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<th>Description</th>
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<td>15-Watt Oscillator</td>
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<th>Overall Dimensions</th>
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<td>334-Z</td>
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<td>10 µµf</td>
<td>3 1/4 x 3 1/2 x 3 3/4 in.</td>
<td>5 1/2 lb.</td>
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Prepared by Official Examining Officer
The author, G. E. Steding, 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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<th>Manager Name</th>
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<td>New Jersey</td>
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<td>W3BPW</td>
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<tr>
<td>British Columbia</td>
<td>W6SL</td>
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<tr>
<td>Saskatchewan</td>
<td>W4FR</td>
<td>514 W. 19th St.               Prince Albert</td>
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*Officials appointed to act until the membership of the Section choose permanent SCMs by nomination and election.*
The American Radio Relay League

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternality 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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ADDRESS ALL GENERAL CORRESPONDENCE TO THE EXECUTIVE HEADQUARTERS AT HARTFORD, CONN.
THERE'S some dirt in the air these days, fellows. Perhaps we shouldn't lend it the dignity that comes from mentioning it in QST's pages. We've thought that over, though, and it seems to us that discussion of these problems is one of the prime functions of our magazine. Another reason is that the dust seems to have risen entirely over earlier statements in QST.

You've probably heard some of the talk yourself. Possibly you've already been informed that the policies of A.R.R.L. and its officers are killing amateur radio by leaps and bounds; that the new regulations are a serious blow; that the requirement of d.c. supply is forcing hundreds of stations out of the game; that A.R.R.L. accepts the dictation of the Federal Radio Commission, commercial corporations, and wealthy amateurs, as against the interests of the amateur generally; that the compulsory log consumes all an amateur's time in putting; that the League sponsored it either in order to be able to sell a new kind of log-sheet or as one more step in its plans to trap hams, for which its officers doubtless get a rake-off.

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Let us try once more to unsnarl the haywire: PRIOR to 1928 this League had the "benevolent-autocracy" form of government. It had a hand-picked Board of Directors. They did their work well but they were all "directors at large," they always got returned to office, and those who attended meetings were all in the East. The system was properly criticized and in 1923 the League adopted the present system of one director per division, elected every two years by the membership of the divisions. Now we have democratic government, and with it, we presume, some of the insufficiencies of democracy. One of these is the lack of any adequate way of satisfying minorities who, having representation, expect to have their way about things and don't get it in the face of an opposed majority. Temporary acceptance of such things is supposed to be an essential in the workings of a democracy, but most of us in amateur radio are still young and impetuous, and it's hard to have a pet notion voted down. We're told, though, that the experience of the world shows the representative form of government, with rule by majority vote, to be the best that man has devised; the only workable alternative is absolute dictatorship and that isn't acceptable in America.

Our Board of Directors has a constitutional right to make policies and give orders. What it says goes. Headquarters doesn't decide these things; the headquarters officers obey their orders. J. Warner, do not "run the League." The Board decides what it's to do about a certain subject by taking a vote. If there's any division of opinion at all, somebody gets left out in the cold, his views do not get accepted. This is an unavoidable process in the workings of democracy. The idea itself is fundamentally sound. If you don't like a League policy, you should write to your director about it — the directors are the ones who decide such things and your director is your representative. If you, meaning the general membership, don't like your directors,
don't like the things they do, don't like the way they respond to your suggestions, change your directors at the next election. If you can't change them it's because you're a minority and most people don't share your view — in which case you're not entitled to prevail. If your views are sound, the majority will agree with you and there will be changes. Then if the directors don't like the officers they can fire them at will. If the directors believe the officers are inefficient or disloyal, they jolly well will fire them. If the officers don't do what the directors tell them to do, they'll be fired. There is a chain of responsibility. What the officers do is what the majority of the amateurs of the country told their directors they wanted to have done. If you didn't have your way about something it's because the vote was against your point of view when the Board balloted to find its decision, on the principle of the greatest good to the greatest number.

TIMES change, naturally. Changing conditions bring their new problems. Radio in all its manifestations is a seething cauldron all over the world, in the pains of readjustment made necessary by great expansion and intolerable crowding. Every branch of radio is yel ling its head off about the injustices it is suffering. Every phase of radio finds it necessary to acclimatize itself to new surroundings. Amateur radio is no exception. The changes which have confronted us the past three years have been profound. Like the rest of the radio world, we are obliged to move faster than we wish. Hundreds of new problems arise to be solved. In A.R.R.L. they go before our Board of Directors for solution. Most of them are sticklers; some of them are heart-breakers. What to do about frequency observance, frequency measurement, stability, rights of amateurs; what to do about 'phone, quiet hours, portables, alien operation; what about Madrid preparation, international publicity; what about the cost of improvements made necessary by any change in regulations. Now ask yourself what the ideal way would be to settle upon an A.R.R.L. program in these difficulties. You'd take a vote of the amateurs, wouldn't you, and the majority would win. Just that is provided for in the existing scheme. Amateurs tell their directors, the directors tell the Board. There may be division, change in regulations. Now ask yourself what the amateurs of the country tell their directors thev wanted to have done. If you didn't have your way about something it's because the vote was against your point of view when the Board balloted to find its decision, on the principle of the greatest good to the greatest number.

ONE of QST's duties is to interpret the ever-changing radio picture. Included in this is the endeavor to interpret the actions of the Board of Directors, to explain the reasons behind the decisions so that the necessity may be apparent, the fairness evident. They are not the decisions of the QST staff or of A.R.R.L. Headquarters, and it doesn't even matter whether the officers personally agree with the decisions or not — they're orders. With changing conditions, we have new problems and must devise new ways to deal with them. Change is not necessarily progress, but progress requires change, and as we climb amongst our difficulties it has been inevitable that there were many changes, hateful to those who oppose change, distressing to those to whom change was difficult — but all of them necessary if we were not to stagnate and lose our place in the sun. QST has tried hard to explain these things too, the line of reasoning that showed them to be desirable, and the solutions that were available. QST is supposed to be helpful, not a medium for the hollow parroting of what everyone already knows, but a forum in which "we, the people of the A.R.R.L.," may discuss our difficulties, find joy in our achievements, help each other, and enjoy each other's company. Your officers and your editors are expected to be leaders, to study conditions in our art, to know what is what and how to talk about it, and then they're supposed to exert some leadership by mentioning what they find out and suggesting what might be done about it. This isn't persecution any more than the Board's plans for necessary improvements are persecution. These are the inevitable changes of progress.
The Dynatron Frequency Meter
How to Build, Calibrate and Use It
By George Grammer, Assistant Technical Editor

This article contains intensely practical information on the latest type of frequency meter, and should be read by every amateur whether he intends building one or not. Much of the data on frequency-meter design and calibration is applicable to other heterodyne frequency meters as well as to the dynatron type. — Editor.

In September QST the good and bad points of various types of frequency-measuring devices were discussed, and the advantages of the dynatron oscillator as a heterodyne frequency meter were pointed out. In order to avoid needless repetition we will not go over the same ground again in this story, but will simply tabulate the three major conclusions reached:

1. A heterodyne frequency meter is far superior to an absorption frequency meter as used by most amateurs.
2. A dynatron oscillator is better than an ordinary feed-back oscillator for use in a heterodyne frequency meter.
3. With a heterodyne frequency meter using a dynatron oscillator it is entirely possible and practical to attain an accuracy in frequency measurement within one-tenth of one percent or better if the meter is calibrated from A.R.R.L. Standard Frequency Transmissions, and such accuracy is by no means the ultimate.

