometer.

The diagram of another suggested volume indicator is given in Fig. 6. This volume indicator uses an a.c. operated tube, the Type '27, and could be operated from the same power supply as the speech amplifier. This volume indicator

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1 The Modulometer, QST, Aug., 1929
is to be coupled to a transmission line, as outlined under 1(B). A transmission line should be used if the speech amplifier and transmitter are very far apart. The potentiometer is used to control the triode input.

Small dials with easily read scales should be fitted on the grid bias control and the triode input control, if used. The grid bias control should be mounted front-of-panel, as it requires frequent adjustment, but it is best to place the triode input control behind the panel to protect it against accidental manipulation or the inquir-

With volume indicators using the method of controlling the variations of plate current outlined under 2(B), the detecting power of the triode is varied by varying the grid bias until the plate circuit meter reads some convenient value half or two-thirds scale.

With volume indicators controlling the plate current variations as outlined under 2(A), however, we must first set out grid bias to some convenient value around the point of best detection. The point of greatest detection can be found by reducing the input to the triode to a low value and adjusting the grid bias for maximum plate current. Vary the triode input control until the meter in the plate circuit reads some convenient value half or two-thirds scale. With this type of volume indicator, both the maximum (excited) and minimum (unexcited) plate current can be adjusted so as to make them stand at easily remembered round numbers.

The volume indicator is now calibrated and ready for use. The reading of the plate circuit meter with maximum volume level (reading without excitation) and the bias voltage (if known) should be recorded. For example, with a meter graduated from 0 to 100,

![The Jenkins & Adair Volume Level Indicator](image)

**CALIBRATION**

The first step in calibrating the volume level indicator is to determine the maximum volume level which may be used without causing distortion.

To determine the level at which distortion first occurs, some means of constant amplitude sound input must be provided. To accomplish this, a vacuum-tube audio oscillator may be coupled directly to the input circuit of the speech amplifier, or a telephone unit in the plate circuit of the audio oscillator may be mounted on the microphone as illustrated on page 11 of the August, 1929, QST. The frequency of the audio oscillator should be around 500 to 800 cycles, as this is about the average of voice frequencies.

With constant amplitude sound input and with volume level indicator, speech amplifier, and transmitter operating, we are ready to proceed.

The gain control on the speech amplifier should be advanced until distortion first occurs. On a well-designed transmitter, this point is where the modulator first starts to draw grid current. When the level at which distortion first occurs is found, the gain control should be retarded a point or two. This is the maximum level to be delivered to the modulator hereafter.

![Fig. 6 — A Practical Amateur Volume Level Indicator](image)

The maximum might be 60, the minimum 5, and the grid bias 1.1 volts.

Each time we use the volume indicator hereafter, we must see that the initial conditions are fairly well duplicated. With our example, after bringing the filament and plate voltage to the proper values, the reading of the meter in the plate circuit without excitation should be 5. If

(Continued on page 5.)
What Feeling Exists Between American and Foreign Amateurs?

By Clarence E. Brockert*

THE feeling existing between American and foreign amateurs is a feature of amateur radio the writer has long wished to investigate. Opportunity for such an investigation came while attending the University of Wisconsin. The results are presented herewith, and it is hoped they will be found of as much interest to others as they were to the writer.

In conducting the investigation, questionnaires were sent to two hundred amateurs who were known to have held foreign contact, and who, it was believed, were capable of answering the questions as fully and comprehensively as possible; 102 of the questionnaires were answered, and upon 100 of these were based the conclusions which follow.

**TABLE I**

Question 1. What kind of feeling arose in you when you first worked this man (in foreign country)?

<table>
<thead>
<tr>
<th>Kind of Feeling</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual</td>
<td>97%</td>
</tr>
<tr>
<td>Indifferent</td>
<td>2%</td>
</tr>
<tr>
<td>Weak</td>
<td>1%</td>
</tr>
</tbody>
</table>

Question 2. Would you feel right if the U. S. went to war against this man's country?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>7.4%</td>
</tr>
<tr>
<td>No</td>
<td>56.2%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

Question 3. Did you feel you had an unbiased and absolute feeling toward this man politically, socially and economically?

(a) Politically:

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>74.8%</td>
</tr>
<tr>
<td>No</td>
<td>12.1%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>13.1%</td>
</tr>
</tbody>
</table>

(b) Socially:

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>92.8%</td>
</tr>
<tr>
<td>No</td>
<td>4.1%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>4.1%</td>
</tr>
</tbody>
</table>

(c) Economically:

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>77.9%</td>
</tr>
<tr>
<td>No</td>
<td>6.5%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>15.6%</td>
</tr>
</tbody>
</table>

Question 4. Do you think that through the medium of amateur radio better international relations will be encouraged?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>81.65%</td>
</tr>
<tr>
<td>No</td>
<td>1.08%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>17.82%</td>
</tr>
</tbody>
</table>

Question 5. Do you think that a course in Radio Ethics in every high school would encourage a better international feeling among the youth of the country?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>43.8%</td>
</tr>
<tr>
<td>No</td>
<td>9.3%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>46.9%</td>
</tr>
</tbody>
</table>

Question 6. Do you think that a course in Radio Ethics in every high school would encourage a better international feeling among the youth of the country?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>48.8%</td>
</tr>
<tr>
<td>No</td>
<td>9.3%</td>
</tr>
<tr>
<td>Uncertain</td>
<td>46.9%</td>
</tr>
</tbody>
</table>

In reality, the problem incorporates a two-fold purpose. First, from the standpoint of the American amateur it presents a picture of the reactions supplied by international communication. Second, from the standpoint of the educator it presents a basis for the introduction of a course in transoceanic communication in schools. It should be understood that such a course would necessarily take the form of an outside activity, to be supervised possibly by some sort of club, since school programs are usually already filled to capacity with other subject matter, some of which is more or less related.

A careful analysis of the following data will reveal many interesting facts. Note, for example, the wide variance in the answers to Questions 4 and 5. In Question 4, eighty-one percent as-

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*Ex-W9OM and W9ERC 401 N. Murray St., Madison, Wis.
asserted that better international relations could be fostered by the course heretofore mentioned. Fig. 2 will serve to more fully illustrate this.

The question follows, what of it? It is my objective to construct an outline of a course of study dealing with the advantages derived from participation in amateur radio. I think such a course would be warranted from the fact that there was little thought given to that phase of radio as was revealed by the answers to Question 5. It is true that there are already a great number of activities in which boys indulge while out of school, but I feel, and my own experience and that of others bears me out in this, that an unlimited amount of real vitalized instruction, and a better understanding of one’s fellows, will thus be most efficiently obtained. If more boys and young men were given this opportunity it would result in a beneficial application of amateur radio toward the end that more harmonious international relationships would exist.

In conclusion, I wish to take this opportunity to express my sincere thanks to those who so willingly assisted me in obtaining this material. This is additional splendid evidence of the quality of amateur radio cooperation.

The Hawaii Convention

W

The Hawaii Convention

Who should have thought, a few years ago, that a typical “ham” convention would be held in a far away island in the Pacific Ocean. This is exactly what came to pass in Honolulu, Territory of Hawaii, on August 8th and 9th: the convention being held under the sponsorship of L. A. Walworth, W6C1B, A.R.R.L. Section Communications Manager.

This first A.R.R.L. Hawaiian Convention was affectionately dedicated to the memory of Kenneth A. Cantin, former SCM, whose untiring efforts, unexcelled sportsmanship and inspiring personality did more for the cause of amateur radio than any other person in Hawaii.

All the activities of the convention were held in the new Army and Navy Y. M. C. A., through the courtesy of the staff, and no better place could have been chosen — it was an ideal spot for the affair.

Dr. N. S. Fairweather, K6BQJ, presided at the opening session on Friday. The opening exercises included the sending of an Aloha radiogram to Mr. Ray Wilbur, Secretary of the Interior at Washington over the convention’s own transmitter, operating under the call, K6EIG, and the message was signed by Territorial Delegate Victor S. K. Houston, who was the guest of honor. Following the opening address by Dr. Fairweather, who welcomed the delegates with well-chosen words, Mr. M. A. Mulroney, radio engineer and director of KGU, gave a talk on “Interference” and its problems with particular reference to atmospheric interference. Parker Lewis, who spoke in place of W. H. Friedly, absent because of illness, gave an intimate story of the former Radio Club of Hawaii.

One of the most interesting speakers of the convention was W. I. Harrington, Mutual Telephone Co., who spoke on the use of ultra-short waves and the great care necessary in handling the equipment at such high frequencies. J. K. Shibata, the last speaker, gave a good talk outlining important facts in tuning transmitters and balancing circuits.

Stunts which are a part of all conventions were carried out and much interest created over the high speed sending and receiving contests.

The convention station K6EIG was active during all the convention time and Jack Shibata certainly deserves a lot of credit for sticking to it as he did. Here are some of the stations that were worked: W6BCH, W6BBP, W6DWT, W6ECN, W6BCK, W6BQK, CE1AH, W7BA, W6EOU. A large number of messages was handled.

The banquet was the big event of the convention, and the chef did justice to his art; whilst D. W. Horstmeyer proved equal to the occasion as the toastmaster. His Honor, Mayor John H. Wilson was one of the guests, and if reports are true another inoculation of “Hamitis” will see a new call letter. Another guest was William L. Holland of Christ Church, New Zealand, who spoke on the value of amateur radio to international friendship. Several resolutions were passed at the convention to be transmitted to Director Bahecock as expressions from the Hawaiian Section. The sincere thanks of all go to SCM L. A. Walworth for his untiring efforts and those who assisted him in making this first Hawaii Convention such a huge success. And now Aloha Nui Loa from Hawaiian Amateurs.

— A. A. H.
Standard Frequency News and Schedules

The number of standard frequency schedules that will be on the air after November 1st should make it possible for any amateur to calibrate his new dynatron frequency meter at his own convenience, no matter where he may be located. The Pacific Coast station will transmit its first schedule on that date, starting off at the early hour of 4:00 a.m. (P.S.T.) with a BX schedule for the gang in Oceania and the Far East. W9XAM-W9SI started transmissions September 12th, in spite of the inevitable handicaps surrounding the setting up and adjustment of a standard frequency station on short notice. A number of difficulties were encountered and a few are still being ironed out at this writing. W1XP-W1AXV is giving its usual fine persistant service and will be using a new oscillator-amplifier set by the time this issue of QST is off the press. The complete description of the standard frequency equipment used at Round Hill will be an important feature of the next issue of QST. The transmission of standard frequency signals is an art in itself and the description of W1XP-W1AXV should be of more than usual interest to every amateur.

The frequency standard for the Pacific Coast station has been given a calibration of 100.000 kc. by the Bureau of Standards at Washington, the accuracy of the standard being to within 1 cycle at 100 kc.—the same as that of the one calibrated for W9XAM. A calibration has also been made by the Bureau of Standards on the signals of W1XP-W1AXV so that all units of the A.R.R.L. Standard Frequency System are now using frequency standards which have been calibrated from the National Frequency Standard.

The best procedure for using the standard frequency signals to calibrate a heterodyne frequency meter is that described by George Grammer in the article on the dynatron frequency meter in October QST. Incidentally, this frequency meter is the finest ham frequency measuring gadget we have met up with and anyone who has not read that article from end to end has missed something.

The complete schedules for November and December follow. The schedules for November are as published in October QST with the exception of W1XP-W1AXV's Schedule C, which has been shifted from November 9th to November 16th, and the addition of a W9XAM Schedule C on November 30th. The assignment of the Pacific Coast station's call has been delayed, but there should be no difficulty in identifying the signals. When you hear a "W6X" calling "QST" on the schedules shown below you will know that Harold Peery and his gang are on the job.

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 1, Saturday</td>
<td>RX</td>
<td>W6X-</td>
</tr>
<tr>
<td>Nov. 2, Sunday</td>
<td>C</td>
<td>W9XAM-W9SI</td>
</tr>
<tr>
<td>Nov. 7, Friday</td>
<td>BB</td>
<td>W8X-</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>W1XP</td>
</tr>
<tr>
<td>Nov. 8, Saturday</td>
<td>RX</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Nov. 9, Sunday</td>
<td>BB</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Nov. 14, Friday</td>
<td>C</td>
<td>W6X-</td>
</tr>
<tr>
<td>Nov. 16, Sunday</td>
<td>C</td>
<td>W1XP</td>
</tr>
<tr>
<td>Nov. 21, Friday</td>
<td>A</td>
<td>W1XP</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>W9XAM</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>W6X-</td>
</tr>
<tr>
<td>Nov. 26, Friday</td>
<td>BB</td>
<td>W1XP</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Nov. 29, Tuesday</td>
<td>RX</td>
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</tr>
<tr>
<td>Nov. 30, Sunday</td>
<td>C</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Dec. 5, Friday</td>
<td>BB</td>
<td>W6X-</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 6, Saturday</td>
<td>RX</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Dec. 7, Sunday</td>
<td>BB</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Dec. 12, Friday</td>
<td>C</td>
<td>W6X-</td>
</tr>
<tr>
<td>Dec. 14, Sunday</td>
<td>C</td>
<td>W1XP</td>
</tr>
<tr>
<td>Dec. 19, Friday</td>
<td>A</td>
<td>W1XP</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>W9XAM</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>W6X-</td>
</tr>
<tr>
<td>Dec. 26, Friday</td>
<td>BB</td>
<td>W1XP</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Dec. 27, Sunday</td>
<td>BX</td>
<td>W6X-</td>
</tr>
<tr>
<td>Dec. 28, Sunday</td>
<td>C</td>
<td>W9XAM</td>
</tr>
</tbody>
</table>

It is possible that the Pacific Coast station may use the call W6AQG if the special "X" license has not been issued in time for the first scheduled transmission.

The time specified in the schedules is local standard time at the transmitting station, W1XP
uses Eastern Standard Time, W9XAM, Central Standard Time, and W6X-, Pacific Standard Time. Schedule BB transmitted by W1XP is intended particularly for European amateurs and starts at 2100 G.C.T. Schedules BX are transmitted especially for amateurs in Oceania and the Far East. They are transmitted starting at 1000 G.C.T. by W9XAM and at 1200 G.C.T. by W6X-. Reports on these special schedules are particularly desired, not only from overseas hams but from those in the Americas also.

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. 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, interrupted by call letters. Characteristic letter of W1XP is "G", of W9XAM is "D", and of W6X- 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.
W6X-: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

Do not forget to QSL the transmissions. All reports should be sent to the A.R.R.L. Standard Frequency System, 1711 Park Street, Hartford, Conn. A record will be made at Headquarters and the report will be then forwarded to the proper station. S. F. report blanks can be obtained from Headquarters, free and postpaid, upon request.

"Make every Friday night Standard Frequency Night."

— J. J. L.

A Non-Inductive Resistor

A NEW wire-wound resistor with negligible inductance has been developed by the Ward-Leonard Electric Company, Mt. Vernon, N. Y. The new resistor is known as the "plaque" type, and except for the flat shape and method of winding the resistance wire on the form, is similar to the other Vitrohm resistors manufactured by this company. They are made in two sizes, as shown in the photograph, the larger having a power dissipation rating of 40 watts and the smaller 25 watts.

In the 40-watt size values of resistance between 0.5 and 3000 ohms can be obtained. Resistances between 0.25 and 4500 ohms are furnished in the 25-watt size. Taps may be brought out under certain conditions.

These resistors may be used in radio circuits where a non-inductive resistor is required. A 70-ohm sample of the 25-watt size was tried out in the QST lab. as a load for a dummy antenna, and at 14,000 kc. apparently had no more inductance than an ordinary 60-watt lamp. The 70-ohm size was used because this represents the average characteristic impedance of most Hertz antennas. Since the change in resistance in heat in these units is negligible it is impossible to measure the power developed by a transmitter by simply measuring the current through the resistor in the dummy. This cannot be done with an ordinary lamp because the resistance of the lamp is subject to drastic variations with the amount of current flowing through it.

The new plaque resistors should also be excellent as transmitting grid leaks. Ordinary wire-wound resistors sometimes try to act as r.f. choke coils and burn out because of circulating currents.

Bus wire that has become bent in handling can be straightened easily with the aid of a vise and a heavy pair of pliers. Take the piece to be straightened and clamp one end in the vise. Get a firm grip on the other end with the pliers and give a hard yank. Kinks and bends will disappear.

— W3CA.

Dictaphone operators here at HQ have their troubles. The YL who handles the Information Service letters recently wrote "secure" instead of "cure" in a letter about key clicks. The chap who got it wrote back, "I can do that quite easily now". Hi! So say we all.
My five years of experience with amateur and experimental radiophone work have shown that one of the greatest faults in the average station is the failure to provide a receiver that is reasonably efficient when radiophone signals are to be intercepted. This holds true not only at the average amateur station but also at the college experimental stations where one would naturally expect to find the most efficient receivers.

I believe the amateur neglects this part of the job because he thinks that an entirely different receiver, with a high grade audio system, is required for such work. Experience teaches that any audio system that will bring in c.w. signals of constant if reasonable stability is acceptable. The do not incorporate any radio frequency amplification, frequency circuit (if any) and the detector circuit to crowded bands. This leaves only the radio frequency circuit.

I will confine my suggestions mostly to the detector circuit.

A sensitive detector tube is absolutely necessary if anything like maximum results are to be obtained. Numerous tests with the ordinary '00-A type of tube have shown that, while very sensitive, it tends to be noisy and most important of all the filament temperature must be kept constant if reasonable stability is expected. The tubes are not very uniform, however, and some makes will be found much more satisfactory than others. A good one is a tremendous improvement over the Type '01-A. Possibly only one tube out of four will be satisfactory on frequencies above 10,000 kc., whereas at least two out of three will be satisfactory on frequencies below 5000 kc. Some of them, of course, tend to squeal or lack stability at the highest frequencies even though they may be (and usually are) perfectly satisfactory on broadcast frequencies.

Assuming that a satisfactory detector tube has been secured the next point is to make sure that it will slide into oscillation with a very slight bias instead of the "plunk" commonly associated with regenerative receivers. On a well-designed and constructed receiver this is easily accomplished by inserting a variable resistance (fifty thousand to one hundred thousand ohms) in the detector plate circuit and raising the voltage to the point where thirty to fifty volts reaches the plate when at least two-thirds of the resistance is in series. This variable resistor can be used as an oscillation control if shunted by a condenser of 0.25 to 1.0 μfd. capacity but my personal preference is for capacity feed-back, varying the resistance only to secure best results with different inductances.

The grid leak resistance, of course, is an important feature and most of these tubes operate best with 4- to 7-megohm leaks. Fringe howl does not occur very frequently, and is less likely to show up if the first audio transformer has a fairly high ratio, such as 6 to 1. When encountered it can often be eliminated by shunting the secondary of the first audio transformer with a 2- to 3-megohm leak or by re-adjusting the detector plate circuit. By-pass condensers should also be connected from each high voltage lead to ground, particularly if the batteries are to be used until the internal resistance becomes fairly high.

Assuming the receiver is fitted with a sensitive detector and operating in a smooth manner, it will be found advantageous to use the zero-best method of reception on weak radiophone signals particularly if QRM from other stations is not bad. Many amateur radios, of course, will not stand this method of reception because the carrier suffers too much frequency modulation but a large percentage of the transmitters now on 14,200 kc. and many of those on 3500 kc. will stand it, with a considerable increase in signal strength resulting.

Few vernier dials have a sufficiently low ratio to make such fine tuning easy, consequently I always incorporate a small vernier condenser in parallel with the main tuning condenser. This vernier unit is usually made from a two-plate Hammarlund Midget in which the spacing has been increased to three-eighths inch. This is just about the right capacity to make zero beat tuning easy while at the same time enough capacity variation is provided to cover the frequency creep on the average transmitter of reasonably good design.

Most amateurs probably have not constructed receivers incorporating tuned radio frequency circuits but many of them have used one Type '22 as a coupling tube. My general purpose receiver originally used a tube of this type but I find that a '21 gives much better results. When the antenna coupling tube first came into fairly general use there was much difference of opinion as to whether there was any real signal gain through it, but when a Type '21 tube is used there is no question but that some gain is effected. My own impression is that the signal strength is doubled or tripled as compared with the same receiver using plain capacitive or inductive coupling. The filament of this tube can, of course, be heated from the regular storage battery, but since it must be kept lighted all the time the station is on the air I provide a filament transformer for this tube.
alone. No trouble is experienced with hum if the transformer is kept at a reasonable distance from the detector circuit and a twisted pair used to carry the current.

If a loud-speaker is to be used, many of the old discarded units will be found superior to the newest reproducers for voice reception only. Voice frequencies do not as a rule cover much territory and the audio system or reproducer that is necessary to bring in a full orchestra will produce a lot of extra noise when speech alone is to be considered.

An All-Purpose Filament Transformer

By S. M. Douglas, Jr., W4ACB

Here is a transformer that will give a variety of voltages that will be found useful around the shack, and also one that can be used as a "spare" in case the main one goes south, or west, or wherever it is that transformers go when the windings get tired of carrying the juice.

The items needed for its construction are few, and it is very easy to build. The writer used four pieces of cigarbox wood as a winding form, cut three inches long and one and one-half inches wide, as shown in Fig. 1. These were tacked together with small brads to hold them in place in the form of a box, then the whole thing wrapped with a couple of layers of waxed paper. The paper was put on to allow easy removal of the wooden form.

Number 24 d.c.e. enameled wire is used for the primary. In case this size does not happen to be handy, it can be purchased at almost any automobile generator repair shop. It will be found that with the form dimensions given above, about one-half to three-quarters of a pound of wire will suffice. There are approximately thirty turns to the inch, and therefore it will be possible to get about ninety turns on the three inches of layer. Start at one end and wind to the other, then wrap another layer of paper around the coil and continue back to the beginning, then another layer of paper, and so on until the whole spool of wire is used, or until there are approximately 650 turns.

This finishes the primary, and it should be well wrapped with waxed paper and prepared for the secondary. This is wound with number 18 d.c.e. enameled wire. For the two 7½-volt windings, use fifty turns each with a center tap at the twenty-fifth turn on the first winding and no center tap on the second. Combined, these two will give 15 volts, with center tap. The two 2½-volt windings will take about 15 turns each. One side pieces. These should be alternated all around and, when all are in place, bolted together securely. If the transformer hums when it is con-
nected in the circuit, drive some wedges in the center to make it tight fitting. Care should be taken that the iron pieces of the core do not short-circuit any of the windings.

When completed, the whole thing can be mounted in a metal box, and a piece of bakelite used on one side for a panel, to which all leads are brought out to binding posts. The leads should be tagged for identification. After connecting all the leads to the posts, fill the can with some battery compound, such as wax compound off the tops of old "B" batteries. Do not use hard rubber for the panel as the hot compound will ruin it.

After the compound has cooled and hardened, the box can be painted to match the other apparatus and the transformer is ready for operation. Of course before putting the whole thing in the box it will be well to test the windings to see if they are delivering the proper voltages. It will be found that the voltages will vary with the size of the coil.

This may be some trouble to a lot of hams, but the writer likes to experiment and this transformer is one of his experiments. It works well and the total cost is not over $1.50, if most of the parts are to be found in the shack's junk box.

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A 5-METER VARIABLE CAPACITY

"If for no other reason than the fact that the 5-meter band" occupies 4000 kc, it is highly desirable to cover only 7 cm. with a given inductance. The photograph shows plainly what has been evolved after a lot of experimenting and picking up of signals over a distance of 170 miles when they were found to be terribly sharp and difficult to hold. The circular copper rotating disc is 1 1/2" in diameter and is the movable plate. The stator is 1 1/2" across by 2 1/2" from top to bottom. The inductance is fitted with two G.R. plugs and it can be replaced by others for differing frequencies. An extension handle of hard rubber 10" in length is recommended to get the field well away from the operator. The recommended circuit is the ultraudion and with an extremely low-loss tube socket and a tube with good characteristics there will be no trouble in getting down to 1 meter with this arrangement. The writer has had a screen-grid tube (Mazda SG215 with grid plate capacity of 0.0045 µfd.) down to 4.9 meters easily."

— E. G. Somerset, G2DT

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REMOTE CONTROL

"The diagram of Fig. 5 shows a keying system that has been in use here for some time. This is a nice arrangement for those who want to use remote control.

"When the key is pressed relay No. 2 closes, lighting the filament of the Type '80 tube. When the filament reaches the correct operating temperature current flows in the plate circuit, closing relay No. 1, which is in the a.c. line to the power transformer. After the key is opened it takes four to six seconds for the a.c. line relay No. 1 to kick out. Relay No. 1 should be a good one which will operate on 50 to 100 milliamperes. The other relays are made from automobile generator cutouts that can be bought at any garage. The Type '80 is used as a time-delay tube and 6 to 8 volts is put on the filament. The greater the filament voltage the longer the a.c. line relay will stay in."

"Relay No. 2 is not necessary if the Type '80 tube is near the key. With a long line, however, the filament would get little current because there

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A 5-METER ULTRAUDION RECEIVER CIRCUIT

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THE 50-MC. TUNING CONDENSER AND COIL

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FIG. 5. — THE 50-MC. ULTRAUDION RECEIVER CIRCUIT

L1 — 2 turns of No. 8 copper wire. Coil is 2" in diameter and the turns are 1" apart
C1 — See text and photograph
C2 — 800 µfd.
C3 — 1,000 µfd.
C4 — 1.0 µfd.
C5 — 1.0 µfd.
R1 — 1-manometer
RFC1 — 120 turns No. 32 d.c.c. wound in 10 sections spaced at 1/32" intervals on 3/8" glass tube
RFC2 — 15 turns No. 20 d.c.c. on 1/2" glass tube

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RBMOTE CONTROL

---

THE 50-MC. TUNING CONDENSER AND COIL

---

FIG. 5. — THE 50-MC. ULTRAUDION RECEIVER CIRCUIT

L1 — 2 turns of No. 8 copper wire. Coil is 2" in diameter and the turns are 1" apart
C1 — See text and photograph
C2 — 800 µfd.
C3 — 1,000 µfd.
C4 — 1.0 µfd.
C5 — 1.0 µfd.
R1 — 1-manometer
RFC1 — 120 turns No. 32 d.c.c. wound in 10 sections spaced at 1/32" intervals on 3/8" glass tube
RFC2 — 15 turns No. 20 d.c.c. on 1/2" glass tube
would be a heavy voltage drop. With the relay, any length of line may be used, provided the filament battery is near the tube.

"The keying relay, No. 3, is placed across the filament of the Type '80, and as the key is pressed the keying relay also responds. The key is held down a few seconds to start the a.c. line and after relay No. 1 closes, the set may be keyed in the usual way. If the key is left open the transmitter automatically shuts itself off after a few seconds."

— Francis H. Thisse, W8BJI

**ANOTHER STUNT FOR CHANGING BANDS**

"Several ways of rapidly changing from one band to another have been presented in *QST*, and an additional method is shown in Figs. 6 and 7. The idea is to use two separate detector tuning circuits with the same audio amplifier and regeneration control.