Deciding on the heterodyne frequency meter with a dynatron oscillator as the best practical combination for precise work is by no means the end of the story, however. Oscillator stability, even though of utmost importance, is only one of the factors which necessarily influence frequency-meter-design. The object in view is accurate measurement of frequency, and every factor which affects the measurement must be taken into account, from the accuracy of the signals by which the meter is calibrated to the errors which may be introduced by the person making measurements with the calibrated meter, and including all the intermediate steps.

The accuracy of standard frequency signals is within 0.01% of the frequency announced at the time of transmission. Taking this as a basis, further errors can be safely considered to be entirely dependent upon the construction of the frequency meter and the manipulation of it by its owner. These errors may be divided into five general classes, as follows:

1. Errors in adjusting the meter to synchronism with standard frequency signals.
2. Errors in reading the dial settings during calibration and inaccuracies in curve plotting and interpolation.
3. Shifting of the oscillator frequency from any cause.
4. Error in adjusting the meter to synchronism with the signal whose frequency is to be measured.
5. Errors in reading dial settings and in reading the frequency from the calibration curve.

Nos. 1 and 4 are unlikely to cause any serious trouble since almost any operator can set an oscillator to zero beat with an incoming signal and be not more than a few cycles off true zero.

No. 3 is entirely a function of the suitability of the oscillator for frequency meter work and the mechanical construction of the meter. The dynatron oscillator meets the requirements nicely, as has been explained previously, and good mechanical construction is not difficult. When the total space current taken by a dynatron oscillator — as read by the milliammeter connected in the negative “B” lead — is maintained at

THE FRONT PANEL
On it are the tuning dial, the milliammeter for measuring space current, and the filament rheostat.
a constant value the effects of battery decay, aging of the tube and variations in grid bias are made negligible. The negative resistance — the only dynamic tube characteristic which can affect calibration — is practically constant in spite of such changes so long as the space current is constant. We therefore have a visual indication of the conditions in the tube, and by keeping the space current at the same value as during calibration can be sure that no changes have occurred which are attributable to the tube or batteries.

With a stable oscillator Nos. 2 and 5 are in the majority of cases more serious than No. 3, al-

This very uncertainty is one of the chief reasons why the heterodyne frequency meter is so far superior to the absorption meter for amateur work; personal errors have less chance to affect the accuracy of measurement.

GOOD CONSTRUCTION

With any frequency meter it is highly important that the chances of loss of calibration be reduced to a minimum. This makes necessary the use of well-built coils and condensers and rigid construction throughout. Continual handling of any part of the meter which can affect the calibration should be avoided. Plug-in coils are particularly bad in this respect, since it is almost impossible to prevent mechanical shocks to them by bumping or dropping them, and it is always necessary to be sure they are fitted into the sockets in just the same way as when calibrated.

Coil troubles may be avoided with the dynatron frequency meter since it is possible to use but one coil and condenser and calibrate the meter on the lowest frequency band to be covered, using harmonics for the higher frequency bands. There is an additional advantage to this, because the meter will hold calibration better at the lower frequencies and this will increase the accuracy at the higher frequencies as well, since the percentage change in oscillator frequency will be the same on the harmonics as on the fundamental.

For amateur work as carried on today the best system is to cover the 3500-ke. band with the frequency meter and use the second and fourth harmonics for the 7000- and 14,000-ke. bands respectively. These harmonics will usually be present in sufficient strength to be used easily and higher ones may be emphasized by special means if necessary. The 3500-ke. band is about the highest that can be successfully used with a maximum of tube life and a minimum of battery consumption with available tubes which will function as dynatron oscillators. Even if the transmitter is not used on 3500 kc. it is a simple matter to listen on that band for picking up standard-frequency signals for calibration purposes although even this is not entirely necessary, as will be explained later.

REDUCING THE PERSONAL ERROR

The selection of the 3500-ke. band for the oscillator automatically limits the tuning range to a little over 500 kc. since it is desirable to spread the band over the dial scale as much as possible. Too much band spreading should be avoided, however, since the calibration is least likely to hold at the ends of the scale. Lopping off fifteen divisions (100-division dial) at each end will be sufficient, and will leave 70 useful divisions over which the band is to be spread. Assuming the tuning condenser to have a straight curve of frequency vs. dial reading, each scale division

![DIA.LS](image)
will represent a little more than 7 kilocycles. Obviously it must be possible to read the dial to less than one scale division, because 7 kilocycles represents 0.2% at 3500 kc., and is twice the total error — from calibration to measurement — which should be allowed.

It was pointed out in September QST that a good dynatron oscillator could be expected to hold calibration within 1500 cycles at 3500 kc. under reasonable conditions. This figure can be bettered considerably if certain precautions in operation are taken, but is nevertheless a good one to use for the present calculation. It is desirable that the final frequency measurements made with the meter be within 0.1% of the actual frequency, which at 3500 kc. is 3500 cycles (3.5 kc.). Standard Frequency Transmissions represent a possible error of 350 cycles at the same frequency. The oscillator and calibration sources therefore make up a total of 1850 out of a maximum allowable error of 3500 cycles, leaving not more than 1650 cycles for all other errors.

Personal error is greatest when the amount of estimating required is largest. Nearly all of us can estimate accurately to a quarter of a scale division if the dial is a good one with fine lines — such as the so-called vernier dials with printed paper scales — and if the indicator is also a fine line with negligible parallax. Bakelite dials with filled-in lines are very poor because the line itself spreads over about a quarter of the division, and the indicators which can be used with such dials are rarely satisfactory.

If the dial is constructed with readability in mind: i.e., fine-line divisions, fine-line indicator, and negligible parallax, and each division is also supplied with a half-division marker, it is possible to easily read it to a quarter of a division and tenths can be estimated well enough to make accurate readings to a fifth of a division possible. A fifth of a division is 1400 cycles on the basis discussed above, and slightly less than the 1650 cycles allowable if the accuracy is to be within 0.1%. If it were possible to read accurately to a tenth of a division errors from this source would be reduced just that much more. If the error in frequency measurement is to be less than 0.1% the dial must be such that it can be read to a tenth or less of a scale division, or the tuning must be restricted to a smaller portion of the band so that each dial division represents a smaller percentage of the frequency.

* Parallax is the apparent difference in readings obtained when the dial is viewed from different angles. It is negligible when the indicator and dial are in the same plane, and becomes worse as the two are farther apart.

To meet the requirements outlined above, the dial must be at least four inches in diameter, and the larger it is the better will be the precision in reading it. The General Radio dial shown in the photograph (p.17) is a good one. The scale has 200 divisions, numbered to 100, and the indicator rides on the edge of the dial, eliminating parallax. The four-inch National dial shown in the photographs of the experimental frequency meter is also well suited to this work, and is supplied with a vernier for reading to a tenth of a scale division. The vernier scale is mounted above the dial because of the mechanical difficulty of building such a dial with the two scales in the same plane, and some parallax may be introduced unless care is used. The dial can be read accurately to at least a fifth of a division, however, in spite of this. The 6" National dial is the best of all if real precision in readings is wanted, and is so constructed that it can be read very accurately to a tenth of a division, and twentieths may be estimated. With this dial working under the conditions named previously (500-kc. spread over 70 divisions) it is possible to estimate accurately to within 350 cycles at 3500 kc., or 0.01%.

Since there are many amateurs who work only in the 7000- or 14,000-kc. bands, the dial problem can be simplified considerably if the frequency meter is made to cover 3500 to 3650 kc. over 70 divisions of the scale. In such a case there are only a little more than 2 kilocycles per division, and the required accuracy can be obtained without difficulty with a reasonably good dial.
The usefulness of the meter in the 3500-ke. band is restricted, of course. It is not advisable to attempt to run the oscillator on 7000 kc. directly because available tubes do not always oscillate well at such high frequencies.

PRACTICAL CONSTRUCTION

With a thorough understanding of the points discussed above it is possible to proceed to the construction of a frequency meter which will embody the suggestions which have been made. Such a meter, using a Type '22 tube as a dynatron oscillator, is shown in two of the photographs. The reasons for using a Type '22 tube as a receiving device, but simply as a miniature shielding of the oscillator and batteries, as is the ease with the monitor. In fact, the same batteries and "B" battery power consumption is lower.

The heterodyne frequency meter differs from the monitor in that it is not intended to be used as a receiving device, but simply as a miniature transmitter. Therefore no provision is made for the insertion of phones in any part of the circuit. There is likewise no necessity for thorough shielding of the oscillator and batteries, as is the case with the monitor. In fact, the same batteries which supply "B" power to the receiver may be used to supply the frequency meter also, unless it is desired to have the complete set-up portable, which is not advisable for ordinary station use.

On the other hand, there is no need for direct coupling between the frequency meter and receiver for satisfactory pick-up. Such coupling is likely to affect the calibration, and for harmonics up to the fourth, at least, is not necessary. If common "B" batteries are used for both receiver and frequency meter enough coupling will be provided. The frequency meter therefore need not be shielded if it is placed in a suitable location on the operating table and left there permanently, with no material near it which can affect the calibration. Shielding is sometimes helpful if the frequency meter must be located close to other pieces of equipment, however. The question is largely one for the individual constructor to decide. To be on the safe side it may be better to use shielding than not.

The wiring diagram for the frequency meter shown in the photographs appears in Fig. 2. This arrangement is quite compact and all the parts are supported by the panel. The leads between the tuned circuit and the tube are short — a desirable feature. The panel is bakelite, 7 x 10 inches, and on it are mounted the tuning condenser, the milliammeter for reading the total space current, and the filament rheostat. The tube socket is mounted on a piece of bakelite which is supported from the panel by two small brass angle pieces. This mounting also holds the by-pass condensers for the plate and screen-grid circuits. The fixed resistor, $R_x$, is used only if the tube filament supply is a 6-volt battery, and prevents the application of too much voltage to the filament. It may be omitted with a 4-volt supply.

The tuning condenser is mounted behind an aluminum shield to prevent body-capacity effects, since the condenser has no shielding end-plates. The coil, $L_2$, is mounted directly on the condenser, and is wound with No. 30 d.c.e. wire on a half-inch dowel. Both dowel and coil are coated with airplane "dope." In spite of the fact that a coil of this shape has a very poor form factor, it was found that the tube would oscillate more readily with it than with some others of supposedly lower r.f. losses. A coil of such small diameter has a rather small field, and the calibration of the meter is less likely to be changed when other objects are placed near it. The number of turns specified may vary slightly with individual constructors, and it should be remembered that the object is to spread the 3500-ke. band over about 70 divisions on the tuning dial. To do this it will be necessary to readjust the fixed plates at the back of the tuning condenser and filament as experiment with the coil, until the desired spread is obtained. With the number of turns specified, the two circular rotor plates should be moved toward the stationary plate between them until the spacing is roughly a sixteenth of an inch.

If the constructor prefers a different layout it should be remembered that leads in the coil-condenser circuit should be short, and that the lead from the plate of the tube to the tank circuit and...
those connecting the tank circuit through the by-pass condenser to the filament should likewise be short. At the same time, however, the coil, condenser and tube should be so placed as to be out of each others' fields as much as possible.

The capacity values for the by-pass condensers are not critical, but should be fairly large to prevent hand-capacity effects at the battery leads and the tuning dial. The larger the plate by-pass condenser is made the less will be the hand capacity during tuning. A half- or one-microfarad condenser is sufficient.

In the previous article the desirability of having a small amount of fixed capacity in the tuned circuit was pointed out. The General Radio condenser illustrated is ideal from this standpoint, the two circular plates supplying a fixed capacity which is easily adjustable within sufficiently wide limits. The only objection to this model is that the operator's hand is not shielded from the stationary plates. It is probable that a new condenser of the same general type but with metal end-plates will be marketed shortly, in which case the shield on the panel would be unnecessary. Other condensers without the fixed-capacity feature may be used, of course, either with or without an external fixed condenser to supply it.

Be sure to select one that is solidly built and which has wide spacing between plates — and good bearings — or the calibration of the meter is likely to change.

The desirability of a comparatively low $L/C$ ratio (High-C) is illustrated by the curves in Fig. 3. Both curves were taken with the dynatron oscillator beating against a crystal-controlled oscillator, and in each case the dynatron tube was "cold" when the run was started. In Curve I the $L/C$ ratio in the dynatron tuned circuit was about the same as would be used in a receiver designed to spread the 3500-kc. band over most of the dial. In Curve II the $L/C$ ratio was approximately that used in the frequency meter shown in the photographs. The change in frequency is noticeably less with the lower $L/C$ ratio, illustrating the point that the capacity between the tube elements changes as the tube temperature rises, and also emphasizing the fact that such variations in capacity can be "washed out" if the external capacity across the tube elements is made comparatively large.

If a separate fixed condenser is to be used in parallel with the tuning condenser it should preferably be an air condenser with low dielectric losses, since the '22 will not oscillate as a dynatron if the losses become too large. The capacity necessary will be in the vicinity of 50 µfd.

Although the exact value will depend on the minimum capacity of the tuning condenser being used. A low-loss midget condenser should be satisfactory, provided the plates can be locked in position by some means or other after the correct setting has been determined.

After the frequency meter has been constructed it should be connected up, using the same "B" batteries as are used on the receiver, and tested for oscillation. A separate "A" supply should be used; otherwise the milliammeter will give no indication. Listen in on the 3500-kc. band and turn the dial on the meter. If it is working at all there will be no difficulty in hearing it — most of the time the signal is R9 plus. If there is no sign of oscillation check all connections carefully and make sure there is nothing in the field of either the coil or the condenser to cause losses. It may be that the dynatron is oscillating at some frequency outside the range of the receiver, although this should not happen if the specifications given in Fig. 2 are followed carefully. If the tube is oscillating the milliammeter will show a deflection when a finger is touched to the plate terminal or the stationary plates of the condenser. It may be that the tube is a "dud," in which case the only thing to do is try another one.

In the diagrams the plate voltage indicated is 22 volts and the screen-grid voltage 67 volts. It is well to operate the tube at these voltages, but if the oscillations are too weak or there is no oscillation at all, 45 volts on the plate and 90 volts on the screen-grid will result in greater output.

While on the subject of tubes it is well to remember that the dynatron characteristics of individual tubes vary greatly. Some fifteen different d.c. screen-grid tubes (including both Type '22 and Type '32 and also the DeForest 422-A) of various makes were tested in the frequency meter illustrated and every one of them oscillated, but the amount of space current required for oscillation was different in almost every case, varying anywhere from 2.5 to 9.5 milliamperes. Obviously the tubes taking the lower currents are less likely to be deactivated in a short time, and it is important that the space current be kept at the lowest value which will give the desired results if the tube is to have long life.
In using tubes with thoriated filaments (the ones which light up rather brightly as contrasted with the dull red of the oxide-coated filament) it is a good plan to operate the filament at the rated voltage rather than above or below it. When using the filament rheostat to control space current, as in Fig. 2, the actual voltage on the filament is often 25% or more below the rated value. The space current, on the other hand, is likely to be somewhat greater than the rated plate-plus-screen-grid current for the tube. This may result in rapid deactivation because the thorium is torn off the surface of the filament more rapidly than it is boiled out from inside. To remedy this condition the filament should be operated at rated voltage and the space current controlled by other means. This may be readily accomplished by using the circuit shown in Fig. 4. The "B" current flowing through the 2000-ohm resistor causes a voltage drop which may be used as bias for the control grid, the value of bias being regulated by the movable contact. This voltage-divider allows smooth adjustment of space current within rather wide limits.