"The tuning condenser is a two-gang affair, each section having enough plates removed to satisfactorily spread the band on which it is to tune. Since one shaft turns both condensers, only one tuning dial is required. To change from one band to another it is only necessary to set the filament switch so the proper detector tube gets filament current — a change which only requires a second and which can be made from the front of the panel.

"The idea can be extended of course to cover three bands by using a three-gang condenser and three detector circuits. Chaps who dislike the bother of plugging in coils (and perhaps also condensers) will find this about the simplest possible method of changing bands in a hurry. Of course a little additional equipment is necessary, but the parts are inexpensive."

— R. C. Alexander, W6ESO-W6DPW

**MAGNIFYING THE DIAL SCALE**

"I am one of those fellows who has to wear ‘specs’ because of rather bad eyesight, so have utilized a little stunt that may be of use to others in the ham game.

"The ordinary vernier dial used on so many ham receivers has a scale of comparatively small figures and divisions. To make those figures and divisions clear and easily read from my operating table which is located some three feet from the receiver, I have made use of a lens from an old flashlight to enlarge them. The attached diagram explains how it's done. The lens is inclined at an angle determined by the distance from the operator and the height in relation to the eye level. This particular dial is one of the old Pilot Kilograds but the same idea can be applied to many of the other similar dials commonly used.
"This arrangement gives brilliant illumination, and the figures can be read easily at a distance of four feet. Does another thing, too; eliminates glare from the panel lights and one can operate in subdued light—something conducive to nice QSO's! Might come in handy for the boys who work the YL's!"

— H. Guy Moats, W8AE

LOW LOSS COILS

Director Babcock suggests the following method of making coil material of the type that used to be sold "by the inch" some years ago.

Take a 5 x 7 non-curling photographic film and remove the sensitized emulsion by soaking the film in a mixture of hot water and washing soda or household ammonia. The film is then wound around a 2-inch mailing tube and the lapped-over portions cemented together with collodion or one of the varnishes. Two of the films will just cover a 10-inch mailing tube, which is an easy size to handle. After the ends are firmly set, the winding is put on, using No. 22 d.c.c. wire, with a space between each turn equal to the diameter of the wire. The coil is then painted with lacquer, collodion or other coil dope and allowed to dry thoroughly.

If a spiral mailing tube has been used it is a very simple matter to remove it from inside the coil. Catch the inside point of the tube material with a pair of flat-nose pliers and then twist against the lay; the whole thing will unwind and come out without any trouble.

PROTECTING THE RECTIFIER

"If the transmitting tube stops oscillating or one of the filter condensers blows the filaments of the rectifier tubes are likely to go west in a hurry because of the heavy current, unless the operator gets the power switch open pronto or unless some protective device is used. The latter is the safest method, and it is quite simple and inexpensive.

"Fig. 9 shows how two flash-light or panel-light bulbs may be used to provide the necessary protection for the rectifier. The lamp in series with the filter condensers may be one of the very small flash-light bulbs (6-volt size is satisfactory) since it carries practically no current and its only function is to immediately burn out if one of the filter condensers blow. The lamp in series with the positive high voltage, however, must be capable of carrying the plate current taken by the transmitter without blowing, yet should burn out if the current goes much above normal. The 2½-volt lamps will be better in this position than the 6-volt size if the current is 100 milliamperes or more."

— H. E. Hurley, W6CKS

INDUCTIVE GRID LEAKS

Norman B. Krim, W2AJP, writes that he ran into a rather unusual condition with his Type '10 Hartley outfit which resulted in extremely high plate current and a very poor note on the 14,000-ke. band, although the set was perfectly normal on 3500 and 7000 ke. On the two latter bands, the plate current with the set unloaded was in the vicinity of 50 milliamperes, while on 14,000 ke. the current would not go below 115 ma. Naturally the r.f. chokes came under suspicion, but experimenting with different sizes and shapes brought very little relief.

It was noticed that the grid leak was very hot on the band in question, indicating the presence of r.f. in the leak, and this led to the idea that perhaps the grid condenser and leak together formed a tuned circuit which was resonant near the operating frequency. Substitution of a grid condenser of higher capacity confirmed this conclusion, because the transmitter began to act as it should on 14,000 ke. and a similar "bad spot" appeared at about 9000 ke.

So many things of this sort can and do happen that the success most amateurs have with their equipment is little short of surprising. The natural tendency is to blame the rectifier-filter system if the note is poor, but at least 99% of the poor notes heard on the air could be greatly improved with a little thoughtful and patient "operating" on the transmitter itself.
CLICKLESS KEYING

A rather unusual form of blocked-grid keying is suggested by A. S. Waterbury, W8BCL, of Perry, N. Y. Absolute elimination of clicks is claimed for this method, and it has made possible the operation of W8BCL's transmitter with a sensitive broadcast receiver in the next room without interference. The diagram is shown in Fig. 10. The Type '45 tube in the keying circuit furnishes the time lag. Ordinary practice with this form of keying would be to connect the key directly across the 15,000-ohm resistor, which because of the method of connecting it in the circuit biases the grid of the oscillator tube sufficiently to prevent the flow of plate current when the key is open. This extra bias disappears when the key is closed.

In this circuit, however, the bias resistor is in parallel with the '45, which acts as a variable resistance. A probable explanation of the action of the tube is that during the time the key is open the 1-μfd. condenser becomes charged, which automatically regulates the grid potential and thus limits the flow of plate current. When the key is pressed an appreciable amount of time is required for the condenser to discharge through the 3000-ohm resistor, and this in turn varies the grid potential at a comparatively slow rate, with the result that the bias on the oscillator drops slowly to a final value, during which period oscillations build up. The time lag thus provided eliminates the click when the key is pressed. When the key is opened an appreciable period of time is required for charging the condenser, with the result that there is again a time lag.

A GOOD RELAY

While looking over my junk box I found an old Yaxley Automatic Power Control which looked as though it might have possibilities as a keying relay. The original circuit of the Power Control is shown in Fig. 11 (A). The two parts of the armature are insulated from each other.

To convert the Power Control into a keying relay, simply remove the wires to the plugs and connect the contacts as in Fig. 11 (B). There are four wires to solder, and these are soldered in pairs.

The contacts may be adjusted by means of screws provided for that purpose. On testing the relay I found it would follow my bug at its fastest speed.

— John Payne, W1CCP

ANOTHER USE FOR THE AUTOMATIC POWER CONTROL

Sheldon E. Brink, W8DXJ, suggests that the same type of relay can be used to shift the 'phones to the monitor when transmitting.

Referring to Fig. 11 (A), the leads from the two armatures are connected to the headphones, the set of contacts nearest the magnet to the output of the receiver, and the back contacts to the output of the monitor. A switch is placed in one of the leads from the 6-volt battery to the magnet. When the receiver is in operation the switch is closed, connecting the 'phones to the receiver. To shift the 'phones to the monitor the switch is opened.

If the filaments of the tubes in the receiver are ordinarily turned off during transmission, the change can be made automatic by making the switch control both the receiver filaments and the magnet in the relay. By using one blade of a double-pole double-throw switch for the 110-volt line and the other blade for the 6-volt battery, it is possible to automatically connect the 'phones to the monitor when the transmitter is turned on, and by throwing the switch the other way connect the 'phones to the receiver and turn on the filaments.

A bell-ringing transformer can be used as a microphone transformer for a single-button mike if a regular transformer is not handy.

— W6BRI
THIS station is the result of years of planning and thought and incorporates some innovations that facilitate convenient and efficient operation.

It is owned by H. C. Sherrod, Jr., Galveston, Texas, and is located in two rooms adjacent to the garage at his house and is entirely a “one man” outfit. Sherrod first broke into the game back in 1920 under the call 5VY, with a small spark transmitter. This was soon changed to c.w. with four UV-202’s, operating on 41 meters. The call 5ZG was acquired in 1923. With the advent of high-frequency work the transmitter was rebuilt, using two UX-210’s, operating on 41 meters. Since that time various small transmitters have been used while the preparations for the present outfit were being made.

TRANSMITTERS AND POWER SUPPLY

The transmitter to the left of the switchboard is crystal controlled and operates on a frequency of 7130 kilocycles using the call letters W5ZG. This is the main transmitter and the one to which primary consideration has been given.

The crystal oscillator is a Type ’12-A and operates on 3565 kilocycles. Both the crystal oscillator and the intermediate amplifier operate from the same filament supply. Although the intermediate amplifier uses two Type ’10 tubes in parallel no overload is placed on the filament of the oscillator as the Type ’10 tubes operate very well with only six volts on the filament. This has proved to be both economical and efficient. The quartz plate controlling the oscillator is mounted in a shock-proof holder and the whole enclosed in a heat-proof box. Two twelve-volt bulbs supplied from a transformer having primary control maintain the quartz plate at practically constant temperature.

No thermostat is necessary thanks to the very good regulation of the domestic supply. This has proven to be a very satisfactory arrangement and much favorable comment has been received regarding the purity and constancy of the signals from W5ZG.

The intermediate amplifier consists of two Type ’10 tubes in parallel. Because this stage is operated as a frequency doubler very high grid bias is necessary, the grids being biased beyond the cut-off point. With a plate voltage of 500 efficient operation of this amplifier requires 125 volts for grid bias. Both the crystal oscillator and intermediate amplifier receive plate voltage from a
Westinghouse 500-volt 100-watt machine. Incidentally this motor-generator has been in regular service for nine years and still seems to be going strong. The voltage-dividing resistance shown in the diagram as $R_3$ permits reduction of the generator voltage for the crystal oscillator. This arrangement was used in preference to a series resistance in the plate of the oscillator tube because of the greatly improved regulation obtainable. The plate voltage supplied to the crystal oscillator is 250 volts and the plate current is 50 to 60 milliamperes. Although the intermediate amplifier current is 150 to 175 milliamperes the voltage regulation of the oscillator plate voltage is less than two percent.

It will be noticed that the keying relay $R_s$ has two sets of contacts. One set is used for keying the transmitter; the other set of contacts is across the variable resistance $R_5$, a six ohm receiving-type rheostat. This rheostat is in series with the 110-volt supply to all of the filament transformers and permits absolute balance of the filament voltages whether the key is up or down. Though of secondary importance this feature is desirable as it prolongs the life of the tubes and theoretically contributes to constancy of the emitted frequency.

Another "winkle" which contributes no small amount of facility to the rapid operation is the starter switch used to start and stop the transmitter. The circuit-closing switch on the Vibroplex is mounted on a small square of bakelite which is bolted to the metal base of the key. The bolt holding the bakelite is of course in contact with the base of the key and also serves as a contact point for the remounted circuit-closing switch. The arm of the switch, the base of the key, and the key contacts constitute the three lines from the key as shown in the diagram. A flip of the circuit closing switch with a finger starts the transmitter by closing the relays marked $R_h$ and $R_c$. $R_h$ is a relay to connect the voltmeter which shows the grid voltages on the various stages by means of the three-point switch. $R_c$ is the starting relay proper. This relay also has two sets of contacts. A small set of contacts is in series with the high voltage supply and disconnects it immediately upon opening the starting switch. This prevents the voltage on the crystal oscillator from rising while the filament of the oscillator tube is cooling. This is necessary because the filament cools much more rapidly than the generator slows down, and as the current through the tube diminishes the voltage across it increases to a point where the quartz plate might be endangered by a voltage surge. The installation of this device is not absolutely necessary but precludes any possi-
bility of ruining the quartz plate by puncture. The loss of three such plates at W5ZG by various accidents causes the owner to be very solicitous of

The antenna stage is coupled to a half-wave Zeppelin antenna having quarter-wave feeders. This radiating system has proved to be the most efficient tried.

To be doubly sure that the transmitter is always operating on its proper frequency a frequency meter is permanently mounted on the wall just below the antenna lead-in and gives a constant check on the frequency being emitted. This instrument uses a low-capacity circuit and has a frequency range of 6800 to 7500 kilocycles.

Immediately above the frequency meter on the wall is the change-over switch which connects the radiating system to whichever transmitter is used.

Mounted on the top of the power control board is the small transmitter which is used to test various circuits, ideas, etc. This outfit is never the same from one week to another and no definite description can be given. At the time of this writing it is a Hartley circuit with 225 volts of "B" battery on the plate of one Type '15 tube. With an input of four and a half watts the best DX is W9AXU at Glencoe, Illinois. He was successfully worked and gave a report of QSA3 p.d.c. This transmitter is entirely battery supplied. This form of power supply is being tested, as the installation of an emergency transmitter independent of the local power supply is being considered.

The large panel at the right of the main transmitter is the power control board. This panel controls all circuits necessary for the operation of the transmitters and receivers. Like all of the rest it is of quarter-inch bakelite. The three-pole double-throw switch in the top center connects the key and starter switch to either transmitter it is desired to use. The four-pole double-throw switch below this and to the right, controls the battery charger, "A" power for the receiver, and the "B" eliminator from which the receivers ordinarily operate. When to the right this switch connects the storage battery being used to the two receivers and turns power on the "B" eliminator. When to the left the receivers are disconnected from the "A" power, the "B" eliminator cut off and the battery being used placed on charge. A homemade five-ampere charger using a Tungar bulb is behind the panel. The double-pole double-throw switch at the upper left selects one of two storage batteries available for use on the receiving equipment. The lower double-pole double-throw switch connects the remaining battery to the transmitter. This is necessary to operate the relays already mentioned. The large double-pole single-throw switch on the bottom center of this panel is connected in the power supply for the entire station. It is within easy reach of the operator when sitting at the operating desk. The knob and pointer in the center of the panel immediately above the main line switch controls an eight-pole double-throw switch which connects the receivers to either the "B" eliminator or 90 volts of battery which is also available
in case of an emergency. The meter in the upper right corner is the charge-discharge ammeter, a 20-0-20 ampere Westinghouse affair salvaged some years ago from an automobile that had outgrown its usefulness. The meter to the upper left is a 0-750 watt Roller-Smith instrument and shows the power being drawn from the city mains by the station. With the exception of the small 0-2-ampere Weston meter on the panel of the short-wave receiver all of the indicating instruments are Jewells. This of course does not include the two instruments on the power control board which have already been described.

Following is a table of the values in the various circuits when the transmitter is in operation:

<table>
<thead>
<tr>
<th></th>
<th>Plate</th>
<th>Fil.</th>
<th>Grid</th>
<th>Plate</th>
<th>E. P. Tank</th>
<th>Antenna</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volts</td>
<td>Volts</td>
<td>Volts</td>
<td></td>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>Crystal Oscillator</td>
<td>250</td>
<td>6</td>
<td>25</td>
<td>50</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Int. Amp.</td>
<td>500</td>
<td>6</td>
<td>125</td>
<td>175</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>Final Amp.</td>
<td>1500</td>
<td>10</td>
<td>90</td>
<td>90</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Line Watts, 550</td>
<td>Line Volts, 110</td>
<td>Line Amps, 5.2</td>
<td>P.F. 95%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RECEIVING EQUIPMENT

Two receiving sets are used at this station. At the left of the operating desk is the short-wave receiver which, by the use of plug-in coils, covers all of the amateur bands. The coils used are of the fixed-tickler type and regeneration is controlled by a 150-μfd. condenser. This is the conventional arrangement used by many of the amateur fraternity and needs no further explanation.

Immediately below the filament ammeter is an "anti-capacity" switch which is wired as a selector switch for either the first or the first and second stages. This switch incorporates full filament control and permits rapid changing from the first to the second stage.

A diagram of this arrangement is shown in Fig. 2. For the sake of convenience the blades of the control switch are numbered \( S_1, S_2, S_3 \) and \( S_4 \) from left to right. When all blades are to the left the output is connected to the first stage, the filaments of the detector (if control of screen grid stages is desired the filaments may be connected in parallel with the detector filament shown on the diagram) and first stage turned on, and the filament of the second stage turned off. When all blades are in neutral all filaments are cut off and the set does not operate. When all blades are to the right the output is connected to the second stage and the filaments of all tubes are lit. \( S_1 \) is connected to the plate of the first amplifying tube and when thrown to the right connects the plate to the primary of the second audio transformer. When thrown to the left the plate of the first amplifying tube is connected to the left contact of \( S_4 \). One side of the output is permanently connected to the positive side of the "B" battery supply. The other side of the output is connected to the bar of \( S_4 \). When \( S_4 \) is thrown to the right the output is connected to the plate of the final audio stage. When \( S_4 \) is thrown to the left the output is connected through the left side of \( S_4 \) to the plate of the first audio tube. \( S_3 \) is the filament control switch for the final amplifying tube. The left contact of this switch is unconnected. The blades and right contact are connected in series with the filament supply to the final stage. \( S_4 \) is the filament control switch for the first stage, detector and screen grid tube if one is being used. The manner of connecting the screen grid tube has already been described. The contacts of \( S_4 \) are connected together. The contacts and blade are then connected in series with one side of the filament supply to the set.

The above arrangement provides a rapid and very convenient means of changing stages and will be appreciated by those to whom the use of plugs and jacks is inconvenient. The only disadvantage is that the use of the detector alone is impossible. However, this presents no difficulty

(Continued on page 82)
On the morning of September 8th, Hiram Percy Maxim, president of the Union, pressed a key officially opening the initial ceremony of the annual exhibition of amateur radio gear held by the Wireless Institute of Australia, by the taking of a flash-light picture. Mr. Maxim made three five-second dashes on a telegraph key at 5:12 a.m. E.S.T. (10:12 G.C.T.) which were carried by Western Union telegraph wire from Hartford to Montreal, Canada, where they actuated relays controlling the Marconi beam transmitter working into Australia, being received by Amalgamated Wireless. Within a quarter of a second the signal reached Melbourne Town Hall, where the exhibition was held, and the ceremony was executed with complete success.

This international cooperation and familiarity between amateurs and their organizations is branching out along many different lines. No better example of the above can be found than the success of the International Congress of Amateur Short Wave Operators held at Antwerp during July of this year. It was remarkably well attended, and aroused untold interest. Of particular interest to this department are the resolutions adopted by the eight official delegates of the amateur organizations represented, all but one of which were European member-societies of the Union. The high lights of the results of this conference will be presented briefly.

It was resolved to request of the respective governments, facilities for amateur representation at international conferences; these representatives to be under the leadership of K. B. Warner, I.A.R.U. Secretary. Closer relationship between European Sections was advocated; and a successive series of international meetings similar to the present one scheduled, to be held in order annually in Italy, Spain, England and Germany.

The need for stricter observance of technical regulations prescribed by the Washington Convention was pointed out, and to this end Mr. Raymond Braillard, president of the Technical Committee of the U.R.S.I. (International Scientific Radiotelegraph Union) was requested to place calibrated frequency meters at the disposal of European I.A.R.U. Sections, together with regular monitoring of amateur stations from his control center in Brussels. He was tendered a vote of thanks for his application to amateur interests.

An energetic demand was made for the absolute suppression of commercial operation in amateur bands. After consideration of a suggestion for the seclusion of certain territory to be used exclusively for 'phone operation, this was declared impractical, and telegraphy was resolved to be the established medium for amateur communication. Band marker stations were advocated, and certain British marker stations applauded for their past work. I.A.R.U. Headquarters was requested to have pamphlets prepared listing regulations existing in the countries of all member-societies.

It was further resolved to make efforts to ac-
quire the 3.5-mc. amateur band as exclusively amateur territory. QSL forwarding services are to be continued to "pirate" operators, but no cards should be handled bearing any sort of propaganda, whether political or religious, according to the recommendations of the delegates. Modifications in the process of issuing WAC certificates were suggested.

The official communications were concluded with the vote of thanks to Mr. Braillard noted above, as well as another to Mr. Maxim and Mr. Warner. The committees of the Antwerp Congress and the Belgian Network Management were felicitated, congratulated and thanked.

In general, the Antwerp meeting was a successful and valuable affair, which resulted in the crystallizing of European amateur sentiment, and should aid in establishing a suitable background for coming international radio regulatory conferences.

Hong Kong amateurs are anxious to work Canadians on 14 mc. according to reports received here, but unfortunately not one VE has been heard there in two years. Can't some of you Canadians do something about this?

All amateurs, and particularly those in Europe, Asia, and Oceania, are requested to listen for station PHAGA, which will be installed on a Fokker F IX plane, one of those which the Dutch Air Lines (K.L.M.) are using on regular weekly flights from Holland to the Dutch East Indies and return. A. O. L. Strijkers, PAOSV, chief of the aeronautical radio station Waalhaven near Rotterdam, will be the operator.

The first flight will start on November 13th. The transmitter will have an input of 75 watts, and the tone will be modulated d.c. (1000 cycle). Batteries are carried for operation while resting on the ground. It is probable that frequencies near the 7-mc. band will be used. Prizes are offered by the K.L.M. to those amateurs turning in the most valuable reports and offering the most reliable contact. All reports should be sent to Mr. A. O. L. Strijkers, Post Box 400, Rotterdam.

The purpose of the test is not only to handle regular traffic, but also to determine if amateurs can render assistance in relaying distress messages in the event of the plane being forced down in the jungle, some distance away from long-wave stations and immediate relief. It can readily be seen that the equipment has been installed not only for purposes of testing its usefulness and efficiency, but also to determine the extent of the same qualities in our proffered amateur assistance. Because of this the N.V.I.R. earnestly requests the cooperation of all amateurs in making this trial flight a big success.

Due to an error in recording WAC applications in the order of their receipt, the phone WAC issued to R. Ray Carter, VK2IC, was never properly noted in these pages. This certificate was issued on April 24, 1930, and was the first to be issued a British Empire amateur phone station.

In the foregoing resume of the Antwerp Congress, mention is made of the forwarding of QSL cards to "pirate" operators. This brings to mind another situation of an equally delicate nature when viewed in its ethical aspects, and that is the choice of calls made by these illegal operators. We are all fairly well agreed that under present conditions the operation of some of these stations is justifiable, but there are many remedial difficulties created by certain practices of our outlaw stations.

Probably the worst of these is the adoption of a foreign prefix, merely for purposes of identification, and not because of any connection with the country to which the prefix has rightfully been assigned. Such uses place the country in question in an intolerable position, since it can well be and probably is blamed for allowing useless outlaw operation inside its borders, when such is not the case at all. Can't we take this more fully into consideration, in choosing calls in the future?

AUSTRALIAN SECTION

By W. G. Sarnes, Dr. Fed. Publicity, W.I.A.

Poor receiving conditions continued in Australia through July, during which comparatively few international stations could be heard. This
Correspondence

One for T. O. M. to Think Over

Ensenada, P. R.

Editor, QST:

I have no fight to pick with T. O. M., but as an "old-timer" (yep, I cut my radio eye teeth on an E. I. Co. catalog and used a Wm. B. Duck catalog for a pacifier) I rise right up on my hind legs to say that in my case at least, and quite possibly in others, T. O. M. is backing up the wrong tree in his references to the wife that the young squirt takes unto himself and leaves "Radio Mother." T. O. M. is absolutely right when he sizes up the advantages of R. M., but in my case he is "all wet" in sizing up the wife.

Listen, OM, I have a wife, one Jr. 5 years old, and another one 3 years old. Now ook your weather ear over this way and I'll fill her up. I annexed my OW in 1924 and in 1925 I resumed my amateur radio. You see, the Jr. Op who was born in 1925 and "KJKD" got an even start. Granted: the Jr. got the benefit of the doubt for the first few months, even from the OM himself. Let's skip over the next three years, during which the Jr. and the OM about broke even; sometimes one had the advantage and sometimes the other. But in 1927 it became a 2-to-1 proposition when the second Jr. put in his appearance.

From then on, the OW has pulled her favorite movie star's picture out of the frame, and that frame now holds a certificate won in a contest. This has been repeated several times, as additions were made to the station's collection of plain and fancy wall paper. In these said contests, it was the OW who checked the messages for errors, the OW who kept the log, the OW who wrote up the final report in rough form for the OM to type off. The OW checks the incoming and outgoing QSL cards, as well as fills them out for the outgoing mail, classes up the addresses in the call book, and sees that they are mailed. When the OM had stayed up all night running up points in the contests, 'twas the OW who pulled him out of his bunk, threw water on him to wake him up and saw that he got to work on time, Self-preservation? Maybe, but she is young and would have no trouble getting another OM.

When the OM sets the alarm for 4 a.m. and doesn't hear it go off, it's the OW who routs him out to keep his skids. It's the OW who files the QSL cards, sticks the photos in the album, keeps the radio shack clean, and gets as much of a kick out of the OM's accomplishments as does the OM himself. It's the OW who forgoes a new dress, a pair of shoes for the Jr.s, a talkie or what have you, so that the OM can buy that new tube or whatever else it is that happens to be needed for the station. Self-defense? Maybe, but here, cook your ear over closer. Maybe the OW thinks the OM is in his second childhood and deserves humoring. But you think up the reason the OM rates even or preferred over the younger Jr.s. I'll tell you why: This "XYL" who is my OW has that Radio Mother spirit in her make-up and this OM is cashing in on it. So here is one OM who takes off his hat to the R. M. and takes it off again to his OW with the R. M. spirit, and don't you forget it.

Yours till kilocycles have handle-bars.

-- E. W. Mayer, K4KD

KHz Again

2050 Webster Ave.,
Bronx, N. Y. C.

Editor, QST:

Scientific bodies may decide to call a ke/s a ke., just as well as black could be called white by universal understanding, though a new word for the old meaning of the words "ke." and "white" would have to be found.

But there is hardly any logic in such proceedings because a ke. is not inherently a ke/s just as well as black is not white. Both words would be substitutions with very different original meanings, and somebody who would not happen to know about the decisions of those learned bodies would decidedly misunderstand them.

The logical way is, either to call a ke/s a ke. or to substitute a word which does not have any other original meaning. The European congress which decided to call a ke/s a KHz obviously acted according to this simple logic.

If there is any other pioneer in the high-frequency field who is more deserving of being immortalized by giving his name to an electrical high-frequency unit than Dr. Heinrich Hertz there would be room for argument, but I am afraid there is no serious competitor. Would it, therefore, not be a great and noble gesture to support that European convention which conceived the KHz idea?

The A.R.R.L. is an independent organization and QST is its own magazine, written for the members of this organization. There is no need to wait for somebody else to decide whether we are entitled to support a logical idea or not. Or are our brains-so inferior that we need guidance?
The 201-E (2 Plates). A taper plate condenser for short wave receivers. The stator plate is adjustable, affording maximum capacities of from 50 to 10 mid. Constant min. 7 mid.

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The League Emblem comes in four different forms. Its use by Members is endorsed and encouraged by the League. Every Member should be proud to display the insignia of his organization in every possible way.

THE PERSONAL EMBLEM. A handsome creation in extra-heavy rolled gold and black enamel, ½” high, supplied in lapel button or pin-back style. The personal emblem has come to be known as the sign of a good amateur. It identifies you — in the radio store, at the radio club, on the street, traveling — you can spot an amateur by it. Wear your emblem, OM, and take your proper place in the radio fraternity. Either style emblem, $1.00, postpaid.