This frequency-meter, although only an experimental model, performed well enough to justify all the nice things that have been said about the dynatron oscillator. Starting with the tube cold, the total change in frequency while the tube warmed up over a period of about two hours was less than 800 cycles.

**DYNATRON METER WITH TYPE '24 TUBE**

While the '23 seems to be the more satisfactory oscillator for frequency-meter use, many amateurs will prefer to use the '24 because of its greater availability, lower cost, longer life, and the advantages of a.c. filament operation. In addition, no separate "A" supply is necessary, since the cathode is insulated from the filament. The construction of such a meter differs very little from that of the d.c. model, the only difference being in the heater and cathode wiring. The wiring diagram appears in Fig. 5.

With the '24 the grid-bias method of controlling space current is preferred to regulating the filament temperature because of the time lag with filament regulation. A rheostat may be inserted in one of the heater leads, but close adjustment of space current by this means is difficult because the temperature of the cathode thimble — and hence the cathode emission — changes very slowly. Variation of grid bias, however, gives quick and positive control of space current.

The construction of the oscillating circuit is just the same as with the frequency meter using the Type '22 tube. The filament of the '24 may be run from either a.c. or d.c., preferably the latter, because some tubes will be hummy with a.c. supply. The hum is the result of varying grid voltage, and since the grid voltage controls the negative resistance of the tube and consequently affects the frequency of oscillation, a sort of wobbulation results. Many tubes are entirely free from hum, however, and are entirely satisfactory with a.c. filament supply. Batteries should always be used on the plate and screen grid.

The '24 tube requires a greater length of time to reach a stable operating temperature, and the tube-capacity change is somewhat greater than with the '22. The '24 should always be allowed to warm up about a half hour before calibration or before making measurements intended to be accurate. The change in frequency at the end of the half hour will be between 2000 and 3000 cycles from the "cold" value, but after that time is not large enough to affect the performance of the meter unless the accuracy desired is more than 0.1%. If this precaution is observed the Type '24 is equally as good as the '22.

**HOW TO USE THE FREQUENCY METER**

Before going farther, let's get one point straight — the heterodyne frequency meter is not to be thought of as just a glorified monitor. It is not; and there is no provision in it for phones. It is intended to be used with the receiver and monitor; with the receiver for calibration and measurement of frequency of incoming signals, and with the monitor for measurement of our own transmitter frequency. In certain cases, the dynatron frequency-meter may be used as a monitor if the phones are inserted in the screen-grid lead, and if this is done the by-pass condenser from screen-grid to filament, or from screen-grid to cathode, should be made small enough so that it will not by-pass too much audio frequency — 2000 µfd. or less. In this case, however, listening must be done on a harmonic of the frequency meter or else the frequency meter and its batteries must be shielded after the usual.
fashion of monitors. The frequency meter must likewise be calibrated with the phones — or a resistance equal to that of the phones — in circuit, or the calibration will be "off.""

It is best to separate the functions of monitor and frequency meter, though, and we will proceed on that basis for the moment. The meter is supposed to be oscillating satisfactorily by this time, and a good signal from it can be heard on the receiver on the 3500-ke. band. At this time the strength of the second and fourth harmonics should be checked, unless the builder is interested in the 3500-ke. band alone, which is not often the case. If the signal strength on 3500 ke. is about 18, for the sake of an example, it should be about R6 on 7000 ke. and about R4 or 14,000 ke. If the 14,000-ke. harmonic is not strong enough to suit, increase the space current until the audibility is satisfactory. Try to keep the current down (below 4 milliamperes if possible) to prolong the life of the tube. If the current gets too high, connect the screen-grid lead to the receiving antenna through a small condenser — 10 to 25 μfd. or so. This will usually give plenty of coupling, and may allow the use of lower space current. The condenser should be large enough to give good coupling, and yet not so large as to impair the strength of outside signals.

When satisfactory strength has been obtained on all the harmonics to be used, read the space current indicated by the milliammeter and jot it down somewhere where it won't get lost. This reading is your reference point, and the space current should always be adjusted to the same value thereafter whenever the meter is used.

Naturally the first step in making the meter of value after the constructional work has been finished is to calibrate it. The frequency coverage of the instrument should be adjusted first of all by tuning it to zero beat with "marker" signals picked up on the receiver. Such marker signals may be simply those from commercial stations working near the edges of the amateur bands, many of which can be picked up at various times of the day. The "Radio Amateur Call Book" lists practically all of the high-power commercial stations in order of frequency assignments, and is helpful for this preliminary work.

The marker stations need not be near the edges of the band which is fundamental for the frequency meter. The 3500-ke. limit may just as readily be found by tuning in a 7000-ke. signal on the receiver and adjusting the frequency meter so that its second harmonic is at zero beat with the incoming signal, in which case the frequency meter will be tuned to 3500 ke. A 14,000-ke. signal could be used equally well. For instance, two good stations to use are WIZ on 6965 ke. and NAA on 4015 ke. When the second harmonic of the frequency meter is tuned to WIZ the dynatron frequency is 3482.5 ke. — very near the low-frequency edge of the band. NAA would

![FIG. 5. — USING A TYPE '24 TUBE](image)

Constants are the same as those of Figs. 2 and 4. The heater may be supplied with either a.c. or d.c., which may be taken from the receiver supply.

of course be tuned in on the fundamental. Many other stations could be used in like manner. If the coil and condenser in the meter are adjusted to tune to WIZ at 10 and to NAA at 90 on the dial — assuming the dial is set so that increasing numbers mean increasing frequency, which is the only logical way to do it — the band-spread is just about right. To make the dial read right, the indicator should be at zero when the condenser plates are meshed.

With band-spread all set and the final working value of space current noted, the stage is set for calibration. A rough calibration can be obtained by picking up various marker stations as described above and translating their frequencies, if necessary, to the 3500-ke. band. In fact, a fairly good calibration curve can be obtained in this way, although some of the points will not be inside the band and none of them will mark the edges exactly. It is possible, however, to get quite a few points inside the 3500-ke. band by listening to commercial stations on the high-frequency side of the 7000- and 14,000-ke. bands a great many points between 3600 and 4000 ke. can be secured by this method.

For example: WKU on 14,830 ke. might be picked up on the receiver and the fourth harmonic of the frequency meter tuned to zero-beat with the signal, giving a calibration point at 3707.5 ke. Or the receiver might be tuned to WEM on 7400 ke. and the second harmonic of the frequency meter tuned to the signal, giving a calibration point at 3700 ke. Again, WEG on 7520 ke. could be used, giving a point at 3760 ke. Innumerable examples of this sort could be cited, and with ten or fifteen scattered points a fairly decent calibration curve can be worked up.

It is in fact advisable to make up a calibration curve of this sort because you will become familiar with the operation of the frequency meter and
the curve will be helpful in finding the Standard Frequency Transmissions against which the meter is to be checked.

And now for the actual calibration from Standard Frequency Transmissions. By the time this story appears in QST W9XAM will have started

![The Five-Band Frequency-Meter Built By P. E. Handy](image)

The small double-pole double-throw switch below the filament rheostat knob puts the oscillator on either 1550 or 7000 kc. Harmonics are used for the 3500-, 14,000-, and 28,000-kc. bands. The dial is the six-inch National vernier.

its schedules, in addition to those which have been transmitted by W1XP (formerly W1XY-W1AXV) for so long a time, and it is probable that the new S.F. station in California will be ready to go within another month. When the three stations are in operation there will be at least one transmission a week available to amateurs in every section of the country, so there will be no lack of signals from which the frequency meter can be calibrated. The whole story of the Standard Frequency system will be found elsewhere in this issue, with complete schedules.

Suppose the 3500-ke. S.F. transmission from W1XP is to be picked up, and that the great night has arrived. Looking at the schedules, we find that the one for this band is marked “A,” and that it starts at 8:00 p.m., E.S.T. Make sure the station Big Ben is on time, because these schedules are sent right on the dot and there is no waiting for those unfortunates whose clocks may be slow.

Now take a look at the calibration curve which has been made up from points obtained by listening to commercial marker stations and find the dial setting on the frequency meter for 3500 kc. The meter should have been turned on fifteen or twenty minutes before the schedules start to allow the tube to reach a stable operating temperature. Tune in the signal from the frequency meter on the receiver and the latter will be set approximately to W1XP’s frequency — maybe exactly if care has been used in making up the preliminary calibration curve.

When the clock shows 8:00 p.m. start tuning around for W1XP until you hear his QST. After two minutes of this he will start sending “G” very slowly, signing now and then, for three minutes. During this period the regeneration on the receiver should be reduced until the detector is just out of oscillation, and the frequency meter tuned to zero beat with the S.F. signal just the same as with the receiver — except that in this case, we have a separate heterodyne. The sixth minute is the important one, because it is then that W1XP announces the exact frequency at the...
moment, and the figure announced is accurate to better than 0.01 % — often better than 0.001 %. Copy down this frequency on a sheet of paper and immediately alongside it jot down the dial reading on the frequency meter. Get this reading to the nearest tenth of a dial division, if possible.

At the end of this minute, W1XP will announce the next frequency to be transmitted and will go off the air for two minutes to make adjustments. The next frequency will be 3550 kc, according to the schedule, and transmission will start at 8:08 p.m. Follow the same procedure again in getting the 3550 kc. and succeeding calibration signal, and in this case the receiver should be allowed to oscillate weakly and all three adjusted to zero beat. Whenever possible, however, it is better to have the receiver out of oscillation because receiver tuning is eliminated from the picture and there is consequently less confusion in getting everything tuned up. Furthermore, the interference from unwanted signals is less when the receiver is out of oscillation.

**Plotting the Curve**

When the Standard Frequency Transmission is finished and the set of calibration points completed, the next thing to do is to make up a curve for the meter. This curve should be drawn to such a scale that it can be read to a greater degree of precision than the dial on the frequency meter. There is certainly no logic in having a dial on the meter which can be read to a tenth of a division and then plotting a curve which is so cramped that it is difficult to estimate to half a division. Ordinary cross-section paper will do very well — but use at least two rulings to represent a dial division and allow not more than 5 kc. to the ruling — preferably 2.5 — on the frequency side.

Fig. 6 shows a satisfactory “spread” for the calibration curve, based on the use of ordinary cross-section paper (20 lines to the inch). A rather large sheet of paper would be required to take the whole chart covering the 3500-kc. band, but the curve can easily be split in two parts — one running from 3500 to 3750 kc., with some overlap on each side of course, and the other from 3750 to 4000 kc. The first chart will take care of the lower frequency half of the 3500-kc. band and all of the 7000- and 14,000-kc. bands. It is also a good idea to jot down on the chart the actual dial readings at the calibration points — the curve is only for convenience anyway, and the best accuracy is only obtainable at the actual calibration points. While the curve drawn between the points may be — and should be — very smooth, it is really only an estimate. The important thing for an amateur frequency meter to do is to define the limits of the bands accurately, and the Standard Frequency Transmissions make this possible. Therefore note particularly these transmissions which mark band limits.

The 3500-kc. calibration is of course useful on the other two bands as well. Simply multiply all frequency readings by 2 for the 7000-ke. band and by 4 for the 14,000-ke. band. It is a good idea to put all three down on the chart as shown in Fig. 6.

Great strides have been made in frequency measurement and frequency stability of transmitters during the past few years, with the result that tolerances have been tightening up all along the line. The present requirement for fixed stations above 1500 kc. is roughly 0.1 %, and for stations on lower frequencies, particularly broadcasting, somewhat more rigorous. With hundreds of such stations on the air between 500 and 20,000 kc. a rather good calibration can be made for a frequency meter with the aid of the receiver and a list of stations and their assigned frequencies.

Although the frequencies do not fall directly in the amateur bands, a check on almost any desired frequency can be obtained by juggling harmonics to fit the case. It is a very interesting field for experiment for the fellow who thinks of something besides DX now and then — and when you get a large number of points which check out into a good curve you know you’re right no matter what some fellow with a twenty-dollar
“wavemeter” may say about it. Besides, the Standard Frequency Transmissions can be used nearly every week to give a good check.

After an accurate calibration from Standard Frequency Transmissions has been secured, note the position of a few commercial stations who are on the air regularly and make a record of them.

Every good station has a monitor, and with its aid measurement of transmitter frequency is quite simple. First tune the transmitter to zero beat with the monitor. Then leaving the monitor set at this point, pick up the signal from the monitor in the receiver and treat it in the same way as any other incoming signal in measuring its frequency. The transmitter must be turned off, of course, during this step. In making a measurement in this way the phones used with the receiver, or else a resistor of the same value as that of the phones, must be plugged in the monitor. This will avoid the change in monitor frequency which would occur if the phones were removed and a short-circuiting plug used instead. The process would simply be reversed to set the transmitter on a desired frequency. The only difference between this and the common stunt of placing the transmitter at a given point on the receiver dial with the aid of the monitor is that an accurate measurement of the frequency is made.

It has already been suggested that the phones could be plugged in the screen-grid lead of the frequency meter and the meter used as a monitor. This will work best if the transmitter is on a higher frequency than that to which the frequency meter is tuned, because the pick-up on the fundamental will be too great unless the frequency meter and its batteries are thoroughly shielded. In this case the meter must be calibrated with the phones — or an equivalent resistance — in place or the calibration cannot be depended upon. A separate monitor is very much to be preferred to such an arrangement.

Another possible way of measuring transmitter frequency without the aid of a separate monitor and without using the frequency meter for listening purposes is to listen to the transmitter on a harmonic of the receiver. For instance, if the transmitter is in the 7000-ke. band the receiver may be tuned to 3500 ke., picking up the signal on the receiver's second harmonic. The frequency meter would be adjusted to zero beat with the signal, and the frequency read accordingly. The receiver cannot be used out of oscillation, however, because harmonics are not present when it is not oscillating.

In using harmonics of a heterodyne frequency meter or in listening to a transmitter on harmonic
ics of a receiver or monitor be careful that the transmitter is on the harmonic you think it is. It would be easily possible to listen on 3500 kc. to a transmitter supposedly on 7000 kc. but which was really on 10,500 kc. Perhaps the first adjustment should be a rough one with the receiver on 7000 kc.; although the transmitter will make a rather heavy noise all over the band it will reach a peak at some frequency which will allow identification of the harmonic.

A FIVE-BAND FREQUENCY METER

While a meter covering the 3500- and 14,000-ke. bands, it may be necessary to cover the 1750- and 28,000-ke. bands as well. F. E. Handy, A.R.R.L. Communications Manager, wanted to cover all frequencies in the 2-fl,000-ke. bands as well. F. E. Handy, A.R.R.L. Communications Manager, wanted to cover all bands and built the meter shown in two photographs. The diagram appears in Fig. 7.

Two coils are used in this meter, one for the 1750-ke. band and the other for 7000 ke. The tuning condenser, a Cardwell Taper-Plate which has been double spaced, is adjusted so that when connected to the 1750-ke. coil the band is spread over the dial with a little leeway on each end. The midget condenser is permanently connected between the condenser and the front panel. There is also a jack connected across the tube filament so that a voltmeter can be plugged in to read the filament voltage on the tube.

The 1750-ke. coil is mounted on the underside of the sub-panel directly over the main tuning condenser. Either coil may be selected by throwing the small double-pole double-throw switch on the front panel to the proper position.