THE AUTOMOBILE EMBLEM. 5 x 2½”, heavily enameled in yellow and black on sheet metal, holes top and bottom, 50c each, postpaid.

THE EMBLEM CUT. A mounted printing electrotype, the same size as the personal emblem, for use by Members on amateur printed matter, letterheads, cards, etc. $1.00 each, postpaid.

THE “JUMBO” EMBLEM. How about the shack wall or that 100-foot? Think of the attention this big yellow-and-black enamel metal emblem will get! 19 x 8¼”, same style as Automobile Emblem. $1.25 each, postpaid.

The American Radio Relay League
Hartford, Conn.

There is no doubt that a decision of 17,000 or more highly intelligent Americans will carry a definite weight and help materially to foster an idea of obvious value.

Why not bring up this topic again in QST and get the opinion of some more members on it?

— H. H. R. Sollau

What’s the Answer?

Editor, QST:

Want to congratulate Headquarters on its very honest radio publication. It smacks of more of the truth than any other. Lots of thought and effort back of its articles and I’m finding it very necessary. No, your articles are not “too technical.” Guess some fellows’ scorn for algebraic phrases is a hangover from school days. Mental gymnastics should be combined with soldering iron activities.

And now answer me this. After all your good “A B C” articles on how to get d.c. signs and the new Federal Regulations requiring an adequately filtered plate supply — why is an a.c. sig.?

— E. H. Baertschy

Seeing America First

Editor, QST:

Below is a list of actual figures on amateurs listed for each state of the Union, taken from the last issue of the Government call book.

Arizona .......... 65  New Hampshire .......... 87
Arkansas .......... 105  New Jersey ............ 558
Alabama .......... 91  New York .......... 1,622
Connecticut ....... 256  New Mexico .......... 43
California ....... 2,471  North Carolina .......... 180
Colorado ........ 108  Nevada .......... 29
Delaware .......... 19  Nebraska .......... 211
District of Columbia 99  North Dakota .......... 53
Florida .......... 197  Oregon .......... 305
Georgia .......... 107  Ohio .......... 938
Idaho .......... 68  Oklahoma .......... 289
Illinois .......... 908  Pennsylvania .......... 1,073
Indiana .......... 402  Rhode Island .......... 104
Iowa ........ 221  South Carolina .......... 23
Kansas ........ 233  South Dakota .......... 64
Kentucky .......... 108  Texas .......... 689
Louisiana .......... 139  Tennessee .......... 88
Mississippi ........ 78  Utah .......... 79
Michigan .......... 337  Virginia .......... 139
Massachusetts ....... 959  Vermont .......... 40
Maine .......... 162  Washington .......... 430
Maryland .......... 156  Wyoming .......... 49
Massachusetts ....... 38  West Virginia .......... 105
Minnesota .......... 246  Wisconsin .......... 274
Missouri .......... 314

After receiving numerous cards from fellow amateurs, some with dozens of foreign countries listed on them but with only 42 states, others that are proud owners of a WAC certificate but admit only working 44 or 46 states, and after working mouth after mouth without hearing stations in what nowadays we call our own back yard, some solution was sought without taking locality and our present receiver (which we believe behaves as good as the average) into consideration.

You fellows in the Western states, if you are still looking for a QSO in Delaware, note that it has 19 stations listed — Vermont has 40. Those
BARGAINS ARMY AND NAVY RADIO SURPLUS

NEW LOW PRICE

Dynamotor 32/380 volt, ball bearing, 10 mills. Special $5.00
Per pair. .......... $15.00

Anti-Capacity Switches, W.E.
6-8-12 Terminals, all with Platinum Contacts. Value $8.50
Each with shaft......... $4.50
Lots of 6. ................ $5.00

Lightning Switch. High Grade W.E.
Heavy Copper Blade and Contacts.
Size 7 x 8 x 6 high. While they last. $8.50

EDISON Storage Battery Cells

Type M-81.2 volts, 11 amp. never used. .......... $1.50
Type A-4.12 volts. 175 amp, first class, nickel alkali. $8.50
Type A-9.11 volts. 225 amp. nickel alkali. .......... $4.50

Western Electric Tapped Transformer 32/35 volt, ball
rheostat. Ward Leonard, 500 ohm. 2 to 1.5
amp. 35 lap field reg. type. $5.00
Rheostat, vitrified, variable. Ward Leonard, 6 ohm 15-20 am.
bat. charge type. $3.50
Rheostat, vitrified Ward Leonard, with leads, axes, shafts per
doz. .......... 1.50
Relay 1 and 5 tier. (110 or 220 volt) $4 silver contacts
500. .......... 7.50
Relay West, Elec. low voltage. 2 upper and 3 lower platinum
point relays. 3 contact arms. $5.00
Amplifier, W.E. radiophone, C.W. 926, 3 Stage
Heterodyne, Signal Corps, type B.C. 104. 1000 to 5000 meters
with detector. $15.00
Air compressor, Kellogg, Model T, 1 1/4 cu. ft., per min. weight
6 lbs. 600 ft. P.M. 125-b. Requires 1 1/2 HP. $3.00
SPECLAL—U.S. Army instruction book on telephony
or telegraphy. Hundreds of pictures and diagrams. $1.00
Microphone, Army Trench, military. $1.50
Charging Board. 32 volt, complete with Western No. 369
motor 6-50, arm cutout resistances, switches, etc., on static base. $80 value
15.00

Largest Radio and Electric Supply House in U.S. Specializing on Army and Navy Surplus. Write for your particular requirements.

Say You Saw It in QST—It Identifies You and Helps QST

Sufficient postage and deposit of 20% required on C.O.D. orders.

NO C.O.D. ON CANADIAN ORDERS, DUE TO LIMITED GOVERNMENT SURPLUS WE DO NOT ISSUE CATALOGS.

MANHATTAN ELECTRIC BARGAIN HOUSE, Dept. Q, 105-7 Fulton St., New York City
of you in the Eastern States glance at Wyoming with 19 amateurs, Montana with 38 — and there is no way of telling how many of these are active.

Trusting this will help you solve your chances of breaking into that State you have been looking for, and wishing you the best of luck.

— F. K. Mckesson, W8YB

Amateur Radio and International Good Will

60, Wellhead Lane, Perry Barr, Birmingham, England.

Editor, QST:

I wonder if amateurs fully realize how they are helping to create a spirit of friendship and good will between the nations of the world? Truly here is an instrument with which the friendship of nations can be firmly cemented.

After having had a QSO with a foreign "ham" I inevitably feel that a bond of friendship will always exist between us, and I am sure I am quite right in saying we all get similar impressions. In our own particular sphere we can be a League of Nations in a small way, and by fostering the "ham" spirit we shall surely be helping forward the claims of international peace and good-fellowship.

Not only can we bring about this state by genial, friendly and helpful operating procedure when on the air, but also by giving foreign and colonial "hams" a jolly good time when they come to our country. Unfortunately we do not get a large number of overseas visitors in the Midlands, but any chap who does look us up is assured of a good time with the Birmingham "Bhoys," and all visitors we have had to date invariably promise similar fare if we pay a reciprocal visit.

Wishing the heartiest success to the "Ham Spirit."

— A. C. Edwards, G6XJ

QRM

12 Forest Hill Drive, Edinburgh, England.

Editor, QST:

Having read the new regulations requiring d.c. plate supply, I was just burning up about this infringement on my personal liberty and freedom to use raw a.c. if I wanted to. Just as I had about worked myself up to writing QST and cussing out the directors for doing this without consulting me, a near-by ham borrowed the school's transmitter for the summer and came on with raw a.c. Although he at first used only a 201-A tube, it not only blanked the 7000-kc. band but also ruined 14,000 kc. as well. I gave him a rectifier and he borrowed a filter from the school, and this eliminated QRM on other bands, but he decided that he could not get out so well with this, so he went back to raw a.c., and when I protested he got mad and took to coming on every time he saw a
Build the Finest

PRACTICAL AMATEUR BAND RECEIVER!

Designed exclusively for amateur work by the oldest reliable manufacturer of short wave equipment. Some outstanding advantages of this receiver are:

1. Employ new super-sensitive 2 volt non-microphonic battery operated tubes
2. Spreads each amateur band over the full range of the dial
3. Equally efficient for DX, CW or tone reception
4. Thoroughly tried and tested circuit guaranteeing consistent results
5. Screen grid RF detector - power audio
6. Readily calibrated for each band
7. Easily assembled and wired

REL CAT. NO. 231
RECEIVER CIRCUIT

COMPLETE KIT comprising all necessary parts to build this receiver including drilled and engraved panel and metal cabinet. Price $30.00

GAT. NO. 253 — Coil kit comprises three (3) coils and one (1) coil base designed for full spread tuning of the 20, 40, and 80 meter bands when used with Cat. No. 187-E condenser. Price $6.00

GAT. NO. 187-E combined tank and vernier condenser, necessary for obtaining full spread tuning. Price $6.25

Write for our large loose leaf handbook full of information, kept up to date by regular bulletins. Price only 50c.

Our booklet 50 describes Modern Short Wave Receivers and Transmitters. Write for it — It's FREE

RADIO ENGINEERING LABORATORIES
100 WILBUR AVENUE
LONG ISLAND CITY, N. Y.

Export Department, 116 Broad Street, New York City

Say You Saw It in QST — It Identifies You and Helps QST
WESTON
Model 564
Volt-Ohmmeter

For Checking Voltages, Resistance and Continuity of Circuits

This instrument is ideally suited to the needs of radio service. It is handy and very useful for general purposes, especially in experimental work.

Model 564 is compact, completely self-contained. Though moderately priced, it gives that same dependable service for which all Weston instruments are known.

It consists of a Model 301, 3¼ inch diameter meter with ranges of 3, 30, 300 and 600 volts (all 1,000 ohms per volt) and two resistance ranges 0–10,000 and 0–100,000 ohms; two toggle switches connect the various ranges of the meter in circuit; a pair of 30" cables with long test prods is provided with each instrument.

Testing continuity of high and low resistance circuits is simplified by means of a toggle switch which changes the sensitivity of the meter to either 1 or 10 milliamperes. Accuracy 2%. Size: 5½" x 3½" x 2½" deep (excluding binding posts). Weight: 2.3 lbs. (including self-contained "C" battery).

60 Say You Saw It in QST — It Identifies You and Helps QST
RCA
RADIOTRON
UX-860

One of the well known Screen-Grid transmitting tubes

For the amateur or others having transmitters working at high frequencies (above 3000 kilocycles) this tube will be found advantageous, since its internal shielding obviates difficulties due to feedback and self-oscillation.

This Radiotron is primarily designed for power amplification at Radio frequencies. It is not generally satisfactory as an audio frequency amplifier or modulator, for which purposes other Radiotrons are available.

The user will find Radiotron UX-860 possesses the same rugged construction and performance qualities as the well known UX-852.

75 Watt
Filament Volts : 10.00
Filament Amperes : 3.25

Instruction book giving further rating and data information will be gladly forwarded on receipt of request giving the call letters of your station.

Firm net price, $37.50.

RCA VICTOR COMPANY, INC.
ENGINEERING PRODUCTS DIVISION
CAMDEN NEW JERSEY
Ah, that Figure 1!

To be found in most every QST article, and it takes your eye to the bottom of the page to refer to some past issue or issues of QST.

Obviously the reference is there for a real and helpful purpose.

You can always check—and double-check—what has been written on the subject treated if you keep your copies in a

QST Binder

Note the wire fasteners. Unnecessary to mutilate copies. Opens and lies flat in any position.

$1.50 each postpaid

A binder will keep your QSTs always together and protect them for future use. And it's a good-looking binder, too.

QST
1711 Park St., Hartford, Conn.

I.A.R.U. News

(Continued from page 61)

month is mid-winter in the Southern Hemisphere, and in the Southern States of the Commonwealth is marked by frosts and rain, with foggy and generally cold conditions, although rarely below the freezing point except on the highlands. Even on good receiving days foreign stations do not seem to get through except when accompanied by high noise levels. The theory propounded by the Federal Technical Director, Mr. M. Howden, VK3BQ, for this phenomena is that during our winter the northern hemisphere stations are experiencing summer conditions and that there are fewer of them at work. In addition, the stations we do hear are affected by static and other summer interference, to which is added any other interference such as may be caused from power leaks, etc. during our wintry conditions. 3.5-mc. work even for locals is practically out of the question, while 7 mc. is very little better. 14 mc. is not quite so noisy, but seems to be affected more or less for most of the time.

In spite of the poor conditions the men working on 28 mc. continue to get results, and the number of stations using crystal control on this band is growing weekly. Several of them are employing telephone modulation occasionally.

The majority of the Divisions of the W.T.A. have lately held Annual Meetings, election of officers, and balancing of accounts for the year. All reports show an excellent year, of great service to the interests of amateur radio, increased membership and continued enthusiasm. Full reports are not yet available from Divisions other than Western Australia and Victoria, but as the remainder come along interesting extracts should be available for the information of foreign friends.

Western Australian Division reports a membership of 139, with an average attendance of 50 members at each meeting. (Many have to travel considerable distances to attend, because of the scattered nature of the membership.) Twenty-four meetings were held during the twelve months under review. A permanent headquarters has been obtained for VK6WI, the official station. Educational activity through local broadcasting stations for assisting and gaining the interest of B.C.L. listeners; operating and Morse classes for beginners; field days; social activities and ex-
Filament Heating Transformers

Voltage regulation within 5%. Note insulation test voltage.

<table>
<thead>
<tr>
<th>Type</th>
<th>V.A.</th>
<th>Cycles</th>
<th>Line Volts</th>
<th>Sec. Volts</th>
<th>Sec. Amps.</th>
<th>Test Voltage</th>
<th>Type Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-4648</td>
<td>12½</td>
<td>50/60</td>
<td>200/230</td>
<td>2.5/1.25</td>
<td>5</td>
<td>12,000</td>
<td>-66</td>
</tr>
<tr>
<td>H-66A</td>
<td>25</td>
<td>50/60</td>
<td>100/115</td>
<td>2.5/1.25</td>
<td>10</td>
<td>12,000</td>
<td>-66</td>
</tr>
<tr>
<td>H-4649</td>
<td>37½</td>
<td>50/60</td>
<td>200/230</td>
<td>2.5/1.25</td>
<td>15</td>
<td>12,000</td>
<td>-66</td>
</tr>
<tr>
<td>H-4650</td>
<td>50</td>
<td>50/60</td>
<td>100/115</td>
<td>5/2.5</td>
<td>10</td>
<td>12,000</td>
<td>-72</td>
</tr>
<tr>
<td>H-4651</td>
<td>50</td>
<td>50/60</td>
<td>200/230</td>
<td>5/2.5</td>
<td>10</td>
<td>12,000</td>
<td>-72</td>
</tr>
<tr>
<td>H-4652</td>
<td>100</td>
<td>50/60</td>
<td>100/115</td>
<td>5/2.5</td>
<td>20</td>
<td>12,000</td>
<td>-72</td>
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<tr>
<td>H-4653</td>
<td>150</td>
<td>50/60</td>
<td>200/230</td>
<td>5/2.5</td>
<td>30</td>
<td>12,000</td>
<td>-72</td>
</tr>
</tbody>
</table>

Plate Transformers

P-4656 290, 415 50/60 100/108 2360 0.175 6,000 two 211
115/125 1180 two 849

The above Plate Transformer is designed to deliver 1000 volts D. C. with the average filter. Other Plate Transformers can be furnished upon receipt of specifications giving your requirements.

Radio Filter and Modulation Chokes

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Inductance (Henries)</th>
<th>Amperes (D. C.)</th>
<th>D. C. Resistance (ohms)</th>
<th>Insulation Test (volts)</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>4725</td>
<td>8</td>
<td>0.250</td>
<td>65</td>
<td>2500</td>
<td>Filter</td>
</tr>
<tr>
<td>557A</td>
<td>15</td>
<td>0.250</td>
<td>130</td>
<td>2500</td>
<td>Filter</td>
</tr>
<tr>
<td>4618</td>
<td>70</td>
<td>0.050 to 0.200</td>
<td>410</td>
<td>5000</td>
<td>Modulation</td>
</tr>
</tbody>
</table>

Other standard size Choke Coils available for transmitting circuits.

Amertran Radio Parts have long been recognized as the highest quality. Amateurs obtaining the best results realize their value.

Write for Bulletin No. 1066.
they speak for themselves in every test
Since 1915

E. T. CUNNINGHAM, INC.
NEW YORK SAN FRANCISCO
CHICAGO DALLAS ATLANTA

cursions to places of interest such as radio stations, power houses, telegraph stations, etc.;
the equipment of a comprehensive library; and a
successful amateur Exhibition during the year,
are exemplary of the year’s activity.

The Victorian Division report is very similar.
The total membership is 166, and new members
are enrolled at each meeting. During the year the
Division has been able to install a reference
library of textbooks for the use of the members;
a lending library of technical instruments to as-
sist in the experiments of individuals; the organi-
zation of field days, excursions, etc. and experi-
enced an altogether successful twelve months.
Some interesting experiments in measurement
of the Heaviside layer were undertaken during
July by one of the Victorian telephone stations,
VK3BY, cooperating with the Radio Research
Board of Melbourne University. Complete de-
tails of the results are not yet available, but will
be reported later. The measurements were made
on the reflected waves from VK3BY, the fre-
quency of which was varied at a known value by
means of a small paralleled condenser inserted in
the aerial circuit and rotated by a constant speed
motor.

DUTCH NOTES

By W. Keeman, Traffic Manager, N.V.I.R.

The months of July and August have been
particularly barren of results. The number
of reports from our O.R.S. has been rather small,
probably in consequence of the stifling heat, and
those who sent in their notes were very pessimis-
tic. The word “rotten” was used frequently
(T.O.M. — N.B.). No signals were received on
28 mc., but a few DX stations were heard on 14
mc. although few contacts were reported. Operat-
ing conditions and practices both were had on 7
mc. The 3.5-mc. band alone showed signs of life.

The long awaited book containing all the
technical information amateurs should have has
been prepared. It was written and edited entirely
by our membership, and is gotten out in mimeo-
graphed form. The publication program of our
society is finished now, and our members now can
avail themselves of three books, each dovetailing
into each other, in which they can find all the in-
formation they require.

Our Board of Directors has made another im-
portant decision. This is to the effect that in fu-
ture all QSL cards which are not in agreement
with the regulations of the Washington I.R.C.
will be returned to the sender by our QSL service,
after having been stamped as follows: “Refused.
Does not conform with Washington Regula-
tions.” We hope this will help to make an end to
the childish effort of a few amateurs to create
confusion, and introduce political differences to
the detriment of amateur radio. We have hesi-
tated a considerable time before taking this step,
but it has appeared to be really necessary if we
wish to keep amateur radio the fine, clean sport it
has been since the very beginning.

(Continued on page 66)

Say You Saw It in QST — It Identifies You and Helps QST
Look Inside the Can

Condensers may look pretty much alike from the outside. But it's the "insides" that does the job. And when you take a look at the Sprague's "innards" you'll see why this new type electrolytic condenser has literally swept the radio industry off its feet.

Here's a standardized unit of 8 MFD capacity, with a rating of 430 volts DC, in a space of 1 3/8" diameter, 4 1/2" height. Packed with such exclusive features as the one-piece anode, without a single welded or riveted joint. A protected vent vulcanized into the hard rubber top. An individual container allowing of the utmost flexibility in circuit design. Screw socket mounting for ease of attachment. And a proven puncture-proof, self-healing construction that gives it almost limitless life.

Write for illustrated folder which shows the Sprague superiority at a glance.

Sprague Specialties Company
Manufacturers also of the world's most
Sprague Paper Condenser
Complete data on construction and repair of modern radio sets

These three books cover the entire field of building, repairing and "trouble-shooting" on modern broadcast receiving sets. The Library has been brought right up-to-the-minute in every respect, including the very latest developments in the design and manufacture of equipment. The recent interest in short-wave reception is reflected in a section which deals with the construction of this type of receiver.

Radio Construction Library

By JAMES A. MOYER
Director of University Extension, Massachusetts Department of Education

and JOHN F. WOSTREL
Instructor in Radio Division of University Extension, Massachusetts Department of Education

THREE three books embody not only a thorough home-study course, but a ready means of reference for the experienced radio technician. The practical information is given on wiring, "trouble-shooting", installation and servicing to get the best tone quality, distance and selectivity in broadcast reception in all types of sets. Practical data is given on radio equipment such as antenna systems, battery eliminators, loud speakers, chargers, vacuum tubes, etc., etc.

A section is devoted to the identification of common faults in receivers and methods of making workmanlike repairs.

The three books are profusely illustrated with understandable diagrams of hookups, connections, loud speaker units, installation work and antenna erection -- as well as numerous photographs, tables and charts which clarify the text.

See this Library for 10 Days Free

No Money Down — Small Monthly Payments

It is your privilege to examine this Library for 10 days without cost. If it proves satisfactory, send an initial payment of only $1.50 and $2.00 a month until $7.50 has been paid. Otherwise return the books.

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You may send me the Radio Construction Library, three volumes, for 10 days' free examination. I agree to permit an initial payment of $1.50 at the end of 10 days and $2.00 a month until $7.50 has been paid — or — I will return the books.

Name ...........................................
Home Address ..................................
City and State .................................
Position ........................................
Name of Company ..............................

BRITISH NOTES

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

By the time these notes are published the Fifth Annual Convention of the R.S.G.B. will have taken place. A full report of the decisions reached will appear later. The Society was represented at the British National Radio Exhibition at Olympia, and exhibited a complete amateur radio station, besides transmitters and receivers designed to operate on 1 and 5 meters.

Many new B.E.R.U. members have been elected and within a few months the full Empire Network will be in operation. Some dozen British amateurs have been appointed Empire Link Stations.

The Rotab Cup (presented in 1926 by Mr. G. Marcuse, G2XM) has been won by Mr. F. Miles, G5ML, whilst the Worley-Talbot Trophy goes to Mr. C. E. Runnecks, SU8RS. We are sure amateurs throughout the world will join in congratulating these well known amateurs.

Preparations are proceeding apace for the coming 28-me. tests, and all who desire to assist should advise our Contact Bureau Manager, Mr. Powditch, Porth House, Porth, St. Colomb Minor, Cornwall.

In answer to several requests, we wish to advise all amateurs that the coveted W.B.E. certificate is only issued to R.S.G.B. or B.E.R.U. members who have worked a British station in each of the five continents.

Membership in the Society is open to all genuine amateurs, and full particulars will be sent on application to the Hon. Sec. R.S.G.B. 53 Victoria Street, London, S.W.1.

NORWEGIAN NOTES

By G. H. Petersen, Pres. N.R.E.

The outstanding event during August was the Convention and General Meeting at Oslo on August 9th and 10th.

There was a very fine representation from all parts of the country, and many interesting plans were discussed. Much importance was attached to the inland tests to be arranged during the autumn months to establish reliable national relay lines. It was decided to stimulate the exchange of foreign reports and cooperation in international tests, and in this connection it is interesting to note that we have arranged for foreign reports to be distributed to all our members by a monthly circular, which is also to contain bulletins from Headquarters, inland reports, and anything else of interest.

The Board for the coming two years will consist of:

G. H. Petersen, LA1D, President
L. Salieuth, LA1G, Vice-president
Captain L. B. Gottwaldt
R. Corneliusen

Our Section Managers at present are:

R. Larsen, LA2B, Fredrikstad
J. Fundingsrud, LA2C, Oslo
R. Pedersen, LA1W, Notodden
F. Knudsen, LA2Y, Bergen
K. E. Weeden, Trondheim

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New York

New York's Headquarters for

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ACME JEWELL PYREX
BRADLEY FLERON
THORDARSON
ELECTRAD NATIONAL
LYNCH SIGNAL
FLECHTHEIM
NATIONAL RECTOBULB
CARDWELL

IN STOCK

LEEDS RADIO LABORATORIES

Precision Custom Built Short Wave Receivers and Transmitters

This department under the supervision of the Short-Wave Specialist Jerome Gross. We design, construct and advise on any material for the "Ham" Broadcasting station or laboratory. Write Jerry Gross for advice on any of your problems.

LEEDS Special 75 Watt Master TRANSMITTER

The ultimate in a real transmitter of medium high power. Finest construction throughout. Angle aluminum framework, oscillator thoroughly shielded with heavy aluminum. Circuit perfectly balanced. Easily adjusted for full output. Size 11" x 19" x 26" overall. Extremely flexible, wavelength changes easily effected. Utilizes one UX210 as oscillator, one UX852 as power amplifier. WRITE FOR OUR CIRCULARS ON OUR PRODUCTS, QUOTATIONS ON SPECIAL TRANSMITTERS, ETC., SUPPLIED UPON APPLICATION.

G. R. No. 557

Short Wave Condenser

The use of this condenser was suggested in the Oct. article on Dynatron oscillators. The only condenser incorporating as well contained fixed capacity in addition to the variable plates. Condenser consists of 6 stator plates and a rotor plate of the straight line wavelength type and 2 additional rotor plates which are complete circular discs. Min. capacity 44.5 MILMF to 70 MILMF Maximum; size 7 ½" x 4 ½" for panel mounting only. Price $3.25.

FILTER CHOKE

30 Henry, 150 Mill — special heavy choke, good for filter circuits for transmitters up to and including one UX852, or as a modulation choke on medium power transmitters. Specially priced at $3.25.

DUBLIER CONDENSERS

400 Volts D. C. Working Voltage

Type 902—1 Mfd. — 200 high, 20 watt. 4 3/4" deep, listed Special $1.35

7 Mfd. — 5" high, 2 ½" wide, 4 3/4" deep, listed $7.50. Special $1.75

Hardwick, Hindle Bleeder Resistors

ALSO THE NEW ENAMELED SLIDE RESISTOR IN VARIOUS SIZES.

We recommend HH Resistors for the following voltages:

- 500 to 600 volts — 50,000 ohms — 100 watt. ............... $2.75
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- 1500 volts — 200,000 ohms — 200 watt. .............. 3.45
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200 Watt Centre Tapped Transmitting GRID LEAK

Size 8 ½" x 1 ½" complete with bracket mounting

- 5,000 ohms. Special 2.25
- 10,000 ohms. Special 2.75
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- 30,000 ohms. Special 5.75
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NEON GLOW LAMPS

Made by General Electric Co., type C, 10, standard base, 104 uses, as illustrated in QST May issue page 17. Price only 15c.

Standard electric socket for tube ... $0.10

WIRE

- No. 14 Enamel .................. 1 ½ Foot $0.75
- No. 12 .......................... 1 ½ " $0.20
- No. 10 .......................... 1 ¼ " $0.10

Any length up to 1000 feet

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TRIAD brings you a perfected T-210 TUBE!

Triad Engineers have at last made available a T-210 Tube which functions equally well as a power amplifier and an oscillator — and in addition to meeting these requirements, offers a far longer life.