A resistor in series with a single-pole single-throw switch is connected across the 0-10 milliammeter so that the range is extended to 100 milliamperes when the switch is closed. The switch is visible on the front panel to the left of the dial and below the milliammeter. The milliammeter terminals are brought out to a jack on the front panel so that the meter can be used for measurements in other circuits. There is also a jack connected across the tube filament so that a voltmeter can be plugged in to read the filament voltage on the tube.

The dial is a 6-inch National with the vernier scale. A FIVE-BAND FREQUENCY METER

The oscilloscope on 7000 kc.; although the transmitter adjustment should be a rough one with the receiver approximately 6950 to 7550 kc., the high-frequency limit being chosen so that the fourth harmonic of the meter will take care of the entire 28-mc. band. The 7000-ke. coil is mounted on the small sub-panel which holds the midget condenser, between the condenser and the front panel. The 1750-ke. coil is mounted on the underside

![Diagram](image-url)

FIG. 7.—A FIVE-BAND FREQUENCY METER

The oscillator operates on 1750 or 7000 kc. by throwing the double-pole double-throw switch.

C1 — Cardwell 6-plate condenser (taper-plate) adjusted to cover the 1750-ke. band in conjunction with L1.

C2 — 60-µfd. midget condenser.

C3 — 1 µfd.

L4 — 990 turns of No. 36 d.c.c. on %-inch form.

L2 — 45 turns of No. 48 d.c.c. on %-inch form.

R1 — 60-ohm rheostat.

R2 — Resistor to extend range of milliammeter to 100 milliamperes. Exact value will depend on resistance of meter. This resistor is not required unless the meter is to be used for external measurements.

MA — 0-10 milliammeter.

THINGS TO REMEMBER

The chap who has stuck with this story thus far should have a fairly good idea of how a dynatron frequency meter should be built and used. Here is a little summary, however, put at the end to serve as a reminder:

1. Get a good solid condenser with wide spacing between plates, and which will hold calibration more than ten minutes. Get one with a fixed "tank" capacity if possible.

2. Make everything as solid as it can possibly be made. Keep the coil small and dope the wire so it can't come loose.

3. Keep the space current at the lowest value which will give satisfactory signal strength on all bands wanted.

4. When calibrating the meter keep the space current constant at the most satisfactory value and always have it at the same value when taking readings.

5. Allow the tube to warm up from fifteen minutes to a half hour before calibration; also before taking readings which you want to be especially accurate.

6. Check the calibration now and then to make sure it is holding, and recalibrate when necessary.

7. Don't remove the tube from the meter or change tubes without recalibration.

8. When you make use of a Standard Frequency Transmission drop a card to Headquarters and let us know about it.
Looking Ahead

ONE of the things that has contributed a lot in past years to building up our A.R.R.L. has been our ability to look ahead. It is one of the very important ingredients of success. I believe it applies to every one of us individually, as well as to our organizations.

I have been wondering for almost a year now what it is that we radio amateurs ought to be doing now in order to have at Madrid, in 1932, the general set-up that is to be needed at that time. In other words, what is it we shall be kicking ourselves for not having done along in 1930 and 1931, when our representatives sit down in Madrid in 1932?

We can best judge the answer to this question by looking back at the Washington International Radio Conference of 1927. We were not exactly greenhorns in international negotiating in 1927, because we had been through the International Radio Congress at Paris in 1925 when our I.A.R.U. was formed. But, just the same, we had to watch our step when we found we were up against some 150 delegates from some 75 foreign countries, colonies, protectorates and what not, ninety per cent of whom had absolutely no use for amateur radio. It will be recalled that only by the skin of our teeth and the heroic effort of our spokesmen, backed up by our U. S. delegates and those of a very few other countries, chiefly Australia and New Zealand, were we able to have any amateur radio at all.

We do not want such a fierce fight in Madrid. In fact, if you think enough about it, you wonder if things could not be so fixed by 1932 that instead of having a fight we might be offered some help. There’s a whale of a difference between the two. I am even optimistic enough to believe that if we do the preparatory job well enough, we may be listened to favorably when we ask to have some of our hands widened. Now just what was it at Washington that caused most of the nations of the earth to be arrayed against us? It was that they knew nothing about amateur radio. If half of the magnificent story of amateur radio had been known to those foreign delegates, we would have had an entirely different kind of an experience. Ours is a magnificent story. I happen to know, because I have had to tell it and by actual experience know that it tells well.

If, then, our story is a fine one that will stand any amount of searching investigation — in fact, the more searching the better — then does it not follow that it’s up to us to tell it to those delegates who will convene in Madrid in 1932? It seems to me it is. If I am right, then the thing to do is for us to roll up our sleeves and go to work telling it.

How shall we tell it? It seems to me that, since it is in foreign countries that the telling is necessary, we of the A.R.R.L. who have the story should see to it that our brothers in all of the nations where we have I.A.R.U. representation set about an organized effort to get a steady supply of amateur radio knowledge into the hands of those men who will be delegates at Madrid in 1932. If the story of amateur radio as we know it here in America were to be got over to those who will be present there at that time, it would make things tremendously different for our representatives.

Hiram Percy Maxim
A Multi-Range Receiver With Four Tuned Circuits

By Robert S. Kruse*

There is a marked tendency in high-frequency receiver design towards single-control tuning of two and more circuits. The receiver described by Mr. Kruse involves true single-control tuning of four circuits, and the trick is successfully accomplished. The receiver has a number of features which can be profitably adopted for amateur use. — Editor.

The amateur receiver with but one tuned circuit seems to be passing, at last, as did the "single circuit" broadcast receiver of evil memory. Two tuned circuits are now accepted as a matter of course, even though one is sometimes accompanied by another control. Logically, and surely, we shall proceed to more tuned circuits, more r.f. gain, and easier operation.

The widespread opinion that such receivers cannot be built to operate with single control at high frequencies has some basis in fact, but is not wholly correct. The single-control receiver with two tuned circuits has indeed reached commercial form for frequencies as high as 33,300 kc. (9 meters), and is in wide amateur use.

With so definite a tendency in view it is interesting to look ahead toward the future receiver. This need not be done blindly for there has only just appeared a receiver which, though designed for aircraft use, may very well be the forerunner of the amateur receiver of the future. That is our story.

The Stromberg-Carlson Model D Aircraft Receiver operates at frequencies as low as 235 kc. (1276 meters) and as high as 8000 kc. (37.5 meters) with its normal coil equipment, maintaining over this range a very high degree of sensitivity and selectivity much above that found in the usual high-frequency receiver. It is purely single-control, uses but five tubes, makes small demand on the plate supply, and is designed with particular attention to the reduction of noise. The frequency range, incidentally, can be perfectly well extended above 8000 kc. by means of additional coils, not normal to the commercial set. This has been done at Aircraft Radio Corporation, where the set was designed. Again the performance was greatly superior to that of the usual amateur set.

GENERAL ARRANGEMENT

Since the Model D is primarily meant for use in aircraft, its construction has considered the requirements of that severe service. As may be seen from the photograph, a cushioned mounting is provided for the set, and the inter-connections between the set, the control-head, the junction box and the battery box, are run through highly flexible metallic braided hose. This hose provides electrical shielding and mechanical protection. It is obtainable in lengths of 2, 3, 4, 7 and 10 feet and is connected to the various units by means of screw-couplings. This arrangement provides ease of servicing and great flexibility in the placement of parts in various types of ships. A remote tuning control can be supplied, but this has not been shown here, as it is solely of aircraft use, being intended to permit placement of the set in the fuselage at distance as great as 35 feet from the pilot or other operator. One may, however, note that the set cannot be fussy if such an installation is to be practical.