This new Triad T-210 has a thoriated Tungsten Filament. This construction allows it to be easily reactivated, thus greatly increasing the life of the tube. In this construction, Triad engineers have used molybdenum, a material that will withstand excessive heat far better than nickel which is usually used. The using of molybdenum has eliminated grid and plate emission which is the chief cause of noisy tubes.

Here is still another proof of the progressive spirit which has made the name Triad famous, and has won for Triad tubes the preference among those who know!

Send now for Triad bulletin T-10 and for information regarding the remarkable improvements that have been carried out throughout the entire Triad line.

A special price is extended to Licensed Amateurs and Members of A.R.R.L.

TRIAD Tubes are fully licensed under all R.C.A. General Electric and Westinghouse Electric Mfg. Co. Patents

Triad Manufacturing Co.
Pawtucket, R. I.

The Convention included a fine hamfest and a very interesting visit to amateur stations, the commercial transmitting and receiving stations at Oslo, the new Oslo broadcasting station, the Sailor School laboratory, and the works and laboratories of the Norwegian branch of Phillips Lamps.

It was certainly regretted that we had no opportunity to welcome any foreign amateurs. We had certainly hoped to see G6YL and SM6UA.

No interesting work has been reported during the month, LAIG moving to a new QRA, and most of the gang reporting bad conditions, or rebuilding for the coming season.

SPANISH NOTES

By Miguel Muñoz, Pres. Asociacion E.A.R.

The Asociacion E.A.R. has been very active during the past few months, by virtue of the new decree issued by the Spanish Government and originating at the Hague Conference.

Thanks to the intervention of the President of the E.A.R. with the Inter-Ministerial Committee of which it forms a part, the Spanish amateurs have been able to work undisturbed at all hours and on all waves allotted by the Washington Conference, both with C.W. and 'phone.

The number of official licenses granted by the E.A.R. has reached 210.

Another and important group of the E.A.R. has just been organized to take part in the tests periodically conducted by the U.R.S.I. for the purpose of studying the propagation of short waves.

Just recently a communication contest was held between Argentine and Spanish amateurs. The contest was organized by the Argentine Radio Club, in collaboration with the E.A.R. Of the Argentine amateurs, LU3DE and LU8DY, and of the Spanish, EAR98 and EAR96, were the most successful.

In accordance with the resolutions adopted by the League of Amateurs at Antwerp and the recommendations made by the Secretary of the I.A.R.U., the Asociacion E.A.R. has pledged itself to do everything possible to have representatives of the I.A.R.U. meet again at the next International Conference to be held at Madrid in 1932.

NEW ZEALAND NOTES


N.Z.A.R.T. affairs have undergone a change since last year, Headquarters having been changed from Auckland to Wellington upon the vote of members. The new address is now P. O. Box 489, Wellington, N. Z., and this should be used for all QSL cards, correspondence, etc.

Recently concessions have been granted by the Government in the way of reduced license fees and the privilege of exchanging messages. This latter has led to the formation of a Relay Chain and by collaboration with the Defense Department it is hoped to inaugurate shortly an Army-Amateur network similar to that in force in the U. S. A.
Every Transmitting Amateur Uses These Forms

Everything that you've wanted in a log is in the Official A. R. R. L. Log Book

New page design to take care of every operating need and fulfill the requirements of the new regulations!

New book form! No more fussing with binders, or trying to weight down loose sheets when the breezes blow!

New handy operating hints and log-keeping suggestions, put where they are always convenient!

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One color (black) heading now being used at greatly reduced cost to members. Write your radio letters on League stationery—it identifies you. Lithographed on 8¼ x 11 heavy bond paper.

100 sheets .................. 50c
250 sheets .................. $1.00
500 sheets .................. $1.75
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OFFICIAL A.R.R.L. MESSAGE BLANKS
Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8¼ x 10¾$. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for $1.00.

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AMERICAN RADIO RELAY LEAGUE + HARTFORD, CONN., U. S. A.

Say You Saw It in QST — It Identifies You and Helps QST
Radio Exhibitions have been held in several of the main centers this season and the local hams have acquitted themselves well by installing transmitters at the various shows and have handled greetings messages to friends of the visitors. At one Exhibition alone over 1400 messages were handled in four days.

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Calls Heard

(Continued from page 63)

Radio Exhibitions have been held in several of the main centers this season and the local hams have acquitted themselves well by installing transmitters at the various shows and have handled greetings messages to friends of the visitors. At one Exhibition alone over 1400 messages were handled in four days.

---

OZ1A, Niels Jacobsen, 29 Bredgade, Copenhagen, Denmark

7000-kc. band

14,000-kc. band

W6DHM, Vin W. Berry, Los Angeles, Calif.; Hilo, Hawaii

W6JM, Murray Street, New York City

ACSHM, Mr. H. MacGowan, c/o American Club, Shanghai, China

7000-kc. band

14,000-kc. band

VXJT, C. Luckman, 29 Wangee Rd., Lakemba, S. W., Australia

Baltimore Radio Corp.
47-Q Murray Street, New York City
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The Latest Data!

Complete and up-to-date information covering the entire field of Radio—all arranged for ready reference in this one big guide book.

THE RADIO MANUAL

A Handbook for Students, Amateurs, Operators, and Inspectors

Here's the answer to every question about the principles, operation and maintenance of apparatus for radio transmitting and receiving. No detail has been omitted, from elementary electricity and magnetism for the beginner to television and radio movies. Important new chapters have been added to bring it right up-to-the-minute, and an immense volume of facts never before available is now presented in the book. Included are detailed descriptions of standard equipment, fully illustrated with photographs and diagrams. It is now more than ever the one complete handbook covering the entire radio field.

A Complete Course in Radio Operation IN ONE VOLUME

Enables You to Qualify for Gov't License as Operator or Inspector

20 Big Chapters Cover:

Elementary Electricity and Magnetism; Motors and Generators; Storage Batteries and Charging Circuits; The Vacuum Tube; Circuits Employed in Vacuum Tube Transmitters; Modulating Systems and 100% Modulation; Wave-meter; Piezo-Electric Oscillators; Wave Traps; Marine Vacuum Tube Transmitters; Radio-Broadcasting Equipment; Amateur Transmitters; Spark Transmitters; Commercial Radio Receivers; Aircraft Auto-Alarm; Radio Beacons and Direction Finders; Aircraft Radio Equipment; Practical Television and Radio-movies; Eliminating Radio Interference; Radio Laws and Regulations; Handling and Abstracting Traffic.

Prepared by Official Examining Officer

The author, G. E. Sterkino, is Radio Inspector and Examining Officer, Radio Division, U. S. Dept. of Commerce. The book has been edited in detail by Robert S. Kruse, for five years Technical Editor of QST, the Magazine of the American Radio Relay League, now Radio Consultant. Many other experts assisted them.

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The 1936 edition of "The Radio Manual" has just been published. Nearly 800 pages, 500 illustrations. Bound in Flexible Fabricoid. The coupon brings the volume for free examination. If you do not agree that it is the best Radio book you have seen, return it and owe nothing. If you keep it, send the price of $6.00 within ten days.

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World Wide Triple Grid Short Wave Receiver, a four-tube short wave receiver for the highest efficiency for code, phone and simple output for television experiments. Uses 224 in a R.F. stage, a 224 detector, a 224 resistance coupled audio feeding into a 245 power tube. Tubes used make a minimum of microphonic noises and are so wired to be used on a 6 volt storage battery. A set of 10 plug-in coils are furnished with this set covering from 14 to 125 meters. Other coils can be used to cover lower frequencies.

World Wide 2 tube Short Wave Receiver. $11.75. A two-tube receiver in a beautiful shielded metal cabinet. An ideal all around set which will give iond...

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HAND MICROPHONES
Very Sensitive
Push-switch in handle.
Every one brand new.
Complete with ft. cord.
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DUBILIcER MICA CONDENSERS
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NRH is located in Costa Rica, Central America.

Senor Amando Cespedes Marin—Station NRH (Costa Rica, Central America) writes us that 75% of American requests for confirmation of reception of his world famous short wave broadcasting station are from Super-Wasp users.

More and more hard boiled "Hams" are replacing their haywire sets with Pilot Super-Wasp. They have discovered that the Super-Wasp is "sure fire" on all its wave bands, costs less as a Kit than equivalent parts cost separately, is easy to assemble quickly and looks neater on the operator's table than the usual bread-board job.

Many licensed amateurs are discovering how readily the Super-Wasp can be converted to give full spread on the "Ham" bands. Conviction is growing among amateurs everywhere that Pilot Super-Wasp is the most flexible receiver ever offered for the "Ham's" own use, enabling him quickly to horn in on all transmissions that interest him from 14 to 500 meters.

The first receiver for short waves to have a stage of Screen-Grid TRF ahead of its detector, the Super-Wasp has been proving the soundness of its design for two whole years. Other features particularly interesting to the expert are that all parts of R.F. and Detector stage respectively are enclosed in individual shield cases on the front of the chassis, leaving the audio accessible for those with pet audio ideas.

The battery job has two straight audio transformer stages. The A.C. job has one resistance and one transformer audio stage.

It is Pilot's greatest gratification that the class of radio enthusiasts who developed short waves are turning to the Pilot Super-Wasp.

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FRENSHAM type "N" power packs. Brand new and in original cartons. Can be used to power a 710 oscillator or a 250 power amplifier. It solves that problem for getting pure d.c. power supply. D.C. output is 500 volts at 70 mills at 1.5 and 250 watts, center-tapped for 240's or 250's, 3/4 c.f. for 237, and 2 1/4 center-tapped windings for 276 tubes. Has a plug for the hold coil of a.d.c. dynamic speaker. A 281 is used as rectifier. Price, less tube, 281, $1.95; 282, $2.35.

DONGAN 250 watt transformer with line ballast tube. Insures absolutely steady voltage regulation. Completely mounted and shielded. Terminal box at top. Tube furnished free. Secondary high voltage output is 1500 volts center-tapped at 750 watts filament output at 7.5 volts center-tapped, and 2 3/4 center-tapped. Get your order in fast as there are very few left. Price, complete, $5.65.

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TUBES of high quality and durability. Guaranteed to stand up FREE 30 day replacement. Type X28, $1.60; X28, $2.15; X39, $3.00; X21, $3.00; X25, $3.25.

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Principles of Radio, by Keith Henney. This book is chock-full of meat for the experimenter. The subjects treated range from the fundamentals of electricity to the most modern concepts of modulation and detection. 477 pp., 306 illustrations. $3.50

Elements of Radio Communication, by Prof. J. H. Morecroft. This is a new book by the author of the "Principles" listed below. It is about half the size of the larger work, and the subject is treated in more elementary fashion. Simple algebra is sufficient. An excellent book for the "first-year" student. 269 pp., 170 illustrations. $3.00

Principles of Radio Communication, by Prof. J. H. Morecroft. An elaborate general textbook, and one of the recognized standards on theory for the engineering student. A working knowledge of mathematics is desirable for the reader who expects to get the greatest benefit from this work. 935 pp., 5½ x 9. $7.50

Radio Engineering Principles, by Lauer and Brown. While not as voluminous as "Morecroft," this excellent general textbook on radio principles is the favorite of many students. A moderate knowledge of mathematics is desirable. 300 pp., 5½ x 9. $3.50

Experimental Radio, by Prof. R. R. Ramsey. Revised Edition. A splendid book for the experimenter. This is a laboratory manual, describing 128 excellent experiments designed to bring out the principles of radio theory, instruments and measurements. 150 illustrations, 229 pp. $2.75

Radio Theory and Operating, by Mary Texanna Loomis. Although giving a moderate amount of theory, it is essentially a practical handbook for commercial and broadcast operators, and as such ranks among the foremost publications of this sort. Used as a textbook by many radio schools. A good book for any amateur. 1000 pp., 800 illustrations. $4.25

The Radio Manual, by George E. Sterling. Another excellent practical handbook, especially valuable to the commercial and broadcast operator, and covering the principles, methods and apparatus of all phases of radio activity. Over 900 pp., $6.00

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Radio Operating Questions and Answers, by Nilson and Hormung. Revised Edition. This is intended as a companion volume to "Practical Radio Telegraphy" by the same authors. In conjunction with that work it should leave the commercial license applicant well prepared for his examinations. There is a chapter on amateur license questions and answers, too. 287 pp., 5½ x 8. $2.00

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ATTENDING Northwestern Division Conventions is a new experience for this particular member of the Headquarters staff but if all the rest are as good as the one held this year on Aug. 29th-30th at the Desert Hotel in Spokane he not only hopes he'll get in on future affairs but regrets he missed the past ones.

Registration occupied Friday morning, with President Baird, of the Radio Operators' Club of Spokane, formally opening the convention on Friday afternoon. The acting mayor of Spokane welcomed the delegates, and other notables were called on for brief remarks, following which the meeting turned into a traffic discussion under the chairmanship of SCM Piety—and an excellent job he did of it, too. At 4 p.m. everybody piled into buses for a trip to the natatorium which took up the rest of the afternoon and incidentally was a stroke of pure genius on the part of the convention committee. Suits and lockers were free, the water was just right, and the contests were interesting. (We do believe, though, that parachutes should have been provided for those hardy souls who dove off the rafters!)

Friday evening most of those present ate together informally in one of the private dining rooms of the hotel, apparently under the leadership of the firm of Gusiston Gusiston Gusiston and Gunston. The regular evening session was taken up with talks by Assistant Secretary Budlong, from League Headquarters, Mr. Edan of the A. T. & T., Lts. Street and Pyle, of the Naval Reserve, Mr. Prince (rectifiers and filters) and a final technical session featuring Prof. Woodruff, visiting director from the Atlantic Division, who held the gang until after midnight with his remarks and demonstrations on r.f. chokes, TNT transmitters, etc.

Saturday morning there were trips to KFPY and KHQ. Certain well-remembered "voice DX" between the studio and the Hotel Ridpath featured the KFPY visit! Following a short session in the early afternoon, there was another bus trip to the aviation field, where Lt. Holter, of the local National Guard Squadron demonstrated ship-ground communication and then went aloft to give everybody a chance to guess his plane's height and thus win a free ride. W7AHV won by coming within ten feet of the correct height of 3300 feet.

At a Northwestern Division Convention the banquet really is the principal feature. Our first impression, on getting seated, was the R9 appearance of the waitresses and the many YL's. Following the banquet proper, President Baird introduced Director Weingarten, who acted as toastmaster, and called for remarks from Senator C. C. Dill, Supervisor Lovejoy, Prof. Woodruff, Mr. Budlong, Mr. Waskey, Lt. Holter and others. To list all those who spoke would be to list the convention register of 84, for the banquet was delightfully informal and before it was over...
BARGAINS IN TRANSMITTING EQUIPMENT

TRANSFORMERS

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>THORDARSON 175 watt — 1150 volts center tapped, two 7.5 and one 3 v. windings</td>
<td>$4.25</td>
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<tr>
<td>THORDARSON 250 watt — 1200 volts center tapped, two 7.5 and one 3 v. windings</td>
<td>$5.75</td>
</tr>
<tr>
<td>THORDARSON 100 watt — 700 volts center tapped, one 5 and one 2.5 v. windings</td>
<td>$3.75</td>
</tr>
<tr>
<td>THORDARSON 100 watt — same as above but for use with 20 cents A.C. current</td>
<td>$4.25</td>
</tr>
<tr>
<td>JEFFERSON step-down — gives 14 volts at 2.5 amperes from 110 v. A.C.</td>
<td>$1.25</td>
</tr>
<tr>
<td>AMERICAN Double Filter Choke, 250 mils. D.C. resistance 110 ohms</td>
<td>$0.75</td>
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<tr>
<td>AMERTRAN step-down — three 2.5 volt windings at 3.1 and 2.5 amps from 110 A.C.</td>
<td>$9.00</td>
</tr>
<tr>
<td>AMERTRAN 1200 volt center tapped with two 7.5 volt winding at 2.5 amps</td>
<td>$15.00</td>
</tr>
<tr>
<td>AMERICAN FILAMENT TRANSFORMER—110-170 V. primary—secondary—two windings—2.5 volts at 11 amps, and 2.5 volts at 3 amps. Mounted and tested</td>
<td>$3.75</td>
</tr>
<tr>
<td>THORDARSON Push Pull output transformer</td>
<td>$2.75</td>
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CHOKES

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<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>THORDARSON Filter Choke, 30 henri — 150 mils.</td>
<td>$2.70</td>
</tr>
<tr>
<td>THORDARSON Double Filter Choke, contains two 18 henri — 250 mil chokes</td>
<td>$6.25</td>
</tr>
<tr>
<td>AMERTRAN Filter Choke, 15 henri — 250 mls. D.C. resistance 200 ohms.</td>
<td>$0.90</td>
</tr>
<tr>
<td>AMERTRAN Filter Choke, 30 henri — 120 mls. D.C. resistance 110 ohms.</td>
<td>$3.60</td>
</tr>
<tr>
<td>PILOT Filter Choke, 32 henri — 145 mls.</td>
<td>$7.00</td>
</tr>
<tr>
<td>R.C.A. Double Filter Choke contains two 30 henri 100 mls chokes</td>
<td>$1.75</td>
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CONDENSERS

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>FLECHTHEIM HIGH TENSION Filter Condensers, with porcelain insulators, guaranteed</td>
<td>$2.70</td>
</tr>
<tr>
<td>1500 volts — 1 mfd.</td>
<td>$2.70</td>
</tr>
<tr>
<td>2 mfd.</td>
<td>$5.10</td>
</tr>
<tr>
<td>4 mfd.</td>
<td>$8.70</td>
</tr>
<tr>
<td>2000 volts — 1 mfd.</td>
<td>$6.00</td>
</tr>
<tr>
<td>2 mfd.</td>
<td>$9.00</td>
</tr>
<tr>
<td>4 mfd.</td>
<td>$15.60</td>
</tr>
<tr>
<td>Write for special prices on 3000 volt condensers and type HS &amp; HV.</td>
<td></td>
</tr>
<tr>
<td>DUBLIER Filter Condenser, 1.75 mfd., 1000 working voltage D.C.</td>
<td>$1.35</td>
</tr>
<tr>
<td>DUBLIER Filter Condenser, 7 mfd., 600 working voltage D.C.</td>
<td>$2.50</td>
</tr>
<tr>
<td>DUBLIER Filter Condenser, 4 mfd., 600 working voltage D.C.</td>
<td>$1.80</td>
</tr>
<tr>
<td>DUBLIER Filter Condenser, 1.17 mfd., 600, 600 and 750 mfd, at 160 working voltage D.C.</td>
<td>$3.75</td>
</tr>
<tr>
<td>STRONGBERG-CARLSON Filter Condenser, 3.5 mfd. at 600 working voltage D.C.</td>
<td>$1.50</td>
</tr>
<tr>
<td>AGREVOX 7 mfd., Condenser, 2 mfd. at 1600, 2 mfd. at 800 and 3 mfd. at 400 working voltage D.C.</td>
<td>$2.50</td>
</tr>
<tr>
<td>DUBLIER Plate Stopping Condenser, 0.00125 mfd. at 1000 volts.</td>
<td>$0.35</td>
</tr>
<tr>
<td>DUBLIER 10 mfd. condenser, 3 mfd. at 800 volts, 3 mfd. at 600, 3 1/4 at 400 and 1 mfd. at 200 working volts</td>
<td>$4.50</td>
</tr>
</tbody>
</table>

TUBES

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENUINE R.C.A. UV-213 Rectifying Tubes, full wave, same voltages at 230</td>
<td>$9.75</td>
</tr>
<tr>
<td>GENUINE R.C.A. 216-B Rectifying Tubes, 7.5 volt filament, 500 plate volts D.C.</td>
<td>$2.45</td>
</tr>
<tr>
<td>KENOTRON Rectifying Tubes, filament voltage 8 to 10, plate 550 volts</td>
<td>$5.50</td>
</tr>
<tr>
<td>WESTERN ELECTRIC VT-7—t-10, i-10 out put tubes—standard base</td>
<td>$2.50</td>
</tr>
<tr>
<td>GENUINE DE FOREST Transmitting Tubes shipped you direct from factory: 563-A, $30.00; 511, $30.00; 545, $37.75 (50 watt oscillators, modulators, etc.)</td>
<td>$31.50</td>
</tr>
<tr>
<td>Specification 552, $24.25 (75 watt oscillator and R.F. amplifier, low internal capacity.)</td>
<td>$36.00</td>
</tr>
<tr>
<td>Simplified mercury arc rectifier, filament 2.5 — plate 7500 volts</td>
<td>$2.50</td>
</tr>
</tbody>
</table>

MICROPHONES

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
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<tbody>
<tr>
<td>AMERICAN DOUBLE BUTTON, will respond to frequencies from 30 to 7000 cycles, low carbon bias.</td>
<td>$1.50</td>
</tr>
<tr>
<td>UNIVERSAL and GENERAL INDUSTRIES MICROPHONES, DESK STANDS AND MOUNTS— Write for special discounts.</td>
<td></td>
</tr>
</tbody>
</table>

SPECIALS

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRADLEYSTAD, type E110, current capacity 10 amperes, for transmitters</td>
<td>$9.50</td>
</tr>
<tr>
<td>WARD LEONARD—1460 ohm, heavy-duty resistor tapped at 6000, 6000 and 1600</td>
<td>$1.50</td>
</tr>
<tr>
<td>R.C.A. Power Rheostat, (heavy duty) will carry 15 amperes, for large tubes</td>
<td>$3.00</td>
</tr>
<tr>
<td>R.C.A. Rotary Grid Chopper Wheels, complete with bushing</td>
<td>$7.50</td>
</tr>
<tr>
<td>CENTRALAB Gain Controls for tone transmitters, 0-290000 ohms</td>
<td>$7.50</td>
</tr>
<tr>
<td>SAMSON 3000 Ohm double head set, sensitive on week code signals</td>
<td>$2.25</td>
</tr>
<tr>
<td>ELECTRAD Transmitting Grid-Leaks, center tapped 3000 ohms—141 mls.</td>
<td>$2.25</td>
</tr>
<tr>
<td>ELECTRAD Transmitting Grid-Leaks, center tapped 10,000 ohms—100 mls.</td>
<td>$2.75</td>
</tr>
<tr>
<td>AMERICAN 50 watt transmitting sockets, made from heavy baleen</td>
<td>$2.50</td>
</tr>
<tr>
<td>R.E.L. Frequency meters, separate unit for each band, accurate</td>
<td>$15.00</td>
</tr>
<tr>
<td>VIBROPLEX new and improved, direct from factory in red, green or blue base</td>
<td>$17.00</td>
</tr>
<tr>
<td>TELEPLEX with code learning tapes, shipped you from factory</td>
<td>$25.00</td>
</tr>
<tr>
<td>PILOT SUPER-WASP, D.C. kit, all parts complete for excellent receiver</td>
<td>$19.50</td>
</tr>
<tr>
<td>PILOT SUPER-WASP, A.C. kit, practically hum-less, for short waves</td>
<td>$34.50</td>
</tr>
<tr>
<td>PILOT Modulation Transformer No. 438, excellent for use with American mike</td>
<td>$5.00</td>
</tr>
<tr>
<td>PILOT Short Wave Plug in coils, set of five for all bands</td>
<td>$4.95</td>
</tr>
</tbody>
</table>

We also handle the products of the following nationally known companies and will be pleased to supply catalogs and prices on request: VIBROPLEX, AMERTRAN, GENERAL INDUSTRIES MICROPHONES, ELECTRAD, JEWELL METERS, R.E.L., FLECHTHEIM, DE FOREST, UNIVERSAL MICROPHONES, TELEPLEX CODE LEARNER, PILOT, ESCO GENERATORS, SAMSON AMPLIFIERS, NEW HAVEN ELECTRIC CLOCKS, KEN-WEL SPORTING GOODS, GEORGE W. WALKER MULTI-UNITS and many others.

We are pleased to announce the connection of Mr. Nat Pomoranz, W2WK, W2APD, formerly of the technical staff of Radio News with the American Sales Company. He will answer any of your technical questions free of charge.

AMERICAN SALES COMPANY  Dept. Q, 19-21 Warren St.  NEW YORK CITY
New England Division Convention

(Continued from page 18)

spot “in between times” during the two days of the convention.

With a good number of delegates registered and luncheon over, the gang adjourned to the Chamber of Commerce Building early in the afternoon for the formal opening of the convention. Mr. Perry T. Johnson, WIUS, President of the P. A. W. A., gave the address of welcome, and made every one feel at home. He then introduced Mr. E. L. Battey, Assistant Communications Manager, A.R.R.L., who gave a traffic talk. SCM Brown, W1AQL, was present, and on a suggestion of Fred Best, WBIG, discussed the possibilities of a Maine traffic net. WIANH, Route Manager, showed his scholastic training by drawing a free-hand map of Maine on the blackboard for the use of the SCM. (We could even determine that it was Maine, and not Utah. — E. L. B.)

After the traffic problems had been somewhat ironed out and plans made for the coming season, the A. C. M. displayed a Dynatron Frequency Meter, which he had brought up from Headquarters. Mr. L. C. Brown, W1AQB, who was scheduled for a technical talk was unable to attend, and while the committee was pondering as to whom they would get to fill in, Mr. Reginald Sherman, W1BJL, came forward and “saved the day” with a very interesting talk on screen-grid detectors. The remainder of the first afternoon was spent in hamfesteing and getting acquainted, and while the committee was pondering as to whom they would get to fill in, Mr. Reginald Sherman, W1BJL, came forward and “saved the day” with a very interesting talk on screen-grid detectors. The remainder of the first afternoon was spent in hamfesteing and getting acquainted, and it was not until about 7 p.m. that the bunch got together again at the Chamber of Commerce for the formal opening of the convention. Mr. Perry T. Johnson, WIUS, President of the P. A. W. A., gave the address of welcome, and made every one feel at home. He then introduced Mr. E. L. Battey, Assistant Communications Manager, A.R.R.L., who gave a traffic talk. SCM Brown, W1AQL, was present, and on a suggestion of Fred Best, WBIG, discussed the possibilities of a Maine traffic net. WIANH, Route Manager, showed his scholastic training by drawing a free-hand map of Maine on the blackboard for the use of the SCM. (We could even determine that it was Maine, and not Utah. — E. L. B.)

The weather was quite poor Saturday — in fact it rained practically all day. But that didn’t lessen the enthusiasm of the delegates “one iota.” The visits to WCSS and the Telephone Company, which occupied most of the morning, were interesting to all.

Following a luncheon recess, the fellows again assembled at the Chamber of Commerce for the
Every Item Brand New and Guaranteed — Satisfaction or Money Refunded

LIMITED SUPPLY! ACT NOW!

NEW BEFORE! NEVER AGAIN!

THE EMBLEM OF
PERFECT SOUND

PHOTOPHONE
SOUND EQUIPMENT

RADIO ENGINEERS
SOUND ENGINEERS
EXPERIMENTERS
SERVICE-MEN & HAMS

- Brand new in original cases. Field Supply for 110 V. AC Operation. $6.50 extra.

- Regularly $110.00

- Model II
All Electric
CAPEHART Orchestrope Models are the DeLuxe Line of this noted family. They have the finest materials throughout, exquisite cabinet design, and play 28 records on both sides continuously and automatically.

- Normally $1260

- $290

- SPRAGUE
8 mfd electrolytic condensers. Normally $2.50

- $1.35 ea.

- Brand new in first class condition and fully guaranteed.

- Terms: 25%, with order, Balance C. O. D. or Sight Draft, Specify Express or Freight

- RAYMOND ROSEN & CO., INC.
(Sound Amplification Division)

Control Does It

The arrow sinks into the gold. Muscle alone won't do it. It's all in the CONTROL. Centralab controls give a smooth, noiseless increase in volume ... in millions of receivers. Whether you buy or build a set, be sure it's Centralab equipped.

NOW ready ... the new VOLUME CONTROL GUIDE for Servicemen ... Send 25¢ in stamps for this informative booklet giving control data on all makes of old and new sets.

Centralab
CENTRAL RADIO LABORATORIES
Dept. 320-F, Keefe Ave. and Humboldt
Milwaukee, Wis.

A Condenser Microphone
For the Amateur and Experimenter
$75.00

Complete with 3 tested tubes, 5-ft. shielded cord and standard 5-prong plug and stand as shown. This is a special model we have developed. It embodies the same high quality and precision as our public address and broadcast station Microphones. The output level is well above the level of the best carbon types. No background noises. Unusual fidelity. Low upkeep cost. This item is priced net to the user and is sold on a money back satisfaction guaranteed basis. Order from this ad or write for further information.

Astatic Microphone Laboratory
21 Olive Street Youngstown, Ohio
Two Way Radio Link Never Interrupted—
Capt. Yancey's Radio Makes New Records—
Here’s the Story behind These Headlines

The Yancey plane (ESCO equipped) in its non-stop flight to Bermuda maintained direct two way communication with New York. Darkness forced the plane down a little short of its goal. The plane floating on the sea remained in communication with New York.

Later, on its “Good Will” flight to South America the Yancey plane, on the ground at the Canal Zone, maintained two way communication with New York. Zeh Bouck, Radio Operator, said—"I believe this is without doubt a record for Airplane transmission, and it shows very clearly what we could have done had we been forced down in some of the jungle over which we have flown during the last few weeks."

And on July 1, this last record was broken — the Yancey plane, on the ground at Buenos Aires, communicated uninterruptedly for more than an hour with the New York Times Station, 8838 miles away.

The Yancey plane was equipped with an “ESCO” wind driven generator to supply radio power while flying, and a battery operated “ESCO” dynamotor for ground work.

“ESCO” has a very complete line of wind driven generators, and dynamotors for airplane service. Let “ESCO” Engineers help you with your power supply for communications.

ELECTRIC SPECIALTY COMPANY
225 SOUTH ST.
STAMFORD, CONN.
Manufacturers of motors, generators, dynamotors and rotary converters

QUARTZ OSCILLATING CRYSTALS
Scientifically prepared for highest power and Unconditionally Guaranteed
1 In. Square sections, return to your specified frequency, supplied complete at the following prices:

- 40-75 meters $26.00
- 75-100 meters $12.50
- 100-200 meters $9.00
- 200-400 meters $4.00
- 400-600 meters $1.00
- 600-1000 meters $0.50
- 1000-2000 meters 3.00

Sections of any practicable dimensions made to order
(J. T. Rooney, B. Sc., 4 Calumet Bldg., Buffalo, New York
"A pioneer crystal grader"

Do you know that the latest Radio Amateur’s Handbook is available in bound form — $2.00 per copy, postpaid. When ordering a copy of this new seventh edition, look at your present copy and determine if you want your next copy in more permanent form.

TRANSFORMERS
Guaranteed — Mounted — Complete
1 EVA 3 phase 1500-2000 v. each side $49.00
700 watt 1000-1500 each side 14.50
200 watt 500-750—1000 each side 6.00
Auto-Transformers, Chokes, Polyphase and 25-cycle Transformers. Add $2.00 for mil. winding.
J. W. TGES FRANK GREBEN
1927 So. Poirier Street, Pilsen Sta. Chicago, Il.

SPECIAL
Short Wave and Ultra Short Wave Equipment of all types and design built to order. Send your specifications.
WIRELESS EGERT ENGINEERING, INC.
179 Greenwich St., New York City

PACENT
Duo Lateral COILS
Radio engineers and laboratories with real records of accomplishment use Pacent Duo Lateral Coils. They come in all standard turn ratios.
PACENT ELECTRIC CO., INC.
91 Seventh Avenue
New York City

Say You Saw It in QST — It Identifies You and Helps QST
Volume Level Indicators

Continued from page 34

it is 7 or 8, the grid bias control is varied until it returns to 5. Now the grid bias should be checked to see if it differs greatly from 1.1 volts; if so, the characteristics of the triode have changed, and it should either be replaced by one of similar characteristics, or the volume indicator should be recalibrated. The characteristics of some tubes are unsteady and abnormal at first but after “warming up” will become normal.

After initial conditions are fairly well duplicated, the volume indicator is ready for use at any later time.

The needle of the plate circuit meter will now swing with the amplitude of the audio frequency current when the microphone is spoken into. The gain control should be adjusted to that value which will allow the needle to swing into the high amplitude region (between 50 and 60 in our example) about once every ten seconds. Under these conditions, maximum possible percentage of modulation will be produced without ever introducing distortion. However, the needle must never be allowed to swing beyond the reading representing the maximum permissible volume level.

There is evidently nothing strange or complex about the volume level indicator. It is merely a means of indicating visually the instantaneous volume level, utilizing principles well known to
AMATEUR BANDS:
Winter is coming, and no doubt you are going over your transmitter removing those weak links so as to get the most possible efficiency from your set.

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)
- 7000 to 7300 Kc band ......... $40.00 (unmounted)

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 $35.00. 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 $100.00. Two matched crystals, ground 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 five 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 0.3%. All crystals guaranteed and prompt deliveries can be made. A trial will convince you.

SCIENTIFIC RADIO SERVICE
"THE CRYSTAL SPECIALISTS"
P. O. Box 86 Dept. P-12 Mount Rainier, Maryland

BIG SCOOP — Mesco Keys
Standard for 20 years. Lists from $3 to $6. We just bought a big quantity. Better get them while they last at these special prices.

- No. 101 ............... 95c
- No. 103 ............... $1.75
- No. 244 ............... 1.75

MESCO Half Inch Spark Coil
The coil of a 101 uses. Can be used as a peaked choke. For fixed condensers, etc. Many other uses will suggest themselves to the experimenter. Reg. $7. Special $1.50
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 .................................. 10.00
7000-7300 kilocycle band .................................. 29.00
One inch oscillating blanks .................................. 4.00
Plug-in dust proof mounting as illustrated above ........... 6.00
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.
Grinding instructions furnished with crystal blanks.
You may order direct from this ad C.O.D.

FREE
Send name, no obligation, for full information on crystals, holders, blanks, heater ovens, etc.

“CLEAR AS A CRYSTAL”
AMERICAN PIEZO SUPPLY COMPANY
1101 Huron Building Kansas City, Kansas
Specialists in frequency precision

The “Burbank” Idea in Slide Resistors!

WE HAVE taken the best points of the slide resistor — and “grafted-on” the best points of the vitreous enameled resistor. The result is a new product, one for which there is a genuine need and one which engineers have been quick to adopt. The HH Enamed Slide Resistor is carefully wound on a refractory tube; then coated with a hard, highly insulating and heat resistant vitreous enamel. An exposed track on one side contacts with an adjustable slot — one of three optional types. The wire, firmly embedded in the enamel, can be neither moved nor torn. This improved unit now gives you convenience, flexibility, ruggedness and high wattage — all in one. Detailed information will be sent promptly on request.

ENAMELED

HH SLIDE RESISTORS

HARDWICK, HINDLE, INC.
218 Emmet St. Newark, N. J.

The Vanalta Division Convention
(Continued from page 30)

Following the toast to His Majesty King George V, Mr. John Lawrence, VE5CO, president of the V.S.W.C., introduced Mr. Butterfield, VE5AP, as toastmaster. The speakers were led by Mr. Huber, of the A.R.R.L., in an explanation of why the radio amateur has problems, describing how well the League is prepared for meeting them at present, and making a plea for sober reflection by all on the dignity our hobby has reached and the need for a continuation of its present high status and good leadership. Mr. J. F. Wilson then welcomed all visitors and proposed a toast which was answered by King Cavalsky of Vancouver. The remainder of the evening was spent in conducting liars’ and beauty (the latter being won by Mr. Leonard de Geus, W6BTZ, with a full beard) contests, and awarding of prizes.

Sunday’s activities began at 9:30 a.m. with visits to the government radio station, V.AK, on Gonzales Hill, and to H. M. C. S. Naden, the Royal Canadian Naval Barracks at Esquimalt, where the unique privilege of inspecting CKN was afforded kindly by Chief Operator Fox. In the afternoon a caravan of amateur-laden autos wound through the picturesque countryside of southern Vancouver Island to the famous Mr. Butchart’s sunken gardens. In the evening a visit was made to radio broadcasting studios of CFCT. The Cleveland Air Race film was shown at 8 p.m., and later, after more contests and more prizes — thanks to the generous manufacturers — the “gang” set out for home not only with the satisfaction of having attended a thoroughly enjoyable outing, but with the knowledge that the Times reporter (who had attended every session) had been converted from a BCL into an amateur!

In the mind of the writer the Vanalta Division Convention of 1930 will remain long as the most enjoyable affair he has attended. There are certain advantages in a Canadian convention, not the least one being the fresh viewpoint a Yankee inevitably acquires. We have a great deal to learn from our neighbors next door, and from this consideration the question naturally arises: “Why don’t we hold more conventions in Canada?”

— L. R. H.

Strays

A. R. R. L. members using League stationery frequently fail to realize that no address of any sort is printed on the letterheads. Your complete address is a very essential part of the letter — station calls are not sufficient. This is particularly important when ordering apparatus from QST advertisers. The omission of a complete address works to your disadvantage and causes needless correspondence.
Install Tone Quality in unsatisfactory sets by replacing inferior, obsolete, or worn out units with THORDARSON REPLACEMENT TRANSFORMERS...it is what the set owner hears...the improvements in audio amplification...that makes pleased customers.

THORDARSON Replacement Transformers are constructed according to the true high standard set by all THORDARSON apparatus...and they are almost universal in application.

A small stock of THORDARSON Replacement Transformers enables you to recondition a wide variety of sets, with minimum investment in stock. For sale at all good Parts Dealers everywhere.

SEND TODAY for the new catalog of Replacement Power and Audio Transformers.

PRIDE In your station, in its records, its equipment, that's the predominant amateur trait. A power plant designed specifically for amateur transmitting service, to QST specifications, transformers and reactors built with from two to five times the iron, copper and insulation allowances found in commercial practice, will give the XMTR and operator a chance to do their stuff. Latest data sheets are eye openers, get yours.

Rectifier Engineering Service 4837 Rockwood Rd., Cleveland, Ohio

ELLIS MICROPHONES Models 191M and 191N $5.00 each. Approved in many high grade Amateur Manufacturers in the country. Used by Broadcast Stations and Public Address Systems everywhere. Complete line of stands, cords, etc. Write for descriptive literature and name of nearest jobber.

ELLIS ELECTRICAL LABORATORY 327 W. Melrose St. Chicago, Ill.

U. S. NAVY SURPLUS

A small stock of THORDARSON Replacement Transformers enables you to recondition a wide variety of sets, with minimum investment in stock. For sale at all good Parts Dealers everywhere.

SEND TODAY for the new catalog of Replacement Power and Audio Transformers.

STUYVESANT ELECTRIC CO., Inc.
53 Walker St. New York
FREE CATALOGUE
LATEST RADIO BUYS AT BIG SAVINGS WRITE-TODAY

ON THE PACIFIC COAST IT'S RADIO SUPPLY

Everything for the Amateur and Experimenter

RADIO SUPPLY COMPANY 912-14 So. Broadway Los Angeles, Calif. W6FB1 Located in Building

ON THE PACIFIC COAST IT'S RADIO SUPPLY

Everything for the Amateur and Experimenter

RADIO SUPPLY COMPANY 912-14 So. Broadway Los Angeles, Calif. W6FB1 Located in Building

Say You Saw It in QST — It Identifies You and Helps QST
RIGHT NOW!
is the time to gather up the old tubes and
send them in to be revived. Greet your old
friends across the sea with a new and better
wallop such as can only be obtained from
National reconditioned tubes.
Revamp your rectifier system with Recto­
bulbs and play Safe. Their steady and pure
DC will make the RI your friend.
We are ready for prompt attention to all
orders. It is up to you to start things moving.
Type R3 Rectobulbs .................. $10.00
Type R81 Rectobulbs ............... 7.00
N65 Screen Grid ..................... 12.50
NC10 Power tube ..................... 9.00
REPAIRS
50 watt Thoriated type ................ $19.00
250 watt Thoriated type ............. 60.00
75 watt Thoriated type ............... 16.00
WE211 .................................. 15.00
WE212D ................................ 35.00
All work guaranteed against defects
Try Our Service!

NATIONAL RADIO TUBE CO.
3420 18th Street San Francisco, California

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Midwest Division Convention

THE Midwest Division Convention held
under the auspices of the Kaw Valley Radio
Club on September 6th-7th at Topeka,
Kans., was another one of those affairs which
makes a fellow wish he’d started the habit of
going to that particular section of the country
long before this. It also demonstrated the promis­
ning possibilities of Saturday-Sunday conventions;
other convention committees may well consider
this, since it is undoubtedly easier for many fel­
 lows to get to a convention which begins on
Saturday than one which starts on Friday.
The convention’s sessions were held in the
rooms of the Topeka Chamber of Commerce,
with plenty of technical dope being given by a
list of speakers including R. G. McCurdy, of the
Graybar Electric Co., who used up all the loose
ephemera in Topeka in telling of the total amplifica­
tion which took place over the transatlantic
phone circuit; P. H. (Port) Quinby, W9DXY,
former director from the Division; A. W. Hodge,
W9CFL-NDP and F. H. Smith, who spoke on
crystal control, and “Jim” McCormick, W9BHR,
who presented his latest frequency meter.
The non-technical discussions included a talk
on League affairs by the assistant secretary of the
League, A. L. Budlong; a discussion of the Army­
Amateur network by Lt.-Col. W. F. McFarland,
W9EVT, the assistant adjutant general of
Kansas; and an explanation of the Volunteer
Naval Communications Reserve by Lt.-Cmdr.
R. H. G. Mathews, who, as usual, showed up
from Chicago with a corps of examining officials
and doctors and ran through about a dozen
recruits. We must not omit, either, the popular
editor of “Grandpa’s Regret,” H. W. Kerr,
W9DZW-GP, who came down from Little Sioux,
Ia.

Twelve of thirteen candidates for amateur
licenses were successful, and H. T. Gallaher, the
“R. I.” from Chicago, announced that one of
them secured an extra-first ticket.
Not content with one banquet, the K.V.R.C.
provided two at Topeka. The first, held Saturday
night prior to an evening visit to W1BW, was
provided through the kindness of the Capper
Publications. The second, which was the formal
convention banquet, was held Sunday afternoon
at the Hotel Jayhawk and was followed by con­
tests and prize awards which kept the 90-odd
amateurs in good humor for most of the after­
noon. A huge number of prizes was distributed
through the kindness of various manufacturers,
with Leo W. Born, W9FTY, capturing the main
one by popular vote, the prize being a $200 ten­
months’ scholarship offered by one of the leading
radio schools.
President John Amis, Secretary Frank Tiffany
and other members of the Kaw Valley Radio Club
are to be congratulated for a highly successful
and interesting convention; it is safe to say that
all those who attended this year will look forward
to the announcement of next year’s Topeka
gathering.
1. The Vitrohm Plaque Resistor, non-inductive and non-capacitative, is ready. Standard resistance value 5000 ohms, handles the grid of a 50 watter and the price is only $2.00. Get the dope today.

2. If you haven't received your supply of the snappy new Q.S.L. cards, write for them today. Your call letters will be imprinted in outline letters. There is no obligation for this service.

3. We have a very important matter to discuss with Radio Club Secretaries. Write at once giving the name of your organization and number of members.

Club Members — if your secretary misses this, tell him to drop us a line.

Ward Leonard Electric Co.
Mount Vernon, N.Y.

ALUMINUM BOX SHIELDS
Beautiful Silver Dip Finish
Any Size to Order
Frequency Meter Box 14" x 9" x 7" high
Monitor Size 10" x 6" x 7" high
Stage Shield 9" x 5" x 6" high
1 ½" plug-in forms, 44 grooves to the inch, either UX or UV
prong, for that new tuning, only 40c

Mesco Telegraph Key 90c, Sprague .25 Condensers 90c.
New Test Lamp, 100 to 550 volts. Indicates polarity, $1.00.
.001 Variable Condensers, $1.25
Terms include postage.
Blander, The Radio Man, Inc.
99 Cortlandt Street
New York City

TRANSMISSION CONDENSERS
Send for interesting data and price sheet on Transmission Condensers with working voltages up to 3000 D.C. for use with the following tubes: 203A, 204A, 210, 500W, 851, 852, 860, 865.

CORNELL ELECTRIC MFG. CO.
Long Island City New York

Radio Operators Wanted
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.

Write now for free booklet on "Opportunities in Radio."

WEST SIDE YMCA RADIO INSTITUTE
111 West 66th Street, New York Established 1910
HOT CATHODE MERCURY VAPOR TUBES—with low and practically constant voltage drop. For pure D.C. power supply. Perrymun Rectifiers P.R. 872 (illustrated) and P.R. 876 are now very popular with transmitting amateurs everywhere. Extra long life due to rugged construction, low-operating temperature of oxide coated filament and low voltage drop.

PERRYMAN ELECTRIC CO., INC.
4901 Hudson Blvd., North Bergen, N. J.

Attractive prices offered to licensed amateurs

WIRELESS EGERT
179 GREENWICH ST., NEW YORK CITY

The Oldest Radio House

"Reliability with a Square Deal"

SPECIALS for THIS MONTH

866 Filament Transformer 2.52 V. — 10 A. $5.45 50 Watt Sockets. Excellent rugged construction. $2.45 Power Transformer, Dongan 750-0-750 2 Windings 7.5 Volts. 1 Winding 2.5 Volts. 1 Winding 15 Volts $5.75 Wireless Egert Engineering Calibrated Wave-meter 17 to 200 M. $12.50 8° Pyrex Insulators $1.19 Sangamo 5000 Volt Blocking Cond. .001-.1002 $1.49 Phosphor Bronze No. 8 regulation ship antenna same as specified for U. S. Navy, per hundred foot $3.35

We distribute the following lines


Special discounts on every standard item.

Write for Net price. Mail Orders filled the same day received. Must be accompanied by 10% cash of order plus postage charges.

NAA is now broadcasting cosmic data collected by Science Service, Inc., in cooperation with the American Section of the International Scientific Radio Union, at 4:00 p.m., E.S.T., daily. The frequency is 18,000 kc. Transmissions, which are in a special code, include information on terrestrial magnetism, solar constant, sunspots and auroral displays. Plain English will be used when extraordinary phenomena demand it. Information on terrestrial electricity, radio phenomena and solar activity will be added if a demand arises.

The gang at WHEC got this one from a helpful BCL the other day: "Before blaming the tubes in your radio try changing the fuses on the circuit leading to your receiver. The fuses may not be shot but too weak to carry reception." When the line voltage is low don't call up the power company — put in bigger fuses!

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF QST, published monthly at Hartford, Conn., for October 1, 1930.

State of Connecticut

County of Hartford

Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. 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:


2. That the officers 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 unincorporated association, has no stockholders, mortgagees, or other security holders.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent., or more of the total amount of bonds, mortgages, or other securities are: 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 names of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements, embracing affidavit's full knowledge and belief as to the circumstances under which such 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 affidavit 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 1st day of October, 1930.

Alice V. Scanlan.

(My commission expires February, 1934.)

Say You Saw It in QST — It Identifies You and Helps QST.

90
RESISTORS

Precision Wire Wound for Vacuum Tubes

Extremely low factor of inductance and distributed capacity, the exclusive moulding process eliminating the contact troubles of spot welding and soldering. Values 1 ohm to 2½ megohms.

Tolerances, 1%, ½ of 1% or ¼ of 1%.

Two Valuable Booklets
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Royal-Eastern's New 1931 General Wholesale Trade Catalog has been compiled to place before you a most comprehensive line of high-grade nationally advertised merchandise, at lowest wholesale prices.
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With our large warehouses and a background of thirty-three years of service to the trade, we are in a good way to render the same service to you as has been our custom in the past.


HILET

Engineering Dept. Ludlow 7738
COLUMBIA SPECIALTY CO.
1038 Longwood Avenue
Bronx, N. Y.

SHORT WAVE ENGINEERING

As the first of a line of engineering products, we offer the type WM-1 wavemeter and the type MM-1 Monitor. They are custom built to strict laboratory standards and embodying designs best suited for accurate and precise measurements. Both of these units are sturdy built into aluminum cases and will withstand a great deal of hard rugged use such as is encountered in field work. The wavemeter has a large micro-vibrator dial for very accurate readings. A very sensitive neon bulb is used as an indicator which replaces the old-fashioned flashlight bulbs. Coils are furnished with graphs for the 20, 40 and 80 meter bands. Other frequencies will be supplied at an additional nominal cost. Accuracy is within 1%. The type WM-1 wavemeter, complete with graphs and three coils, sells for $12.50. The MM-1 monitor has the same micro vernier and aluminum case. It is complete with batteries, X99 tube, and coils for the 20, 40 and 80 meter bands. An instrument that every up-to-date radio station should have. Price complete, not calibrated $12.50. Price, calibrated with graphs, $16.00.

We are, at present, working on an all electric S.W. receiver which will be announced in next month's ad.

HILET ENGINEERING CO., Orange, N. J.

Say You Saw It in QST — It Identifies You and Helps QST
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 it.

We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc., any special apparatus, dedicated to your order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Essex Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

CRYSTALS with a guarantee of complete satisfaction, 7000 kc, $15; 3500 kc, $12; blanks, $4. WURD, Herbert Hollister, Edgewater, Conn.


G.E. 1000-watt transformers, 1100-2200-4400 each side center tap, $65 to $85. Naval and Japanese, Guaranteed. 25c. per item, dolly bid, your order is present. Telephone, Radio Laboratory, 76 S. H., Cincinnati, Ohio.


A.K.L.L. sweater emblems should be worn by all League members. They are made of soft black felt letters and embroidered symbol. Only $1.00. Money order or currency only accepted, Eric Ro mom, 125 Jefferson Road, Webster Groves, Mo.

WUSC for QSLs. Nuff said.


WANT used motor generator that would step up voltage of a 1200 bolt house, d.c. to 800-1000V. M. P. Bolleman, Plainview, Nebraska, Route 3.


SALE — R.C.A. Duo Recton Eliminator, 155 volt, in perfect condition, also one 30-360 volt CQ507 dynamotor with switch. Best offer, Want Teletype or what have you? Frederick Horbelt, Washington St., Millville, N. J.


BARGAINS — in everything from solder to television. Stamp brings list. R. Stowell Ware, Lewiston, Maine.


CRYSTALS — guaranteed correct frequency to 1% 3500 kilocycle. $7.50, 1750 kilocycle, $5.00, blank, $3.00. Will trade. WUDL, 22 W. 73rd Terrace, Kansas City, Missouri.

GLS cards, two colors, $1 per hundred. Free samples. W6DTRY, 207 Parker Ave., Buffalo.

SHORTCUTS to Code Reading Speed—last time tested blank. W6BQK, Dundee, N. Y.

TRADE — Guaranteed all crystals. Guaranteed correct frequency, 5-kc. to 7000-kc. $5. We accept no other plate source even approaching its performance, low heat ultimate cost, no other plate source even approaching its performance, low heat ultimate cost.

FACTORY machined special sockets for WE211D tubes, $3. Cash with order. John Matthews, Newton, Iowa.

NATIONAL, 7000 kc., $8. Dubbioni made 100 volt 4 mid. $1.50, 2 mid. $1.50, one millimeter blanks, $1.26. We accept no other plate source even approaching its performance, low heat ultimate cost.

SILVER Marshall 737 Rearcat A.C. short wave receiver, $100, 160 meter blank, $25, 500 kc. blank, $15, 14,000-ke. baud, $7.50. We accept no other plate source even approaching its performance, low heat ultimate cost.

SELL Silver Marshall 737 receiver 14 to 600 meters, $25. 7.5 watt xmitter, $12.50, 15 watt xmitter $15. Free list. W2CIT, 26 W. 73rd Terrace, Kansas City, Mo.

TRAILING — Guaranteed excellent oscillators. One inch square sections of your approximate specified size. Special prices, 5000 kc. band, $9.00, 7000 kc. $12.00. Frequency, 2%.

POWER CRystals — Guaranteed excellent oscillators One inch square sections of your approximate specified size. Special prices, 5000 kc. band, $9.00, 7000 kc. $12.00. Frequency, 2%.
TRANSMITTER described in December QST, $12. John Corbet, 34 Fox St., Dorchester, Mass.

TRANSMITTER WE212D tube—want AG superwap with power pack for 45 tube Kennedy Universal type 110, 50 watts. Radio W1ASG, Belfast, Maine.

NEW WE211E fifty watters $18; Western Electric 387W Double-button tube $5. 250 watt $9.50. GE 212. 1050 volts. $12.50. Powers. Control $4.50. Special $4.50. Rare bargain so hurry! 8 mid. Block sent prepaid upon receipt of order.

SELL or trade: WE211D, 212D; RCA 382, 383-A, 384-A; power Xtal: 210 Xmitter: 500 V. MG; 800 V. MG; dynamotors; Omnigraph; other apparatus. WlARA, Butler, Mo.

FILTER chokes—new, 15 Henrys, 120 mills, $1.50. W8DAA, Robert Thompson, Bay City, Michigan.

WANTED—complete fifty watt transmitter and receiver to buy on installment plan. Good references furnished. Joe Brooks, Magnolia, Okla.

CONDENSERS 10 mfd. at 1000 V., working voltage 600, 5000 Megohms per mfd. 8 mfd. sections tested at 2500 volts; rated working voltage 8000. mounted ready to use. 250 watt 550, 750 volts each side center, $14.50. 250 watt 550, 750, 1000 volts each side center $14.50. 250 watt 550, 750, 1000 volts each side center $10. For power transformers. Center tapped, 5000 volt insulation. 2 ½ volt 10 amperes. $3.75; 7½, 4 ¾ amperes, $3.50. 10 volt 6 amperes. $3.50. 10 volt 10 amperes. $4. Electric power transformer 3500 volt, working voltage 5000, 3-phase drive motor generator 600, 2-4-6-8 mfd $6.75. GE 314 D mfd. 1000 volt unmounted filter condensers $17.50. 2 mid. 750 volt 757. Postage extra. Electron Labs., 584 N. Randolph St., Phila., Pa.