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From other photographs and from the general diagram of Fig. 1 it may be seen that there are 3 stages of straightforward r.f. amplification, a "bias" detector, and one resistance-coupled audio stage. Study of the diagram will show that unusual attention has been paid to the "de-

coupling" of different r.f. stages by means of by-pass condensers and de-coupling resistors. As shown, the circuit does not provide for oscillating-detector reception, but this does not mean that the thing is impossible with this sort of a set. Much c.w. reception has been done at Aircraft Radio Corporation with the set using a separate heterodyne. As in the case of modulated reception, the only limit on reception has been the noise level due to electrical disturbances arriving at the antenna. If, for any reason, the receiver were to be used primarily for c.w. reception it would be simple to introduce controllable regeneration and self-oscillation. This, however, would be of no advantage whatever for modulated signals.

The antenna used in the plane is a vertical metal mast — if one may use that term for a stub only 5 feet high. The pickup is at all times close enough to the plane well bonded to prevent loose-contact noises. When used at a ground station the set needs no more than a 10-foot antenna; even this is sometimes excessive at quiet places miles from the electrical disturbances of any town.

**NOISE LIMITING FEATURES**

With such sensitivity the noise problem is of some importance. It is attacked at several points in the set. The usual broadening effect of antenna resistance is avoided because the high sensitivity permits the use of an antenna too small to produce such broadening. Thus there is good preselection of the desired signal, as against noise and interfering signals. The selectivity through the r.f. system as a whole is about that of a very good broadcast receiver with four circuits, when working in that frequency range. The selectivity unavoidably
decreases at the higher frequencies but remains much superior to that of sets with fewer tuned circuits — especially to the type of amateur receiver with one lonesome tuned circuit. The noise which reaches the detector is, of course, passed through to the audio tube. At this point, it encounters an audio filter which cuts off all high-pitched noises, passing only audio frequencies below 3000 cycles. A very large part of the energy of static and of man-made electrical noises, as well as the notes of off-tune c.w. stations, lie above that pitch. These things are severely attenuated without the undesirable features of a peaked audio transformer which reduces noise but spoils voice reception for the phone man and afflicts the e.w. man with a wearisome and unchangeable fixed pitch at which all signals must be heard. Another feature of particular interest to the headset man is the output device. This keeps the "cans" free from the plate supply voltage and also permits the use of either normal high-impedance phones or the new 120-ohm phones which weigh but half as much as the old and are thinner, flatter and far more comfortable. The use of heater-type tubes through the entire system is in itself a noise-eliminating feature in the plane where a battery-charging generator is operating during reception. On the ground this is of no great consequence but may be pointed to as offering a useful suggestion for future sets with a.c. supply.

Anyone who has used shielded high-frequency receivers must be aware of the exceedingly irritating performance given by a set with various parts of the case in uncertain contact, as for instance, in the tongue-and-groove aluminum cases of several years ago. The noises and jumpy reception of such a set are bad enough on the ground and would, of course, be intolerable during the vibration of a plane. All contacts between parts of the case are, therefore, either screwed or riveted permanently or confined to points where good pressure-contact (spring) can be maintained. Thus the removable tube-compartment cover and the removable panel carrying the coil-gang are felt lined and make no contact with the case except at the retaining pegs, where positive spring contact is made by the latches holding the part to these pegs. These latches, incidentally, are in themselves something of an innovation after so many years of sets with loose screws, thumbnuts, snaps, turn-buttons and springs — not one of which ever contrived to combine ease of removal with positive action and silent electrical contact.

One other anti-noise provision must not be overlooked. This is a 3-position switch providing points for "off," "on" and "stand-by." The third of these is used during transmission and leaves the filaments hot while cutting the r.f. cathode returns free from ground. The shielding and filtering of the set is so thorough that this leaves the detector and audio stage almost com-pletely silent, even in the presence of a transmitter in the same room.

THE FOUR-GANG CONDENSER

To gang four tuned circuits successfully the stray capacities must be reduced as far as possible and made as nearly equal as is practical. In addition to this, the operation of the set, including coil changes, should not vary any capacity in the set, except the tuning capacity. This last ideal is not altogether attainable since it is necessary to change the r.f. cathode-return resistance in controlling volume, also to tolerate a gradual decrease of plate potential (if dry cell plate supply is used), together with some small unavoidable mechanical irregularities in the gang itself. Since these things all produce small capacity alterations in one or several stages, one may not work at too low a value of tuning capacity. The gangs in this case have a capacity of 150 µµfd. per section and are shunted by an air-dielectric trimmer of 25 microfarads capacity, except for the antenna-input circuit which uses a trimmer of twice this capacity in series with the antenna capacity. A fairly high minimum capacity is thus assured and minor variations are decreased in importance.
To any possible objection of such a high C/L ratio one may reply that the set has sensitivity in excess of any need, and one might as well trade some of it in for the exceedingly valuable feature of single control, which would not otherwise be practicable. The design of both the air-dielectric trimmers and the tuning gang itself has been aimed at very low loss and extreme mechanical rigidity. Thus, though there is a fairly high minimum capacity, it is not through a high-loss material. The condenser gang has rotors and stators of the familiar soldered-plate type. It is very rigid because of the small size of the plates and the use of 5/16" steel rods for the lengthwise members of the frame. Cadmium plating is used on rotor and stator to prevent corrosion of the conducting surface under conditions of high humidity. The air trimmers are simply small variable condensers of a substantial sort with their shafts slotted for screwdriver setting. After setting they are sealed with wax and need no further attention. The antenna trimmer may be reached through an opening in the case as there is occasionally some reason for antenna alteration and a realignment at this point.

The coils

The set, although having many coils, is altogether free from the usual bunch of loose coils. As may be seen from one of the photographs, all four coils of a set are mounted on a panel with a handle. This panel acts as a cover for the coil box, or closes the side of the set when coils are inserted in it. The thing is done with one motion and with less effort than is required for some single coils. This is due to nice construction and to the use of spring-contact plugs of the familiar "spring banana" type. Each coil carries its own shield with it, which at once affords protection and absolutely assures that the coil will be at the same distance from its shield and therefore will have the same tuning range. The possibility of repairing the coil or replacing a plug is provided for by making the coil shields sectional with the cover secured to the panel or base and the shallow can bottom carrying the coil, which is removable by means of a bayonet catch released when the can bottom is turned slightly. One of the photographs shows a coil removed from its can. From this picture and the one showing a set of coils one may see the construction. The coil form is of R-29 low-loss bakelite, moulded into a smooth cylinder with a flange at one end to carry the terminals. Threads are machined into the form for carrying the windings. The flange does not carry the plugs in the familiar manner but instead carries the jacks or sockets. The plugs are inside the set where they will not be bent over by accident. The primary of each r.f. coil is "inter-wound" with the secondary, in other words, the primary turns lie between the secondary turns. Each coil set gives a tuning range of approximately 2 to 1, in terms of wavelength. The familiar objection to such a range is not substantiated with a high-gain set. In order to understand this one must recall how exceedingly hard it was to "juggle" a distant broadcast station into tune with the early broadcast receivers and how much easier it is to do the same thing with a modern high-gain receiver of enormously greater selectivity.

Special features

The battery drain of the receiver is surprisingly modest, being about 7 to 12 milliamperes (depending on the setting of the volume control) at 144 volts on the plates and 67 volts on the screens. The odd voltages are due to the use of a special compact battery (Eveready Type 769 Aircraft) but are not exceedingly critical, as is shown by the continuance of good performance during a long battery life. When connected as shown, the filament circuit is adapted to use at 12 volts (the rating of the common aircraft storage battery) and the drain is accordingly that of a single filament, 1.57 amperes.

The story is not complete without some mention of features of aircraft interest. Among these is the flexibility that has been referred to. The

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1 The General Radio plugs familiarly known to amateurs are of this type. — Editor.