SELL—transmitter described December QST with filter, less $210, $13.50. Trade 32 V d.c. 16 inch oscillating fan for UX832 filter, or parts.

AERO plug-in units, $4.50. Four new UX210s, $6.25. Five Navy watts $4.50. WAx6EE.

NEW low prices on type 866 mercury tubes—firsts $6.00 each. Seconds (eight imperfections) $4.00 each. Seconds guaranteed to work perfectly. New WE211D $12.00. E. Ewing, Jr., 29 So. LaSalle St., Chicago, Ill.

6000V. 12000W. 3-phase drive motor-generotor $1500.00. 3000V. 6000W. 3-phase drive motor-generator $750.00. 5000V. 5000W. 1-phase drive $118.00. 1500V. 4000W. 3-phase drive $125.00. 1000V. 3000W. $95.00; 1000V. 2500W. $85.00. Queen City Electric Co., 1734 Grand Avenue, Chicago.

Q R A SECTION

90 c. straight with copy in following address form only:

W1AZL—Joe A. Mignin, 147 Ames St., Brockton, Mass.
W2CIV—George Rullis, Jr., 166-287th Ave., Jamaica, N.Y.
W2CMW—William James Petit, 1322 Morris Ave., Bronx, N. Y.
W5YV—George W. Shields, 2794 Bedford Ave., Brooklyn, N. Y.
W5BQW—W. U. Beasley, P. O. Box 110, Muskogee, Oklahoma.
V1YH—Thomas A. Archer, Verona, Bank-Hall Road, Baraboo, Wi. L.

WMXK
A.R.R.L. Headquarters
R. B. Parmenter, Chief Op. "rp"

The following calls and personal sinses belong to members of the A.R.R.L. Headquarters gang:

WIAKW—W1KPD Clyde J. Houlahan "chb."
WIBAW—W1BAP R. B. Beaslen.
WIBDL=W1XLF E. F. Handy "fh."
W1C8D=W1K81 Dan. B. DeSoto "de."
W1CIJ J. J. Lamb "jim."
W1DF Geo. Grammar "ig."
WIEH K. B. Warner "kb."
WIES A. A. Hebert "ah."
WIFL=W7RJ G. Donald Reserve "dm."
W1SR=W1RZ6 C. C. Kodimom "rod."
W1UE E. L. Battey "ev."

ATTENTION!

The new, second edition of our Amateur catalogue will be oil press shortly. It will contain the most complete list of hi-fi equipment that it is possible to assemble. Everything that you may need will be included in it.

Our old customers will receive additional sheets so that the catalogue they already have will be up to date.

Let us put you on our mailing list for one of these free, loose-leaf catalogues.

Just send us your name and address.

218 Chestnut St.
HALL'S Harrisburg, Pa.
To Our Readers who are not A.R.R.L. members

WOULDN'T you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of QST you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of this issue. We should like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio. You will have the membership edition of QST delivered at your door each month. A convenient application form is printed below — clip it out and mail it today.

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

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

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

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

Thanks
Radio needs men just like you. Thousands of opportunities are now open for fellows who already know something about radio... who “think” radio, who “play” with radio, men who are “radio-minded”... radio amateurs! You, too, can use the knowledge you already have as a stepping-stone to success in radio. All you need is a little commercial training in order to make good in this fascinating profession. Others have done it and so can you. RCA Institutes actually trains you for success. It gives you the practical as well as the theoretical knowledge... the “how” as well as the “why” of radio. You study under the direction of nationally known experts... men who have made good in radio and can show you how you, too, can make your mark in this, the fastest-growing industry in the world today.

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Radio needs you. Never before has there been such an opportunity for rapid advancement. On ship or shore, the constant demand is for men... more men... trained men! Large broadcasting stations, manufacturers, dealers, as well as steamship companies are continually asking for men who have the knowledge and the confidence to hold a well-paid position in radio. You, too, can now get that knowledge...
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Say You Saw It in QST — It Identifies You and Helps QST
The New A. C. Traffic-Tuner

**NATIONAL A. C. THRILL-BOX SW5**

Many new features, not previously found, have been developed by NATIONAL co. Engineers for this remarkable all-purpose, high-frequency receiver — assuring a high degree of trouble-proof operation, a continuous tuning range, equal adaptability to phone or C. W., and absence of hum.

**Equally Effective on Phone or C. W.**

**THE R. F. TRANSFORMERS**
Standard set of four pairs. Covers 21.2 to 2.61 m.c. Special coils available for 33-21.2 m.c. and 2.61-1.5 m.c. ranges. R-39 forms giving low loss with high mechanical stability. Blank forms available for experimental use.

**THE TUNING CONDENSERS**
New NATIONAL model SE — special H. F. variable condenser with insulated main bearing and constant impedance pigtail — 270 degree straight line frequency plates. This new design makes gang-tuning possible on short waves.

**THE POWER SUPPLY**
A separate and specially designed unit made with filter sections for humless high-frequency operation. 180 volt B, 2.7 volt filament supply. Equipped with cord and soft rubber covered connecting plug.

Licensed under R C A Patents

**A MECHANICALLY and electrically stable true A. C. High-Frequency Traffic-Tuner and Receiver for amateur use. Will work with different sorts of antennas without readjustment except of antenna trimmer. Once trimmer is set, Thrill-Box tunes and logs with true single control. Extremely simple to operate. 1080 dial degrees available between 21.2 m.c. and 2.61 m.c. Easily adapted to still wider spreading of bands, if desired. Works down to 33 m.c. Very smooth sensitivity control, no grunting, no back-lash, or clicking on higher frequencies. No hand capacity. DOUBLE SCREEN GRID, with 224 grid-leak detection. Push-pull audio, with special phone-jack before the last stage.**

*See Description of Transformers, Condensers and Power-Supply at left*

Also made in new Low-drain D. C. Model, using 230, 231 and 232 tubes. Easily assembled with genuine NATIONAL Radio Parts.

Write today for Amateur Bulletin No. 141-Q

NATIONAL RADIO PARTS

**NATIONAL COMPANY, INCORPORATED, MALDEN, MASS.**
Everything that you've wanted in a log is in the Official A. R. R. L. Log Book

New page design to take care of every operating need and fulfill the requirements of the new regulations!

New book form! No more fussing with binders, or trying to weight down loose sheets when the breezes blow!

New handy operating hints and log-keeping suggestions, put where they are always convenient!

Designed by F. E. HANDY
A. R. R. L. Communications Manager

There are 39 pages like the one above, 8 1/2" x 10 1/2", carefully designed to incorporate space for all the essential information you want and need to record about your station's operation. Thirty-nine blank pages (backs of the log pages) to be used for notes, experiments, changes of equipment, etc. Durable covers of heavy stock with space for your station call and dates over which the log entries extend. On the inside covers and first two pages are complete instructions on maintaining your log, convenient tabulations of the most-used Q signals, miscellaneous abbreviations, operating hints, amateur prefixes and signal-strength scales. The information you want, always at your finger-tips.

The new regulations require a log; a well-kept one identifies your station; a uniform series constitutes a progressive and permanent record.

We honestly believe the new Official A.R.R.L. Log Book is the best you've ever seen!

40 cents each    Three for $1.00
Postpaid anywhere

SEND IN YOUR ORDER TODAY!
American Radio Relay League, Hartford, Conn., U. S. A.
EXPERIENCE

We learn by experience! That's the reason Burgess Batteries are the regular choice of so many who want—or need—dependable dry battery service. They have learned by experience!

*Ask any Radio Engineer*

BURGESS BATTERY COMPANY

MADISON, WISCONSIN
New O.R.S. Certificate Issue Ready

OFFICIAL Relay Station appointees will be pleased to know that the new certificates of appointment are ready. The O.R.S. "tickets" have been completely redesigned and improved. A smaller, neater certificate will be issued to future O.R.S. and re-issued to every present appointee who makes application, providing he has honestly lived up to the terms of his appointment and will continue active in operating work this season. The new certificates will be distributed during the month of November from the offices of every Section Communications Manager.

Present O.R.S. certificates will automatically become null and void at midnight November, 15th. Appointees have been notified by mail approximately one month in advance of this date to give them plenty of time to make application to Section Managers to determine if they are in line to receive one of the new certificates which will be issued beginning November first.

Communications Department field organization has been altered. The new certificate is similar to the photograph reproduced herewith in general make-up. However, a magazine reproduction in black-and-white can hardly do justice to these blue bordered lithographed certificates printed on finest quality stock. Needless to say, the new "ticker" is very attractive. The new size will make the certificates easier to handle and to mount in a uniform arrangement with other station licenses and diplomas which are posted to show visitors and inspectors what is what about a radio station.

As may be noted from the text of the certificate, appointments in the future will be good for one year only from the date they leave the office of the Section Manager. In this respect they are somewhat similar to the familiar station licenses issued by the F.R.C. However, it is only necessary to return certificates at the end of a year to the duly-elected Section Manager. The appointment may be continued for another one-year period by a simple endorsement of the Section Manager, and thus proper action can keep appointments in effect indefinitely, a single certificate being good for five years if endorsed annually. Of course the official records of the S.C.M. must show reports made and activity to permit the S.C.M. to conscientiously endorse a certificate.

THE NEW OFFICIAL RELAY STATION CERTIFICATE

Now ready for issue through the office of the second S.C.M.s, this 8½" by 11" certificate, beautifully lithographed in blue, appoints qualified stations to the basic pool in our A.R.R.L. field organization. Are you in line for one of these?

As noted above, the entire design of the document which affords evidence of appointment to the basic office of our

See page six, any recent number of QST for a full list of Sections, Section Communications Managers, and addresses which will reach them and to which monthly activity reports and applications for O.R.S., R.M., G.O., and O.G.S. appointment should be sent.

QST FOR NOVEMBER, 1930
and continue it in effect. When stations transfer from one Section to another in the future, a simple endorsement by the new S.C.M. will continue appointments in effect provided the station record is certified by the Section Manager having previous jurisdiction.

A WORD ABOUT O.R.S. APPOINTMENT FOR THE UNINITIATED

To any station not in the existing Communications Department line-up at the moment a cordial invitation is extended. Find out more about this appointment from your Section Manager. Any amateur who has a station and equipment who wants to be heard and things on the air with his equipment will find it fairly simple to earn an appointment, but he must know the fundamentals of operating, as explained in brief in the Rules and Regulations of the Communications Department and more fully in The Radio Amateurs' Handbook.

While the basic activity followed from month to month is message handling today, just as it always has been since the inception of our A.R.R.L., Official Relay Stations activities cover a wider field. These stations are prepared for handling emergency communications. They cooperate with our government and different agencies in conducting experimental or operating tests of different kinds, send code practice lessons on voice and c.w. to assist beginning hams to learn the art of proficient and raise the code speed of others, participate in relays and contests arranged by the A.R.R.L. or held in cooperation with foreign amateur societies, and the like, Section Managers, Route Managers, and General Managers are all fellow members with the null—held O.R.S. appointments—and displayed special alertness and proficiency, winning a place in their respective fields by their interest, loyalty, and activity.

The A.R.R.L. Headquarters Department includes men interested in every type of amateur communication work. Official Relay Stations are, as the name implies, stations that can be absolutely depended on to see a hard job through—to deliver and relay accurately and promptly the messages that come their way—to hold their equipment in readiness for whatever opportunity for service to the public or to amateur radio that may come their way, whether a special emergency or in the line of ordinary operation. To be known as an Official Relay Station appointee is very much worth while. O.R.S. are the most active and the best regulated stations as far as compliance with regulations and standard operating practices are concerned. The appointment is highly significant since it puts the station owner in a special position as respects the various opportunities for service. The appointment certificate is the badge that shows that an amateur station has "arrived" in the dependable class.

WHY HOLD O.R.S. APPOINTMENT

Are you one of those fellows who get in on the interesting communication problem worked out with the Army Air Corps? Are you merely a curious who read about the activities in May QST? Do you get the quarterly bulletins with periodic timely data direct from Headquarters, and special information at other intervals when expeditions, trans-ocean flights using radio, "Arctic Patrol" work, etc. are in the wind? Did you ever wonder just how active stations all over the country are picked for work in special and important enterprises undertaken for the credit of the whole amateur fraternity? Perhaps the reason you never got in on any of these interesting and vital undertakings was because you were not lined up as O.R.S. Possibly there were other good reasons. At any rate it is true that when the A.R.R.L. is called upon to set up a special type of communication work we always turn to the O.R.S., records and files of information on the equipment of these stations first to pick the best men. If a scheme involves running communication or listening over a considerable section of territory (as, for example, our Arctic Flight), the obvious solution is only necessary to dig up maps, records of appointees filed by Sections, data on which stations are reporting greatest activity regularly—and invariably some O.R.S. gets the job.

Six weeks is required to report your work on time (the 16th) by mail. The supply of the new certificates sent Section Managers was a limited quantity.

F. E. H.

O.R.S. appointees are entitled to wear the distinctive blue A.R.R.L. pins, similar to regular membership pins except that they have a blue instead of a black background.

W1MK

A.R.R.L. Headquarters' Station W1MK operates on frequencies of 3575 kc and 7150 kc, Robert B. Parmenter, "RP," is the chief operator; his fist is familiar to most of the amateur fraternity. Occasionally other members of the Headquarters staff operate at W1MK. Their personal call signs may be found in the QST Section of QST.

Throughout the following schedules Eastern Standard Time will be used.

OFFICIAL AND SPECIAL BROADCASTS are sent simulaneously on 3575 kc and 7150 kc at the following times:

5:00 p.m.: Sun., Mon., Tues., Thurs., and Fri.
10:00 p.m.: Mon. and Fri.
1:00 p.m. (midnight): Sun., Tues., and Thurs.

GENERAL OPERATION periods have been arranged to allow everyone a chance to communicate with A.R.R.L. Headquarters. These general periods have been arranged so that they usually follow an official broadcast. They are listed under the two headings 8-1000 and 1100-1300, whether the watch is devoted to listening on the 80-meter band or to the 40-meter band.

QST FOR NOVEMBER, 1930

II

3 Copies of the Rules and Regulations of the Communications Department contain the full text of the F.R.C. amateur regulations in so far as they pertain to the exchange of information on amateur operating procedure. A postal will bring you a copy free of charge.

QST FOR NOVEMBER, 1930

II
3,500 kc.

8:10 p.m. to 9:00 p.m. on Sun., Mon., Tues., Thurs., and Fri.
10:00 p.m. to 11:00 p.m. on Tues. and Thurs. (No OBC sent before these periods.)
12:00 p.m. to 1:00 a.m. (or later) on Sunday night (Monday morning).

7,000 kc.

10:00 p.m. to 11:00 p.m. on Sun., Mon., and Fri.
12:00 p.m. to 1:00 a.m. on the following nights (actually on the morning of the next Monday, Tues., Thurs., and Fri. (Only on Tues. and Thurs. does the OBC precede these periods.)

SCHEDULES are kept with the following stations through which traffic will travel expeditiously to A.R.R.L. Headquarters, on 3,500 kc.: W1ACI, W1BXR, WICTI, W1ZB, W2EF, W2WK, W3AVL, W3BWT, W3XCM, W9HX, NEDP; on 7,000 kc.: W75K, W9DQ and W9BCT.

QSL CARDS for W1MK should be addressed in care of A.R.R.L., 1711 Park Street, Hartford, Conn. A complete log of every transmission is made and W1MK is always glad to send any station worked a card, but frequent cards are lost when sent direct to the station at Hartford.

ELECTION NOTICES

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

The Sections, closing date for receipt of nominating petitions for the Office of Communications Manager, the name of the person proposed as candidate, and the date of expiration of his term of office. This notice supersedes the notice given hereafter.

In cases where no valid nominating petitions have been received from A.R.R.L. Members residing in the Sections in response to our previous notices, the closing date for receipt of nominating petitions is hereby extended. In the absence of nominating petitions from Members of a Section, the present incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filling of proper nominating petitions and the holding of an election by the members therein. Petitions must be in the hands of Headquarters or the League in Hartford, Conn., on or before noon of the date specified.

Due to the O'Brien Valley Section, nominating petitions are hereby solicited for the office of Section Communications Manager. The Section, the closing date for receipt of nominating petitions as A.R.R.L. Headquarters in Hartford, Conn., is the 15th of the month. Each Section must be sent to the Acting SCM listed on page 9 of the QST.

In Canadian Sections nominating petitions for Section Manager must be addressed to Canadian General Manager, Alex. Mcll, 161 Oliver St., Quebec, Que., Canada. To be valid such petitions must be filed with him on or before the closing dates named.

Section Closing Date Present SCM Present Term
Alaska Nov. 16, 1936 W. W. Wilson Mar. 28, 1939
Utah-Wyoming Nov. 15, 1935 P. N. James

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

You are hereby notified that an election for an A.R.R.L. Section Communications Manager, for the next two-year term of office, is about to be held in each of these Sections in accordance with the provisions of By-laws, 5, 6, 7, and 8.

The election will take place in the different Sections immediately after the closing date for receipt of nominating petitions. The results will be published in the QST of the month following the closing date for receipt of nominating petitions as A.R.R.L. Headquarters in Hartford, Conn., is the 15th of the month. Each Section must be sent to the Acting SCM listed on page 9 of the QST.

The following Sections are hereby solicited to file nominations for the office of Section Communications Manager:

Communications Manager, A.R.R.L.
1711 Park St., Hartford, Conn.

(Place and date)

Official Broadcasting Stations

CHANGES AND ADDITIONS

W6CQ (3700 kc.) Tues., Thurs., 7:00 p.m. C.S.T.
W1BKN (3700 kc.) Mon., Wed., Fri., Sat., 6:45 p.m. and 8 p.m.; (7200 kc.) Mon., Tues., Fri., 5:45 p.m. and 6:40 p.m.
W4AH (7150 kc.) Every day except Sunday, 4:00 p.m. E.S.T. (6325 kc.) Thursday 7:45 p.m.
W5ACY (7160 kc.) Tues., Thurs., 7:30 p.m. C.S.T.; Sun., 1:00 p.m. C.S.T.
W8BJ (3850 kc.) Phones and CW, Mon., Wed., and Fri., 10:30 p.m. P.S.T.

Wanted—Code Practice Volunteers

EVERY year at this season we devote space in this column to the listing of schedules of 1750 kc., amateur stations which broadcast information and code instruction to beginners. A new and revised

QST FOR NOVEMBER, 1939...
Newcomers to the amateur ranks are learning to send code practice messages, and during the last season many were able to bring their speed up sufficiently to enable them to secure licenses. The new men need code practice more than anything else, instruction in amateur operating practice, and two-way work with patience, experience operators as soon as they secure their licenses to increase their proficiency in using their stations. Thus it is that we are calling for more volunteers to send code practice in the 1750-kc. amateur band. Don't you want to help out by offering your station and a few hours of your time each week to these beginners?

Both new and experienced stations can engage profitably in broadcasting and two-way work for beginning "hams." Radiophone volunteers are really preferred, however, as using both microphone and key instruction can be given most efficiently to the listeners. Last season those who took part in this work had gratifying results and built up large audiences and many friends, who listened regularly as soon as the schedules were announced.

If you have a 1750-kc. phone or telegraph transmitter and can engage in this worthwhile work, please drop us a line at once, giving data on your exact frequency, hours of schedules, etc., and prepare to follow your schedule as soon as it is in print. We shall be glad to send you some mimeographed ideas and help which will assist you in putting this service over to those who copy your transmissions.

BEGINNERS, ATTENTION!

We are receiving many requests for information on how to go about securing amateur radio operators' and station licenses. The January issue of QST contained Part I of the article, "Passing the Government Examinations for Operator's License." The February issue contains the second part. These articles should answer practically every question you may have on obtaining licenses. Simple receiver and transmitter descriptions were given in November and December (1929) QST's, respectively. Back copies of QST may be procured from our Circulation Department for 25 cents a copy.

A list of the "volunteer stations" that are sending code practice and other information on the 1750-kc. band for your especial benefit appears elsewhere in this issue. This list has been recently revised and all schedules are effective November 1. If you receive the transmissions from any of these "volunteer stations" we suggest that you write to them and let them know how they are coming through and what help you are deriving from their efforts.

The Radio Amateur's Handbook contains just the information you need, if you contemplate building a station. We invite requests for any information you may want. Just drop a line to the Communications Department and we shall do our best to help you.

Traffic Briefs

ARMISTICE DAY MESSAGE

The annual Armistice Day message from the Chief Signal Officer to Army Amateurs will be broadcast from W1W1 on 6900 kc. and W3CXM on 3950 kc. on Monday night, November 11th. The message will be broadcast every hour, on the hour, from 6:00 p.m. until 2:00 a.m. E.S.T. Corps Area Control Stations will retransmit the message.

1750-KC. CODE PRACTICE VOLUNTEERS

<table>
<thead>
<tr>
<th>STATION</th>
<th>LOCATION</th>
<th>FREQUENCY</th>
<th>DAYS</th>
<th>HOURS (LOCAL TIME)</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1ABO</td>
<td>Pawtucket, R. I.</td>
<td>1750 kc.</td>
<td>Sundays</td>
<td>1-2 p.m.</td>
<td></td>
</tr>
<tr>
<td>W1AKY</td>
<td>Quincy, Mass.</td>
<td>1750 kc.</td>
<td>Wednesdays</td>
<td>7-8 p.m.</td>
<td></td>
</tr>
<tr>
<td>W1AOX</td>
<td>South Manchester, Conn.</td>
<td>1750 kc.</td>
<td>Mondays, Tuesdays, Wednesdays</td>
<td>10:30 p.m. on 7-17 p.m.</td>
<td></td>
</tr>
<tr>
<td>W3MM</td>
<td>Allentown, Pa.</td>
<td>1750 kc.</td>
<td>Fridays</td>
<td>7-15 p.m.</td>
<td>Phone and CW</td>
</tr>
<tr>
<td>W7ACD</td>
<td>Shelley, Idaho</td>
<td>1875 kc.</td>
<td>Saturdays</td>
<td>7-30 p.m.</td>
<td></td>
</tr>
<tr>
<td>W9APQ</td>
<td>Martinsburg, Pa.</td>
<td>1875 kc.</td>
<td>Tuesdays, Fridays</td>
<td>7-10 p.m.</td>
<td></td>
</tr>
<tr>
<td>W8UFS</td>
<td>Youngstown, Ohio</td>
<td>1750 kc.</td>
<td>Daily</td>
<td>7:30 p.m.</td>
<td></td>
</tr>
<tr>
<td>W94AN</td>
<td>Hewitt, Minn.</td>
<td>1970 kc.</td>
<td>Tuesdays, Thursdays</td>
<td>9:30-10 p.m.</td>
<td></td>
</tr>
<tr>
<td>W94FP</td>
<td>Tabor, So. Dak.</td>
<td>1750 kc.</td>
<td>Tuesdays, Thursdays</td>
<td>9:30-10:30 p.m.</td>
<td></td>
</tr>
<tr>
<td>W98SP</td>
<td>Gathe, Kans.</td>
<td>1795 kc.</td>
<td>Sundays</td>
<td>9-10 a.m.</td>
<td></td>
</tr>
<tr>
<td>W59BD</td>
<td>Memsha, Wis.</td>
<td>1715 kc.</td>
<td>Sundays</td>
<td>7:30 p.m.</td>
<td></td>
</tr>
</tbody>
</table>

All Army Amateur stations should copy the message from either: (a) one of the two Army Net Control Stations or (b) from their own Corps Area Net Control Station.

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Traffic Summaries

(AUGUST-SEPTEMBER)

<table>
<thead>
<tr>
<th>STATION (STATE)</th>
<th>LICENSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pacific led by Los Angeles</td>
<td>12,220</td>
</tr>
<tr>
<td>Central led by Michigan</td>
<td>4,871</td>
</tr>
<tr>
<td>Atlantic led by Maryland-Delaware-District of Columbia</td>
<td>2,175</td>
</tr>
<tr>
<td>New England led by Eastern Massachusetts</td>
<td>1,974</td>
</tr>
<tr>
<td>West Gulf led by Oklahoma</td>
<td>1,114</td>
</tr>
<tr>
<td>Hudson led by New York City &amp; Long Island</td>
<td>771</td>
</tr>
<tr>
<td>Northwestern led by Washington</td>
<td>721</td>
</tr>
<tr>
<td>Roanoke led by Virginia</td>
<td>644</td>
</tr>
<tr>
<td>Midwest led by Missouri</td>
<td>640</td>
</tr>
<tr>
<td>Dakota led by Southern Minnesota</td>
<td>522</td>
</tr>
<tr>
<td>Southwestern led by Florida</td>
<td>355</td>
</tr>
<tr>
<td>Rocky Mountain led by Colorado</td>
<td>207</td>
</tr>
<tr>
<td>Delta led by Tennessee</td>
<td>224</td>
</tr>
<tr>
<td>Ontario</td>
<td>93</td>
</tr>
<tr>
<td>Quebec</td>
<td>78</td>
</tr>
<tr>
<td>Vanalda led by British Columbia</td>
<td>35</td>
</tr>
<tr>
<td>Prairie led by Manitoba</td>
<td>21</td>
</tr>
</tbody>
</table>

578 stations originated 7013; delivered 5025; relayed 14,127; total 29,765. (86% del.)

Oh! Oh! Los Angeles again!! What Section will stop them?

A traffic summary showing the standing of the various Divisions for the past month is printed above. What place does yours take?
DIVISIONAL REPORTS

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Forrest Calhoun, W3BBW was a new ham this month. He moved into his new home during the storm which swept across Virgin Island and its neighborhoods. Communication was maintained with K4AAAN by the following stations, all of which deserve great credit: W3AJ, W3BWT, W3CDQ, W3LA, W3AQJ, W3ALN, W3AAB and W3WEL. The Western Ave crew is lead for this state. W3AFF is working a 7000-kc. Zep on 3000 kc. Hi, W3AAG has a fine bunch of sleets. W3AOQ is moving to Richmond. Sorry to lose you, OM. W3ZK, a new ORS, is using an 852 W3LA has moved to Texas. W3AWG is going to school at Swarthmore and will be heard from W3AJ. His brother will run his outfit. W3B1BW is on his regular 1:30-a.m. to 4 a.m. watch on 3500 kc. W3NYX see with all his 250 watts he can't get any traffic. Hi, W3PQ rebuilt his a.c. receiver. Delaware: W3A1W is the net control station for AA work. W3HC spent two weeks at Bethany Beach with the Del. National Guard as did W3A1W and W3ZN, W3AHJ reported. W3ALG complains of hot weather but by this time should cool. Will W3BAN please report? District of Columbia: W3CXL takes the lead from our old man high W3BWT, W3BWT rebuilt his 3600-kc. txmitter and has a new receiver. W3CAB did not do well during the storm and no reports from W3CPP, W3PM apologizes for no traffic due to testing MOPA. W3UT will be heard soon. Don't forget, gang, reports must be in my hands by the 15th at the latest. Now, on with the traffic.


SOUTHERN NEW JERSEY — SCM, Bayard Allen, W3ATJ — W3ATF is the lunch man this month, a steady station with W3Z3B at the National Guard Artillery Camp doing the txting — our old friend W3Z1 operated W3Z2B at N. J. W3Z2A is now B.S. W3A1A now flies more courses from Planes to ground station tower. W3ATJ reports 100% success. W3ATJ built a new transmitter, with so much success that the foreigners on 14 kc have to use cotton in their ears. Hi, W3REL our official observer, is hard at work at the R.C. A. Victor plant. W3AHL has rebuilt the entire station now, having tried every known transmitting circuit. W3OH is back on the air with an 852 after a year's absence, W3UHF is having trouble with his MOPA, W3ACX has a fifty which doesn't work. W3HEE and W3AUP moved to Northfield. W3WW and W3HFS left for the west coast to observe this section's signals out west. W3JH and W3UT are rebuilding for the fall session. W3BDO is a new station in this division. W3A1W is continuing to report from W3AWG with his M.O.P.A. set. W3ALG is building a new transmitter. W3DYL is building a new transmitter. W3CAB started up, but was damped somewhat by an overload of work. W3UH and W3AUP had to cancel.


WESTERN NEW YORK — SCM, John H. Blum, W3CKC — W3B1W is using a new M.O.P.A. This style of transmitter seems to be the all style down Jamestown way. W3SON, the Chautauqua County Fair transmitter, handled over 200 messages with 7 watts. W3G1Q has gone to college. W3CXL and W3CUT are on 28s. W3D1M is Unit Commander, U.S.N.R. W3CJY is studying aviation radio. W3B1Q is president of E.L.T.S. W3A1K is back on the air again. Welcome, Jerry. W3H1 has a new double-button mike. W3ZK gets a new 50-watt receiver. W3A1W is a new station. W3A1W has a new transmitter. W3ZK is building a new transmitter. W3A1W is getting into the business again.


CENTRAL DIVISION

INDIANA — SCM, George Graue, W3B1J — W3DBB is back at Purdue and is planning on changing to crystal control with a fifty watt as the PA. W3G1U is the able assistant. W3C1K has his new crystal rig near completion and wants several sleets. W3CJG and W3G1Q are hard at work. W3C1K is finishing up his new transmitter and is ready for DX. W3G1Q has been experimenting with a new 50-watt receiver. W3C1K claims the trees are absorbing his output. W3G1JQ suggests a "V" machine for tuning up transmitters. Hi, W3D1S has deserted the 14- 7-
Illinois boys are now beginning to show what kind of material we are made of — keep up this good work for we are out to top the list this winter. W8BU (Route Manager for Illinois) is busy collecting the reports from Chicago and he will have a new report for Chicago traffic especially. Work with him. O.M.'s. W8NBO is building a portable receiver. W8ERU wants all dope on Illinois skeds and those wanting skeds. W8DZ will be in with us with two new reports from the So. Bend bunch, and requests that all the hams write him their reports for forwarding to the SCM.

Traffic: W9GJ 2, W9DSC 6, W9GJS 15, W9AIP 12, W9CIM 3, W9AF 9, W9EAT 12, W9ETH 6, W9BHM 6, W9CVC 5, W9HJ 6, W9FRO 1, W9FCC 10, W9CXY 15, W9DBD 2. MICHIGAN — SCM, Ken Conroy, W8DYH — It’s a pleasure to report this: Michigan breaks her record again. A few of the members were busy with their reports last month. Their new officers are W8DGP, Pres.; W8UC, Vice-Pres., FB, OB. W8BKM has been doing some work on 14 me. He is the chief operator at W8XAO and finds the television work very interesting. W8FUL has been doing fine work on 14 me. with hodgepodge types '10. A new 7-me. transmitter is going at W9FYO, W8GJ is going to rebuild for the winter. W8ZKCM is starting up for a busy traffic season. W9CUG has been having fun on 17 me. W9KBR has been doing great traffic work and reports a new station in his town in W9EFE. W9AMA has a new crystal hanging on K9A. There is a negative heterodyne frequency getting in use at W9BZQ. W8GJ reports that he is picking up as well as traffic. The man who W8DFE wanted out but that did not keep AKB off the air. W8KB has rebuilt and is on with a 50 watter. W8DFJ is studying and collecting crystal data. W8HR handled special traffic with W8DSD, W8FQP is going to rebuild for the winter. W9DZM has been doing fine work on 14 me. with a 50 watt N. W9D9J has taken over from Florida and has already lined up some skeds, he expects to be an ORS by next report. Congrats, OB. W8BF has been doing some work on 14 me. with W8DKC W8GJ is going to rebuild for the winter. W8ZKCM is starting up for a busy traffic season. W9CUG has been having fun on 17 me. W9KBR has been doing great traffic work and reports a new station in his town in W9EFE. W9AMA has a new crystal hanging on K9A. There is a negative heterodyne frequency getting in use at W9BZQ. W8GJ reports that he is picking up as well as traffic. The man who W8DFE wanted out but that did not keep AKB off the air. W8KB has rebuilt and is on with a 50 watter. W8DFJ is studying and collecting crystal data. W8HR handled special traffic with W8DSD, W8FQP is going to rebuild for the winter. W9DZM has been doing fine work on 14 me. with a 50 watt N. W9D9J has taken over from Florida and has already lined up some skeds, he expects to be an ORS by next report. Congrats, OB. W8BF has been doing some work on 14 me. with W8DKC W8GJ is going to rebuild for the winter. W8ZKCM is starting up for a busy traffic season. W9CUG has been having fun on 17 me. W9KBR has been doing great traffic work and reports a new station in his town in W9EFE. W9AMA has a new crystal hanging on K9A. There is a negative heterodyne frequency getting in use at W9BZQ. W8GJ reports that he is picking up as well as traffic. The man who W8DFE wanted out but that did not keep AKB off the air. W8KB has rebuilt and is on with a 50 watter. W8DFJ is studying and collecting crystal data. W8HR handled special traffic with W8DSD, W8FQP is going to rebuild for the winter. W9DZM has been doing fine work on 14 me. with a 50 watt N. W9D9J has taken over from Florida and has already lined up some skeds, he expects to be an ORS by next report. Congrats, OB. W8BF has been doing some work on 14 me. with W8DKC W8GJ is going to rebuild for the winter. W8ZKCM is starting up for a busy traffic season. W9CUG has been having fun on 17 me. W9KBR has been doing great traffic work and reports a new station in his town in W9EFE. W9AMA has a new crystal hanging on K9A. There is a negative heterodyne frequency getting in use at W9BZQ. W8GJ reports that he is picking up as well as traffic. The man who W8DFE wanted out but that did not keep AKB off the air. W8KB has rebuilt and is on with a 50 watter. W8DFJ is studying and collecting crystal data. W8HR handled special traffic with W8DSD, W8FQP is going to rebuild for the winter. W9DZM has been doing fine work on 14 me. with a 50 watt N. W9D9J has taken over from Florida and has already lined up some skeds, he expects to be an ORS by next report. Congrats, OB. W8BF has been doing some work on 14 me. with W8DKC
been coming through showing traffic handled on phone, and WS CW, the Cleveland Wireless Assoc., station at the Cleveland Municipal Airport, reports a total of 84, EB, gqg.

WSBDU is reporting that their call is very active and the club has adopted a policy of Rag chasing and traffic handling. They have applied for ORS. Would appreciate reports from other club stations in Ohio, too. W9BSY, with that reputation for producing tons of traffic, has been very quiet so far. Perhaps their telephone line is not up to par.

WSDSQ reports six licensed operators in Norwalk now. WSDPF is playing semi-pro football in Akron this year. W9GQF returned from a trip to Europe as op. W9DSB is operating evenings alone on 27 kc, W9RTN reports that he will be off the air for a while, and sends 73 to the gang. We all wish you best of luck at your location at Dayton, Howard, and hope to hear you on the air soon. Such a nice report, W9DSH.

Do they have any more? W9DSH has been playing chess and checkers by radio lately. W9DSQ is back on the air for a little while now and has sent a fine report 011 a.n.ticvitiy. W9JD is working fine. W9BSY is planning a fall hamfest. W9BGG is busy with the Duluth gang. Bob says WOCM is the new call at W9CH. W9DG is the winner of the ORS pin given to the station with the highest total June 15th to Sept. 15th: total 409. Nice going, Fred. W9DFX is falling in line with an s.r. receiver. W9AJS is working both 3.5 and 7 kc. Get him to arrange skeds for you. W9CPA is back at the key for the winter season. He is on consistently, with five ops. W9BKH is handling traffic so well. W9BYC has been handling traffic and working dx. W9KN has been very active. W9BKH had a very pleasant two weeks at the Naval Reserve cruise this summer. W9BNI reports that W9BDU will be on and will handle traffic soon. W9BDU has his station going in Duluth and reports a very good turn-out for the A.R.A. Club meetings. The SCM visited W9EGU and W9FJN at Henning. His schedule with W9CP is not going so good at present due to very poor radio conditions. W9DSK is going to be on for the next month. W9BPP and W9NPS are operating.


SOUTHERN MINNESOTA — SCM, J. C. Poloushek, W9EKL — W9ODC is beginning his regular schedule. W9DRG has been handling traffic and working dx. W9BN is on consistently, with five ops. W9AQH will handle less traffic as court has opened. W9GQF has turned FC with a new Radiola V Type. W9BGC has handled traffic for three weeks on the U.S.N.R. cruise. He reports that W9BGC is taking on new life and promises lots of activity. W9DHG is back at the key for the winter season. He and W9COKU are going to have some skeds with some new DX. W9BCTU is installing remote control. W9EVE is a new ham in Southern Minn., living next to W9HNH. W9FIE is planning a fall hamfest. W9CHO has been out of town but will be active soon. W9BPA is on going on 14 mc. W9BHA has been very active. W9BKH has been handling traffic and working dx. W9BPG is on for the fine reports received this month. Let's try and put a star in our section next month.


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bear the title of Gold Medal Station. Now, gang, let's see who will win the title. Let's go.


TENNESSEE — SCM, J. B. Witt, W44P — The weather is FB now for our traffic work and we should have several more reports next month. I will expect reports from here when you have been on the air. W4CW comes through with the best report this month. W4RP says that he will have all skeds going again soon. There are several ORS not reporting and some sections of the report are not sent in from. Send in those reports, fellows, if you want Tenn. to have a fair share.


HUDSON DIVISION

NEW YORK CITY AND LONG ISLAND — SCM, C. Emerson, W2BG — Of 29 ORS we received 17 reports this month. Great! Your inactivity will earn a condonation of that appointment, and that's as sure as QRM on 3.5- and QRM on the 7-mc bands. You fellows who apply for ORS and then forget to report for three consecutive months will never get the appointment. Any wide-awake stations desiring ORS appointment are invited to send for the application blanks, but do not do so until you intend to take care of the job conscientiously.


The Topeka Convention, September 6th-7th. Forty-four hams were on band for the St. Louis hamfest; about 25 were at a similar one held at W9DZ in Kansas City the night before. W8BEG says QRM with job so no tcf. In collaboration with W9CFL, built a SWL's S/N.R. net not too large, which worked successfully in spite of installation while the plane was in the air by fellows who are not radio men and operated by them afterward. This set was shown at the Topeka Convention on a bike, the key is a modified key for WAB, OM, W9ZK is still shut down mostly waiting for cooler WX, when operating can be done in comfort. Most of the Kansas City fellows forgot to report this time, so the SCM can't say very much for them. W9DKG led in traffic while W9CFL led on a SWL's S/N.R. not too large, but a large delegation went from K. C. to the Topeka Convention as usual, sufficient to swing the lira contest in favor of W9DQN since popular vote decided the winner. The joke was on W9DQN, however, for W9BHR led in traffic and the prize was a mule. His fall from grace is freely predicted. W9RR broke a record by not winning a prize at Topeka; however, a pair of 28's came home from St. Louis, W9ZK and W9WDX are among the long-distance visitors at Topeka, with several Nebraskan and Iowan present. Seven fellows signed up for the U.S.N.R. W9CFL walked off with a Thor power pot at Topeka, while W9DOE did the same at St. Louis. Again proving it is hard to beat the U.S.N.R. when it comes to carrying off prizes. W8EL of K. C. applied for a commission in the U.S.N.R. KWKC made an offer to buy the towers at W9RR, but no luck. W9RR would have probably sold his shirt in preference. W9BGO demoted as OBS this month, but is Section Chairman for the next few months. W9BVR has a new QTH and will be looking for schedules after Oct. 1st. meetings every Thursday evening. Every one is welcome.


MAINE — SCM, G. C. Brown, WlAQ — Well, gang, out of nineteen ORS seven reported this month. What is the trouble with the rest of the bunch? It does not matter whether you handle traffic or not. Send in the dope on what is going on in your part of the State. There are a few of the gang who will lose their ORS ticket soon, if there aren't some reports within the next two months. Let's get going, fellows, and put the Maine Section on the map again. How about it, SCM? Now that the SCM has got that off his chest, it is fitting and proper that a word be said about the Convention. The Portland gang sure put on a fine time and deserve a lot of recognition for their part in the event. The Portland group, which worked successfuLly in spite of the weather, and is working on all bands. W1BV7 is on regularly and keeps at least two schedules each week. W1BLJ is at his old location and is looking for more traffic. W1BOW has a new QTH and will be looking for schedules after Oct. 1st. W1WQ introduced a new ham recently, W1AJN, and took him on a trip to Springfield, Northampton and W1MK, where, I am sure, he was welcomed by the gang. W1CTF says it won't be long now before he will be sitting at his key with you fellows, a night life ham. W1BVR has a new 50-watter, W1BKQ, the Worcester Radio Assn., will reopen Oct. 1st. W1AFU reports VPR,Y little activity from his station this month. W1ALO has been busy at Station WORC, pounding brass and doing a fine job. W1AVT, the Worcester Radio Assn., will reopen when W1AVM returns. W1BYQ has the New England Division QST FOR NOVEMBER, 1930

EASTERN MASSACHUSETTS — SCM. Miles W. Weeks. W1WY — An unusual number of new stations have started reporting and the increased activity is most gratifying.

At Norwood, two new stations, W1AXT and W1CAW start reporting. W1CQG is rebuilding. W1CCP has a new antenna and has improved his note after some Xmt changes. W1ASI was able to get early news of the German planes via VE1AX. W1ASM reports that about a new MOPA on all bands. W1APE has burned out all tubes, chokes, voltmeter and two rheostats in his receiver on account of short circuit in tuning condenser.

Traffic: W1BWB 1, W1ATF 14.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ W1BFB 7. W1BFB is putting on a MOPA on all bands. W1BBF is putting up a new mast and will have a new Hertz. W1AUY has been trouble shooting for the BCLS. W1CWD ought to put out a mean sig with his new 230, 1x1 controlled. Congratulations to W1APK, W1CWD. He was married Special Order and sent in 14,000, where he has been for a short time. They want to start a traffic reporter on 14,000. He says he will be going on 3500 soon and keeping his old traffic skeds alive. W1MB is back on the air with a 210. W1BIS is trying a superhet on high freq but he has not been able to realize how much better he can do with his filter system but is still trying for that PDC note. W1INZ is using a 171 with 235 volts B batt and gets good reports. W1UN spent a couple of weeks on the West Coast.


NORTHEASTERN DIVISION

OAHU — SCM, Oscar Z. Johnson, W7AKZ — W7ATF reports two skeds with no interference. Between the “fighting” his Meeny burning out R.F. meters and worrying about rectifier tubes W7ATZ is having a “wonderful” time. W7ATX is a new ham in Oeure d’Alene. W7ATD says now a.e. tuner. W7P 6/b and that he is still on 3, 5, 7, and 14 mc. W7FBT continues to work on 7 and 14 mc. A decreased 210 is keeping W7AW off the air for a short time. W7A1H has his xtal on 14 mc. W7ACP is keeping 3 skeds. Darn rumor tells us that W7AFN has taken the “fatal step.”

W7AVW is the one who keeps regular, reliable skeds. W7AVW is the proud owner of a Push Pull. W7ABF has improved his note after some Xmt change. W7AS! reports a large number of Xmt deliveries. W7AM reports some skeds that look like the old ones.

Traffic: W7AMF 34, W7WL 33, W7IF 32, W7ZD 27, W7AEPE 26, W7MV 18, W7QY 16, W7AMQ 8, W7AHX 22, W7P1 2, W7AHZ 8, W7AHCA 2, W7PE 1, W7UN 12.

WASHINGTON — SCM, Eugene A. Piety, W7ACS W1AKM comes through, with flying colors and between the “fighting” has received no reports from them for some time. Are you still “observing” or don’t you hear any off-frequency stations now? Numerous complaints have been received of siren stations operating in the 3500-kc. band as much as 100 kc. outside of the allotted siren band. This form of unnecessary QRM is particularly irritating and aside from being illegal shows poor sportsmanship when it is realized how many CW signals are blotted out by one such carrier.

Traffic: W7WY 152, W1CH 149, W1DB 27, W1ACH 12, W1BQ 12, W1APK 8, W1VW 7, W1QG 7, W1CWM 6, W1CAD 6, W1CAW 5, W1WU 4, W1WJ 1.

VERMONT — SCM, Clayton Paulette, W1IT — Hello, gents. Here I am again after a very pleasant summer at Camp. Very glad to be back. Have got the old set dusted off and will be on the air fairly regularly from now on. We now have a very lively station in W1ATF. Harry Page, located at Hinesburg. He has been reporting regularly all summer. Keep it up. W1BDO reports that he has been appointed N.C.S. of Vt. Army-Amateur Net. FB, OM. We are all with you fellows.


O ST FOR NOVEMBER, 1930
PACIFIC DIVISION

SANTA CLARA VALLEY — SCM, F. J. Quenent, W6EX — The prospects of very successful traffic handling during the coming season appear good as the old SCM, W6QAM, has taken up residence with W6MM back at San Francisco. The SCM circuit and W6BYY lining up transatlantic skeds, the message totals for the section should soar to new heights. W6HUM is back on the air after a sojourn in Britain Columbia. W6UQF and W6EY should make the BMP, each month now that school has started. W6YV wants traffic skeds with the East Coast on 14 mc. W6YU has a new filter and antenna system designed for day-time operation. W6ALW is back on 7 mc. ready for traffic. To W6BWMW goes the honor of reporting without a break for over three years; and each report contains traffic. W6DCP reports things picking up in Santa Cruz with the Club's transmitter at last on the air. W6EGU and W6CBO are some of the newer lamas on the air. W6BCQ handled by AUSB. All the details of the Section report next month, a nice traffic sum should arise. What say, gang — why not liven up it.


Traffic: W6EQF's fifty-watter works better out of the socket, now and he is after new one. W6BCK handled 150 show tfo and says dx is picking up. W6RT, President of the Long Beach Club, has sent tfc reports. W6ZQK reports handling and starts after traffic. W6GZJ is QRL. Y.M.C.A., at Santa Barbara but sends in his total. W6GAF is holding code class and boosts tfo at same time. W6LAH is on air again at QSO to W6AOA. W6PCB is a traffic sked in con. W6BFP is on week-ends only. W6EPII reports tfo and is QSL school. W6EAU has rebuilt and ready for fall dx and tfo. W6CZT has U.S.N.R. skeds. W6CFF is now temperature control xtal and worked 75 and eight other countries in one night. W6QBF switches from one trans ahead to two. W6EQF's reports W6BFF is married and on his honeymoon in New York. The section congratulates him heartily. W6EXX has finished school so lots of ham radio now. W6BOU has new xtal and is working on 7 mc. W6DCP is experimenting with his rev. W6AM has his xtal at new QRA now with 90 foot feeders in his Zep. W6OFP has returned from his vacation and is moving to Riverside. W6AMU flew four miles and two 281's, so the soup goes back into service. W6AUX is on 7 mc. with show traffic. W6EKE has show tfo all over the district. W6DLV is trying tfo. W6EAF is planning a tour of the country with a portable transmitter to find the good locations and dead spots.


W6CM says he is getting the junk rigged up again, and is planning a 100-watt push-pull job. W6BMS has promised to handle some traffic next month. W6ERF left a mike for traffic and is working on the Globetrotter. W6AHT has been deer hunting and consequently is not on very much. W6AMW reports from Gardiner, Maine, that the station is off as he has been assigned to the Marine Barracks; W6BBP is interrupted from the ski slopes, Kuki, Scrosby Sound, Greenland, that the Second Russian Arctic Expedition, CVII and XOlC, is all ready to hit the air. W9CKF from Phillips, So. Dakota, spent a few days with the SCM and visited some of the local stations. Arizona is a big country and the K9DXY is over the whole range. Reports that the Hong Kong gang are going strong and want to work west coast hams early in the morning. He visited KAIWP while in Manila, The Oakland Radio Club in the city has been put online to 2604 Alaska, Oakland, and has invited all visiting hams to call. The hamfest held by the club at the California Hotel was a great success. Howard Mason of the Byrd Antarctic Expedition gave a fine talk on the radio work of the expedition. W6AJN has joined the Oakland Public schools and is teaching a class in receiving design at the Central Trade School in the evening. W6QG is back with a 75-watt transmitter after experimenting for a couple of days with a 50-watt. W6DXK is on temporarily from Oakland but will return to the Orient. W6ATF is bound for China as one of the operators on the S.S. President Monroe. W6FK of San Francisco visited the local gang recently and described his recent contacts. W6AJA is still in South Africa, one of the first west coast contacts in some time.


HAWAII — SCM, L. A. Walworth, K6CIB — Hawaii held its first Hawaiian Section Convention on Aug. 5th and 9th with about 90 present. The boys had a good time and declared the event a great success and well worth while. Attorney General Leonard in his regular monthly talk at the Pineapple canteens running day and night. Several of the amateurs are employed in the Pineapple industry and ham activities are almost paralysed since the Convention as a result of our second induction. The handsome QRA book of Hawaiian hams which was sent free to all the gang. Many of the Honolulu hams made up cards and are rewarding DYC with 500 two-color QSL cards for station K6YAJ, of which DYC is faculty advisor in Lehigh University Tech. High School. The operators of K6EWS are still on Army Hospital report and our banner traffic station is still silent though it is hoped for only a brief time longer. Hawaii held the second place in the U. S. in traffic. Reports from other amateurs indicate that DX has been more active in the Los Angeles gang about taking the Traffic Banner from them some time. L. A. took this quite seriously and their 52 ORS pushed the totals to 4400 last month. HI, but Hawaii's 14 ORS dawdled considerably more until now that we want to encourage any one but a Harm. McKinley High School of Honolulu opened Sept. 2nd and the Radio Club there, K6YL, is busy getting a 75-watt on 14 mc. and an 35 mc., done for Inter-Island traffic. The 14 mc. station will operate most of the time during the school week between 8:00 a.m. and 3:00 p.m. Give them a buzz and be sure to QSL all completed QSO's. You will get a nobby QSL card in return for your QSO. K6COC has just installed two KG Reachublas which he swears by—out at K6COP, the shortest ham in Hawaii, says he is growing his transmitter from a 210 into a 50, so big things can come from small packages. The traffic report for this month from 16 stations follows:

Traffic: K6CDD 345, K6ALM 75, K6DPG 70, K6COC 42, K6VP 28, K6AJA 24, K6CYP 24, K6EST 16, K6ERH 15, K6ACR 14, K6DQQ 8, K6DUC 6, K6CMC 6, K6ERO 3, K6DEX 3, K6COC 5.

W6ZCQ — SCM, C. F. Bane, W6BB — Conditions have improved somewhat over the previous month and our old reliables are once more entering into rather spirited competition. W6EKS leads off and makes the K6LQ contacts in some time. Good to see George back in the running. W6HLP has informed us that a certain YL induced him to start handling traffic once again; at any rate, his report is a considerable improvement over the previous month. However, he finally received a note from 30 mc. which lives right up to it with a sweet total. We are very glad to announce that there has been a new radio club formed in 8. F. We understand that this club is to be devoted to the development of new men who are attempting to get started on the air. They have adequate facilities for code practice, both fast and slow and welcome visitors at any hour. The club is located in San Francisco and W6DZZ was going strong with his Philippine skeds until he blew up his fifty-watt and power supply. Sure tough luck. OBI! W6PN found little time to handle much traffic being extremely busy with several affairs for the radio club. We are glad to know that the 2604 days are coming up, and hope handling the most traffic over a three months period. There will also be a second prize: not as yet decided upon.


NEVADA — SCM, Keston, L. Ramsey, W6AD — W6AJI leads in messages this month. Most of the fellows are rebuilding their new 15 watts, W6DKY has a well balanced 15 mc. c.w. transmitter, W6EAD has a 3500-ke. crystal, W6CDZ is building a 3500-ke. 'phone. W6EAD has a early measuring instrument, W6EOG is working on an in-line ST for November. 1930

SAN FRANCISCO — SCM, H. A. Ambler, W6EOF — Our old stand-by, W6ACJ, is back with us now and leads the section for the month. He says the east coast tie is going through in fine shape. W6XV has come to town now and says he will be going strong again soon. W6DNS, after a good long rest, is on again and worked lots of DX and handled some tffe. W6BUL has an early morning fox sked with W6EFP of K6Centro and says it works FB, W6ADC is doing his usual good job with his DX skeds, old and new. He says he had a lot of interest among prospective hams, there being more new fellows than regular members at the meeting. All active hams in Nevada please get in touch with your SCM.


PHILIPPINES — SCM, John R. Schultz, KAIJR — Received letter from Aset, CM E. L. Battey stating that PI reports are filed too late to reach the printing press on time, so gang, please hand in your reports earlier if you want to show up in QST. KAIJR leads in tie for this month. A 500-watt M.O.P. is on a lot. KAIJA is using Heintz & Kaufman portable transmitter. KAIWP works nightly and puzzles KA hams with his FB note. KAIHC is busy and has no time to ham. KAIJA is moving into a new place. We hope he will get a lot of DX and see some signal from MG near by. KA1WW prefers DXing to tie handling. KA1PP's slogan is "early to rise and early to bed." KA1SU is a new two sked with 50-watt CC transmitter. KA1RC is back on the air and has all his skeds certified by OA. K1AW is homeward bound for States. We shall miss you very much, OM, and the gang wishes you "bon voyage."

QST FOR NOVEMBER, 1930

XII
KAIC is handling skeds from KA1DJ. KA1DZ is rebuilding to 280 watts, KAIC worked at KAA. KA1JR is now a half-KW stan.

Traffic: KA1HR 760, KA1AW 36, KA1JR 44.

ROANOKE DIVISION

WEST VIRGINIA — SCM, D. B. Morris, W8JM — Well, gang, the fall season is now in full swing, so why not get on the air and report your activity to us? Let's make a big push this fall for West Virginia. We can, if we try will. Remember, skeds mean messages, messages mean leadership. What's going on? W8SDP0 besides working "VK" on 7 mc, sends in a big string of off-frequency stations. No West Virginia hams were included in the transmit test, but they have a proud possession of a two-letter call, WSQK. W8JM is getting parts together for a 3500-ke. MOPA emitter. All traffic hounds, please note. W8SDN started something when he came to Fairmont on his motorcycle. Now Monroe, W8SKA, has one too, and has almost killed your SCM on several occasions. I expect a good many wish they had. (Hi)-(Hi). WSTI is attending V. U. and operating WSZDZ at the University, WA8YI and WSTI Brothers and both passed the "commercial" test recently. WNAKQ informs the SCM that he is the traffic manager of the R. O. R. O. L. a league composed of railroad "Morris" operators. WS8HD seas "Behind on work after returning from Europe, so not much traffic." W8SRK reports a few more calls to come to Pittsburgh for license exams. Luck to you, W8SHOK keeps a weekly phone sked with W8CCA at Cleveland Airport. The reports that W8DMU, W8SDN and W8LT were visiting W8LQ at the MOA are with hopes of contacting his "pet." W8CQK in Charleston. The SCM had the pleasure of meeting W8SDN, W8ATE, W8CKY, W8AWT and W8DRL recently. All hams are on the air, handling traffic, reporting to the SCM and keeping the list of those W8SDP0. We need messages to boost West Virginia. Please report. All "hams" who are not ORS and feel that they can qualify, please get in touch with me and I'll see what I can do for you. Appointment position as Official Red Cross Station is open upon request.

Traffic: W8SHOK 45, WS8MR 45, W8SQR 20, W8SDN 21, W8SPP 20, W8SDP0 12, W8SBK 7, W8AWT 6, W8DRL 5, W8CKY 4, W8HD 2, W8TI 2, W8AWT 1, W8ATE 1, W7DIU 1.

VIRGINIA — SCM, J. F. Wohlford, W8CA — The report this month is short on account of about all the active stations going to the first Virginia convention held in this state. Those who did not get there missed a real treat. W8CQX attended the convention and gave several very interesting talks. Should any of your fellows desire to join the Army Net, address Captain Boldwin, who will take care of you. W8CXM is very anxious for skeds with hams in this section. W8SDP0 reports big traffic at about Lakes Naval Training Station that he is returning to school at Danville and will resume work from his station there. W8CFL, ex-W8CFL, is also a newcomer in our section, and we welcome him. W8CFL's report to date is that he is a real ham station with good traffic reports. W8FXH and W8DP0 called to see your SCM while he was at convention. Sorry you fellows could not get over to the blowout at Richmond. Try it again next year or sooner. Those of us in this section who are interested in the U. S. Naval Reserve should apply to Lieutenant Wilson, U. S. N. R. N., Norfolk, Va., for information. The SCM would like to say that all reports should be in hands not later than the 18th of each month. Those who have had traffic troubles lately please so state and send in the dope with the regular traffic reports. There is no restriction as to how you handle traffic just so long as it is handled properly and the report is sent in. We need big handling to make Virginia known so that we depend on for drill messages. There is no restriction as to how you handle traffic just so long as it is handled properly and the report is sent in. We need big handling to make Virginia known so that we depend on for drill messages. Traffic: W8SHOK 5, W8SDP0 4, W8CFL 4, W8DIU 2.

NORTH CAROLINA — SCM, H. L. Caviness, W4DW — W4LY checks in with a long letter this month, in which he says amongst other things, that there is not much done in the way of traffic handling by the 25 or so Asheville stations. The most active stations at present are W6WJ, W4LY, W4NJ and W4TO. W4IJ checked too much voltage to his crystal with disastrous results. W4TO is working a type '10 crystal set and got a vérK this month. W4LY got live continents in the DX contest, using a 50-watt rig and a home made band. He operated four continents on Labor Day. W4EW, like the rest of us, has been making some changes in his rig and has not been on the air much lately. W4BE is a high score again this month. He reports handling messages for the Dickey Expedition, also some flood messages, and working Asia. He attended the Ham Convention in Richmond, visiting some in Greensboro, High Point, and elsewhere. Now on the air in Georgia where he is neat. The word that he has been too busy with other more vital affairs of life, to handle any traffic this month. W4IR is heard consistently on 3548 kc. with his crystal, and sends in a fair amount of traffic. He is one of the few A stations in North Carolina which can be depended on for drill every Monday night. W4TN has returned to the University of N. C. to take up the study of law, and will be heard occasionally at the key of W4WE. W4AHH informs us indirectly that the reason we have not had him from him for the past two months is that he has just taken himself a wife. Congratulations! And here's hoping that we will soon hear the V7 calling at W4AHH. W4IGI is getting good results with two type 10s and a single Wire Hertz antenna on 7000-ke. and 14000-ke. W4RX with a couple of other Monroe hams stopped by to see W4DWH while on their way home from the Richmond Convention. They reported a wonderful time and a very successful convention. W4IR reports that he has the information that he must ask that his ORS certificate be cancelled as he is now a commercial operator and has called for Denver Aires. A. He took a short wave receiver with him so as to keep in touch with ham radio in his off hours. He signed up card W4ABW-8X7.


ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — Acting SCM, C. R. Miller, W6DPI — Activity in this section seems to be in creating now that fall is here, and Wyoming promises to come to life in December. Mail is another big booster, frontiersmen, mountain men, and others moving in. You fellows are meeting you responsibilities. The hams in this section are keeping their calls handy for a call-up with a whistle. W9CRR handled no traffic, but may before the next report make a call with the Army Net, address Captain Baldwin, who will take care of you. W9BPA will try. Remember, skeds mean messages, messages mean leadership. There is no restriction as to how you handle traffic just so long as it is handled properly and the report is sent in. W6GRB is having trouble with antennas.

Traffic: W8ATQ 9, W8DWH 9, W8CRR 3, W9CRR 1.

COLORADO — SCM, C. R. Stedman, W9CSA — The Denver gang came through with quite a bit of traffic as a result of the Radio Show there. The bulk of the traffic was handled by W9AAB, W9BQO and W9CZ; a real ham station being the station set up at the radio show. W9BOO and W9BE are being added to the list of ORS in Colorado. W9CSA will probably consolidate with W9BQO. W9CRR handled no traffic, but may before the next report providing College life doesn't consume too much time. W6EKP has been busy with the fall harvest, but now that it is over will be ready for some Hamming. W9CDE is back with us again, but not on much these days. W8AOU is a new comer at Yuma, W9CDE and W9CDD in radio at their best, W9DQD is on 7000 and 14,000 kc. doing good work. W9AO D is another new ham, being located at Colorado Springs and working on 7000 kc. W9ECP is in Boulder now. W9BQO is doing a little work on the air, W9CDD is still having trouble with filter condensers and is going to try electrolytic condensers for a change. W9CXX is on 7000 kc. now, QRA. Burlington, Colo.


SOUTHEASTERN DIVISION

ALABAMA — SCM, Robert Troy, Jr., W4AHP — W1KP, a new man, leads the state in traffic, FB, OM. W4AAQ is busy at WSFA, so hasn't been on much. The SCM was very pleased by visits from W4FY, W4GM, and W4HB. W4AHP is working everybody between school and work. W4AHP has rebuilt his outfit and made a very fine job of it. W4XX is having trouble with antennas.
We hear W4AIE operating quite regularly but no report. How about it, OM? W4AHY has gone to the radio school at Ft. Monmouth. W4CY is promising to get on the air. W4AHP is off the air pending the arrival of a "B" elimination. W4AJR is down south west until our next report. W4AUM is holding up the Birmingham end of the A-A net in fine shape. We received a fine report from W4DS. Some of you fellows wake up and let me hear from you. WATT seems to have a lot of new interest. HI, W4CH is batten down the V.L. bug. Another good ham gone wrong, HI! By the time you read this the SCM will be checking your frequency with an accurate meter. So as Floyd Gibbons would say: Watch your frequency.


FLORIDA — SCM, Herb Church, W4AUL-W4pAW — W4JO in Miami leads the section with a good total of 46 msg/s. He had 550 volts of Burgess batteries all ready for U.S.N.R. work during the hurricane. W4ACM, the reserve station at Tampa, is second in line this month. The SCM and W4QZ handle the key most of the time. Mr. Robbins of the U.S.N.R. station W4ALF sends in a fine report this time. W4PI reports that he is going away to the Bells Electrical School and will not be on the air any more this year. He worked 70 stations this month with a single 210. W4SK reports two new stations in St. Pete., W4NU and W4LJ. The latter one is the beginning of a brand new QTH for the Tampa unit. W4BU is a station in Jax. and is the Hgo. Company, 124th Int. of the Field National Guards. It is operated by Sgt. H. E. Heller, and W4AER. W4QL is back from his vacation and is getting into shape for the fall and winter. W4IHI has just moved to West Palm Beach. He operates his own station at Boca Raton and sometimes W4ALF, W4KM handled traffic to W5AIN for the Marines. The following hams were present at the ham fest at Pensacola last week: W4NS, W4BC, W4AIV, W4AVH, W4VR, W4AUL, W4MN, W4PN, W4FY, and W4MS. W4VM and W4ALJ are back on the air and want reports from you fellows. W4QK is a new ham and will be on the air in the near future and will have 150 volts D.C. power at his set for a big winter. W4PN is planning a portable transmitter as his work carries him over west Florida and southern Alabama. W4MS is on the air with a 250 set now and has a little dopper on 28 mc, that he will give the gang soon. The X1T at W4MS is building a low power set to be used by her at Century. The house current is 220 d.c. Hi. FB for low power, W4QN has just built a Parsons Chemical Rectifier as described in July QST and says it is sure FR. W4QH reports that W4SG is a new ham in Tampa at the Tampa Tribune. He is on the air every morning from 2 till 5 o'clock. W4ALH says tcf seems to be a thing of the past to him as he cannot find any one who has any. W4GSP reports a few messages this month. The Jacksonville Valley Operators Club's officers are W4MF, President; W4UL, Vice-President; and W4RU, Sec. and Treasurer. W4VZ is so busy playing football that he cannot find much time to operate. W4VZ is working on 14, 7 and 21 Mc. and also playing football. W4CJ phoned in an idea for a new A-A entering a contest. W4ZPB. McKnight, W5MT, not only reported by radio but sent a written report special delivery also. The Schreiner Institute has an active radio club with a station on the air using the call sign W5INQ. They are supposed to be on the air again. W5AKB is rebuilding and no traffic handled. W5ASM is working tone in the 1750- and 3500-ke. bands and cw in the 7000-ke. band. W5BSC reports traffic handling is good and they expect to handle more traffic in the coming months. W5EY has been helped fully the traffic total. This Houston gang is surely a live bunch! Tennant, W5STD (whose crystal-controlled signal is heard regularly on 1215 kcs.) sends in a nice report. He is on regularly, and those having traffic for Houston should give him a call. W5EI, Ward, our Route Manager, has been somewhat inconvenienced by a pair of soft 28's and a bankroll in the same condition. Nevertheless, he is keeping schedules with W5AYH and W5BLD. Keep it up. That's what we need, W5BNE is working on a new ham in Houston. W5PK, DeBardellen, is on for about as long as he is working on a station between times at KTLC. Bay City: At W5ABH, Williams, is the sole reporter. He has been on account of shot filter condensers, but is contemplating an early return. The fellows in there, OM, are working all through the vacation. Kerrville: McKnight, W5MT, not only reported by radio but sent a written report special delivery also. The Schreiner Institute has an active radio club with a station on the air using the call sign W5INQ. They are supposed to be on the air again. W5AKB is rebuilding and will have two 250-watt tubes as power amplifiers. He will use a UX-210 oscillator. W5BRE is also rebuilding, but is on another, nevertheless, and handling traffic. Send me a report, OM. W5BZL is looking for schedules in order to move student traffic. Those interested in traffic handling should get in touch with him. (Get in touch with W5EI, Route Manager, as he might be able to help you out, fellows.) For all of this dope on Kerrville the SCM is indebted to McKnight, W5MT. There seems to be lots of activity over in the vicinity of Kerrville, and the SCM is looking for more reports from the gang in the coming months. This is imperative if we are to make our section lead in the section lead as it should. San Antonio: No reports from this city. W5AL5 and W5AHA are heard occasionally, W5JC is also on intermittently, but no report from him either. Please drop a line to the SCM if you think you might be having trouble. W5BQV is working 2500 cycles and handling traffic regularly. Might be glad to hear from Corpus, OM, and hope you can get more of the gang to report next month. Beaumont: W5AIA threatened to report. That's all. We will be in to see you soon and make up our report. Drop a card in the mail, Doc., and let us know how the

WEST GULF DIVISION

KLAHOMA — SCM, Wm. J. Gentry, W5GF — W5GF is going on with 250 watts soon. W5ASO is perking well on tone now. W5AVW is always building receivers. I wonder if he ever transmits. HI, W5MMI is rebuilding with about 500 watts cut. FB, OM, is sending FR, now and is also building QTA. Port City, now. W5VSQ is the best relay station for ages now. Vf FB, OMS, W5CB is on again now that the hot weather is over. HI. W5AFH is trying a little tone work now. W5QJL is having a real good month. W5BCH and W5USF are doing FB work. W5BQVMW from Mo. FB, OM. on your tcf, W5AYF is working some now and then. W5ALP has a fair tcf, report. W5QJ is a good tcf. station and is doing FB work. Glad to see W5AMC going so well. W5AO is a Jr. Grade Lieut. in the Naval Reserve NW. FB, OM. Like to see more work in Naval Reserve, OMS. Glad to get W5BBM's report. FB, OM. DX seems to be fair now with the gang. W5BWIW is back on the air after laying off for the summer. HI. FB, OM. I'm hoping to hear from some of you fellows. DX is getting pretty heavy. and is working all states regularly. FB, OMA. W5CB is on again now that the hot weather

QST FOR NOVEMBER, 1930

...
I have just received a letter from the Radio Department at Ottawa in answer to a number of letters to them complaining of the interference in our bands from Mexican station XDA. Most amateurs were aware of the opinion that Mexico was not a signatory to the International Radio Telegraph Convention, Washington 1927, and that it would be useless for us to make a complaint. However the Dept. now informs us that Mexican authorities will meet on the 26th of March 1929 and that they will go into the matter further with a view to taking such steps as may be considered necessary to stop the above interference.

Now that daylight saving is over for another year and the long evenings and real radio weather with us let's get back to the shack, roll up our sleeves and go to work telling the world what a wonderful game this amateur radio of ours is.

Don't forget Wednesday nights for Canadian contacts.

CANADIAN GENERAL MANAGER

Alex Reid, VE2BE

QUEBEC DIVISION

QUEBEC — SCM — Alphy Blais, VE2AC — The amateurs have been roaming along this month. VE2AA visited VE2AC, VE2BE, VE2CA. The SCM dropped in on VE2BE and had tea at VE2CA. The XYL is as good a cook as she is a brassbounder. VE2CL got his dops on the phone and says it is very hot. VE2BBQ has changed his engine to drive his gen. (VE2DQ) from the radio shows put VE2AI over the top again. VE2BBQ has been getting xtal reports on 7000-kc. aigs. VE2DM and VE2BR are still pounding away as usual. VE2AB is settled at last and is using a gas engine to drive his gen. VE2AB is quite alive and is using a gas engine to drive his gen. VE2AB is quite alive and is using a gas engine to drive his gen. VE2AB is quite alive and is using a gas engine to drive his gen. VE2AB is quite alive and is using a gas engine to drive his gen. VE2AB is quite alive and is using a gas engine to drive his gen.

Traffic: VE2BA 9, VE2BB 13, VE2BH 10, VE2BQ 13, VE2BS 10, VE2BT 10, VE2BU 10, VE2BY 10, VE2BZ 10.

Traffic: WM.HI 278, W5AJL 29.

MARITIME DIVISION

NOVA SCOTIA — Acting SCM, A. M. Crowell, VE1DQ — VE1IC has at last got his M.O.F.A. to the States. VE1IC has been going around helping the "hams" in need. VE2BH had a few "W" visitors and came himself to greet VE2CA. VE2BH is going to Toronto and will be working with a new call. Sorry to lose you, O.M. VE2BH is quite alive and is using a gas engine to drive his gen.

ONTARIO DIVISION

ONTARIO — SCM, E. C. Thompson, VE6FC — Central District: VE6BC is back with a vengeance although he hasn’t started yet. VE6FO has decided that school work cannot bear interference and has presented his complete station to VE6BC, so watch your logs, gang. VE6AJ is keeping regular schedules as usual and has a new receiver, no less. He is also preparing to put a new phone set on the 14-mc. band. VE6GT has been doing excellent work in the way of schedules with one of the Ft. William gangs, and says that he is objective to run his station that he has built standard. VE6AD is back from Muskoka, where he and VE6CR had a very good time working everything in sight. VE6DA is back again in harness on 3750 kc. and will welcome traffic schedules. He states that VE6NV, VE6EZ, and VE6BI are also now in action in Belleville, Welcome, fellows. Let’s hear more from and of you, VE6GK is still rebuilding but keeps using 3550 kc. nevertheless. Mrs. GK also enjoyed several contacts during the month. VE6DW says that the 201A is still doing well, and that the lengths are beginning to be a little low, on 7 mc. once again. He also has three potential amateurs learning the code, and a push-pull transmitter is in course of construction.

Southern District: Members of the Southern Ontario Radio Association held a picnic together with Q5s, Ws, and families at Kingsville Park on Sept. 7th. The following hams were present: VE5ID, VE5XL, VE6TM, VE6OC, VE3AA, VE3XA, VE6EC, and VE6FB. They all showed their youth by playing no less than fifteen innings of softball. Some of the fellows have a good time that they wanted to hold a picnic every week! Further District: Members of the Southern Ontario Radio Association held a picnic together with Q5’s, Ws’s, and families at Kingsville Park on Sept. 7th. The following hams were present: VE3NV, VE6EZ, and VE6BI. They all showed their youth by playing no less than fifteen innings of softball. Some of the fellows have a good time that they wanted to hold a picnic every week! Northern District: G. V. Lawrence, VE6ET, Acting SCM — With the advent of good weather, activity in this district, rather than increasing, seems to be on the wane. What’s the matter, gang? VE6HA did good work this month but we are unable to list his total as his traffic report is tied up somewhere in the mails. VE6BD says there isn’t much doing up his way but he is getting ready to take part in the Trans-Continental Chain which he hopes to put across this winter. VE6ET is on 2200 kc. occasionally, VE6HA is an ORS prospect.

Traffic: VE6BC 42, VE6AI 18, VE6GT 16, VE6AD 8, VE6DA 5, VE6GK 3, VE6DW 3.

PRAIRIE DIVISION

MANITOBA — SCM, A. V. Chase, VE4HR — Much rebuilding is being done by the gang in preparation for the winter activities. VE4DK is back from the East. He rebuilt his transmitter and receiver, and is now attacking the antenna system. VE4FV has been operating his Ultradon during vacation in Winnipeg. He worked nearly all Canadian and U.S. A. districts, using a 201A, VE4GQ has his big 2500 kc. rig up and ready to mult. M.O.P.A. Three operators will be available to keep the station running, and much traffic is expected to be handled by them. VE4DJ, on vacation in the West, spent a most enjoyable time in Calgary with the gang. VE4BU is arranging schedules. VE4FO submitted his first report.

Traffic: VE4DJ 11, VE4BU 6, VE4HR 1.

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — Only one station out of all those in Saskatchewan reported this month. Who’s the neatest fellow? Aren’t you doing anything that you think the rest of the gang would be interested in? If you are, let’s have it, especially traffic reports. Why not try and make this winter’s activities the best yet. VE4BB has had quite a number visiting him; VE4BL, VE4LE, and VE4CN. He also called on VE4GR. Three new stations are on the air at Roosetown and two in the making at Biggar.

Traffic: VE4BB 3.

VANALTA DIVISION

BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — Looks very much like the gang had too much convention in Victoria and haven’t recovered in time to get in a report. VE6CC and VE6SCK are two new hams in Vancouver and we understand there are some more coming up. VE5AG has arrived back in town but has trouble with his receiver. VE5B has moved out from his new location and handled some traffic. VE5AL is remodeling for the fall session so hasn’t been on very much lately. VE5DD has been on vacation and is now getting his heap ready to go again. VE5BP is still playing with his set, VE5AJ blew the home rectifier tube. VE5AN and VE5CW brought home the bacon from Victoria. VE5BM is busy but 3000 volts down his skid. VE5GT says things are bad in Prince Rupert and he has a hard time making any in B.C. VE6CY has moved from his old home. VE5DX and VE6CM are back again. VE6CO would like to know how to eliminate the arc light arms in Victoria. VE6DU is practicing on his homemade bug. VE6EC is boasting about his first ZL worked. VE6CR is sporting a new receiver. VE6HR is looking for more power. VE6HK and VE6EA are back on the air. VE6VQ has returned super to the East. VE6CT is up to 3000 with low power and it looks like he is going to have plenty of company before the winter is over.

Traffic: VE6AC 7, VE6BM 5, VE6AL 2, VE6EC 14, VE6CO 2, VE6GT 5.

LATE AND ADDITIONAL REPORTS

W1AWE reports direct to HQs that he is busy at this season as a radio service manager, but expects to have new set on the air shortly. W10WN reported traffic handled too late for inclusion in Western New York report.

Traffic: W8ON 144.

Traffic Briefs

Ula B. Rose, W2UD, is now in charge of Western Electric sound movie work in Peru. His headquarters are at Lima and he has a 10-watt push-pull transmitter on the 14-mc. band under the call O4AW. He is anxious to QSO the states, especially New York. His QTH is care of American Commercial Attaché, Lima, Peru. Give O4AW a call if you hear him, fellows.

V8APQ says he is ORS — "the Only Radio Station around Martinsburg, Pa."

It has been called to our attention that Willis Hudlin’s (star pitcher of the Cleveland team, American League) call letters are W8ISG, not W8RGS as stated on page 11, C. D. September QST. We stand corrected on this!

QSO ENDURANCE CONTESTS

Something entirely new! The “endurance contest craze” has hit this country pretty hard. We read in the newspapers daily about “dancing,” “airplane fan,” “tree-sitting” (hi), and many more called “endurance” that have popped up but up to the time of receipt of a letter from W2AMT we hadn’t thought of “QSO Endurance Contests.” The idea of the "QSO Endurance Contests" was hit upon late one night in the station log of W2AMT working W4AB. Both W2AMT and W4AB had lots of time on their hands, and had no necessity for worrying about lost sleep, so they decided to try to maintain contact for as long a time as was possible, or rather to make an “endurance” record. Perfect contact was maintained for three hours and forty-two minutes, at the end of which time atmospheric conditions became very contrary, and inside of ten minutes both stations had faded completely out.

W2AMT challenged any one to break their present record of three hours and forty-two minutes. We shall be glad to hear from contestants, but must request that the following rules be complied with: Each amateur must submit an accurate excerpt from his station log covering the QSO. Suitable notations must be made in the log at least once every half-hour. The QSO may be counted only for the time that both stations are readable. Should either station go out of audibility the QSO must be called “ended.” Log excerpts must be mailed to QSO Endurance Contest Manager, Communications Department, A.R.R.L., Hartford, Conn. Unless logs are received from both stations in question and unless these logs agree, no credit can be given.

How does it sound, fellows? For the present we will consider that W2AMT and W4AB hold the record. When their record is broken we shall announce the standing of the new record-holders in QST. Let’s get started with these QSO Endurance Contests and see who can successfully challenge the W2AMT-W4ABHS combination.

QST FOR NOVEMBER, 1930
Why "short" your sales and profits with "long chance" condensers

The period in the life of any receiver, of greatest importance to its manufacturer, is after it is sold! The manufacturer is not merely selling an item of merchandise—he is really selling a service. If that service is imperfect—subject to interruptions—it is a direct reflection on the integrity or ability of the individual or firm who built the set. As such it cannot help but injure their business and standing in the trade.

Set builders and manufacturers who expect to profit from the sale of products turned out on a price basis, alone, are not only laying up future trouble for themselves—but for their distributors—and for their dealers as well. Short cuts to quality are too apt to develop into short circuits! Every musical note, every syllable of speech that a set reproduces is affected by the quality of the fixed condensers. They must store, transfer, or stock electrical energy with unfailing accuracy and minimum loss. Why risk reassembly and service losses by using "long chance" condensers with uncertain dependability?

Sangamo Fixed Condensers are accurate—and stay accurate! Sangamo standards of precision have made it possible for manufacturers and custom set builders to eliminate condenser troubles. The standard line of Sangamo Fixed Condensers leaves the factory tested to maximum variation of 10%. The reliability of these ratings is attested to by a number of nationally known radio manufacturers. Sangamo is equally reliable as a source of supply.

SANGAMO ELECTRIC CO
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Nothing takes the place of TONE QUALITY in a radio receiving set.

**Sangamo Transformers in the "audio end"**

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### "X" Line Transformers
- Type AX straight audio amplification. List price: $6.00
- Type BX Push-pull Input unit. List price: $6.50
- Type CX-171 Push-pull Output Transformer, for 171 or 250 power output tubes for cone speaker. List price: $6.50
- Type DX, same as CX except for 210 and 112 power tubes. List price: $6.50
- Type HX Push-pull Output for 171 or 250 Power Output tubes to match the impedance of moving coil of Dynamic loud speakers. List price: $6.50
- Type GX, same as HX except for 210 and 112 power tubes. List price: $6.50
- Type E Output Choke to match impedance of the various type power tubes. List price: $5.00

### "A" Line Transformers (Similar to X Line but with special core metal for greater amplification at low frequencies)
- Type A straight audio amplification. List price: $10.00
- Type B Push-pull Input Transformer for all tubes. List price: $12.00
- Type C-171 Push-pull Output for 171 or 250 type power tubes with cone speaker. List price: $12.00
- Type D-210, same as C except for 210 and 112 power tubes. List price: $12.00
- Type H-171, Push-pull Output for 171 or 250 power tubes for Dynamic Speaker. List price: $12.00
- Type G-210, same as type H except for 210 and 112 tubes. List price: $12.00
- Type F Plate Impedance for use as a choke to prevent oscillation and for impedance coupled amplifiers. List price: $5.00

### Sangamo High Voltage Condensers
- Tested at 5000 volts D.C. and 3500 A.C. and built to Sangamo standards, known throughout the radio world, amateurs, commercial men and manufacturers have learned to depend on Sangamo High Voltage Condensers. Accurately rated and adequately tested — these condensers offer the maximum protection in high voltage, high frequency circuits.

Unusual facilities for furnishing transformers with or without cases ready for mounting and quick assembly with the receiver; Prices on application.

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