2 This is the same type of coil construction used in the new National single-control high-frequency receiver. The plate coil of a preceding stage is wound between the turns of the grid coil of the following stage (or detector). The number of plate turns being 60% to 100% the number of grid turns. The specifications for the amateur bands will depend on the capacity range of the tuning condenser as well as the minimum capacity across the coil. The figures given for the various bands in articles describing other tuned r.f. receivers can be used as a basis. — Editor.
set can be located almost anywhere in the ship and may be set on its cradle or hung from it by one simple change. Coil changes are not normally made in flight, but where this is to be done the set may be located in an accessible place and coils can be changed by the pilot, even when he has no one to whom he may turn over the controls. This has been done repeatedly. The junction box is simply a place into which go cables from the

“\(A\)" and “\(B\)" battery and the switch box, and out of which goes a single cable leading to the set. The junction box must be near the set; the other units may be located at convenience, the actual tuning control being intentionally separated from everything (including volume control and off-on switch) which need not be visible. Thus even the most cramped plane may be fitted out.

Fine tuning by means of a remote mechanical control may seem dubious. It is actually quite workable. The drive is through a flexible shaft of any necessary length up to 35 feet. At one end of the shaft is a small reduction gear which goes into the place of the tuning knob shown in the set photograph in this paper. The shaft turns a greater number of times than in a land station.

Other things that are not visible in the photographs and rather tiresome to detail may be mentioned in brief. They are the care in dust and moisture proofing by means of gaskets, the mechanical solidity and the extreme accessibility for repairs. The last may be better appreciated by examination of the photograph showing the by-pass condensers and small resistors under the tube shelf. The connections between the shielded metallic conduit and the various units have been spoken of as being made by means of screw collars. This is correct only as applied to the junction box and battery box. The other connections — set, dynamotor and control head — are by means of armored multi-plugs which are retained by means of a spring catch when in place but may be released by thumb pressure.

The dynamotor just mentioned is a small affair which mounts on a hollow base containing the filter for the plate current supplied by the dynamotor. Whether dry battery or dynamotor be used depends on the preference of the aircraft owner.

The utility of a multi-range high sensitivity set that is not cranky in tuning is manifest enough in aircraft work. “Range” signals — radio beacons — operate on high frequencies where not a great deal else saves occasional weather information is to be found. For entertainment of passengers, handling of message traffic, or two-way telephone additional frequency ranges are essential, although hitherto aircraft have had to be content without this utility, for it is even less practical to manipulate four separate coils into their respective sockets on a plane than in a land station.

Editorials

(Continued from page 8)

And, it seems to us, real progress has been made. We would like to urge upon those who are displeased a sober realization of the fact that A.R.R.L. decisions must be made on the plan of the greatest apparent good to the greatest number, and the further realization that the plan of government is bound to work out satisfactorily if one is willing to accept the idea of majority control on which A.R.R.L. is founded. When members do not agree with policies, their remedy is to change the policy-makers if they can, and admit they’re wrong if they can’t. Half of the A.R.R.L. divisions are holding elections this autumn. The new directors should be truly representative of majority sentiment in their divisions on all major amateur questions. Right now is your constitutional opportunity to see that this condition is satisfied, and it’s nothing short of a bounden duty that you see that it is.

K. B. W.
High Frequency Notes

By Clark C. Rodimon, Managing Editor

It is our sad duty to relate that after all our preparation and excitement over the June 28-mc. tests reports from four continents are the same — no DX signals were heard. Often the correspondents would mention being able to hear and work stations on 28 mc. until the week before the tests, then all went dead, and to this writing has stayed in the same condition. If nothing else, we must admit that original premises of several experimenters appear to be correct — that 28 megacycles is not usable during the summer months. Thus we must content ourselves with the consolation that we proved their contentions. We had wholehearted cooperation from Great Britain, through the efforts of Mr. H. J. Powditch, G5VL, of the R.S.G.B., as well as amateurs on the continents of Europe and Oceania, not to mention the China stronghold of Mr. Rodman, XU2UU.

We are going to present a few brief notes that have come into Headquarters relative to high frequency communication in an informal manner; quite a few deal with the 28-mc. tests.

"No reports of reception of your stations (U. S. A.) have been received during the 28-mc. tests."

"G6LL, who was the most successful station during our tests, reports no results. G5YK only heard a number of European commercial harmonics. Both of these stations put out test calls but with no results outside of a few local contacts and reports.

"While on the subject of 28-mc. tests may I add that we shall be running a further series of tests during January, 1931 and ask in good time for the collaboration of A.R.R.L. members. (Definite dates and times of these tests will be announced later. — Editor.)"

"Copies of the 1930 test results were sent so far as possible to all American stations who reported our signals. If any were inadvertently overlooked I would be glad to forward a copy upon receipt of a card." — H. J. Powditch, G5VL, Contact Bureau Organizer, R.S.G.B.

From several sources we received a message from ZL4AAA saying to disregard reports of 28-mc. QSO with Europe until we received confirmation from him. This confirmation never came so probably the lane between Europe and Oceania has never been bridged on 28 mc. We know that schedules between England and Australia have been kept, but all reports so far have been negative.

Several reports were received from G2JU during and after the 28-mc. tests. They all contained the same news — no signals save local harmonics. G2JU was transmitting with a d.c. crystal signal on 28, 392 ke.

From W2BON we received word of no success on 28 mc. and a prediction that 28 mc. will not be usable until August. W2BON is also experimenting on 56 mc.

W1AXV reports being heard in Uruguay by Cx1FB on May 25 while transmitting on 29 mc., but no DX reports during the June tests.

W18Z was heard locally.

W1PI was active during the tests but reports only local contacts with other experimenters.

W2AJP reported for every week-end and during the week-end of June 15 he succeeded in hearing W9EXW and worked W9AZZ but for only a few moments for fading was very bad. This was on 28 mc.

W9FUR reports hearing W4NH on 28 mc during the first week-end test.

W9AZZ reported hearing nothing on the first two week-ends of the 28-mc. tests but on the third week-end directly after a local thunder storm, while the sky was still cloudy he succeeded in working W2AJP, W2ACN and W8FZ; hearing W2BG. On June 22 W8SS was contacted with good signal strength both ways. The last weekend the band was completely dead. It is interesting to note from the report of W9AZZ that the only contacts and reception were made when the sky was overcast. He also noted that with his reflector transmitting antenna fading was not nearly so pronounced. No foreign signals were heard.

(Continued on page 74)
How Our Signals Look
An Oscillographic Study of Short-Wave Stations

By Paul E. Griffith, W9DBW*

Have you ever turned on your receiver just as the sun was setting and listened to the terrific QRM on the 7000-ke. band? I'll wager you have; and you wondered where in the wide, wide world a few thousand amateurs could get half as many different kinds of notes, varying from the purest, of pure crystal-controlled d.c. to the worst kind of ripping, gurgling, buzz-saw like, a.c. You ask because most amateurs use full wave rectification in their plate supply equipment. A "pure d.c." note is caused by the absence of modulation of the carrier frequency in any way. Let us now approach this same subject in another way; a way that is very neat and productive of real results.

To most amateurs the word "oscillograph" is merely a meaningless word that is hard to pronounce and harder yet to spell; but to one informed in the more advanced stages of radio it is the name of a wonderful instrument for measuring and studying a.c. waves and transients of frequencies up to 10,000 cycles per second. It usually consists of a very fine loop of silver ribbon mounted between the poles of a very strong magnet. Current passes down one leg of the loop and up the other, causing a motor action which rotates the coil slightly. Mounted on this coil is a very small mirror, about the size of two pin-heads side by side, and very light. A beam of light is focussed on this mirror and reflected from the mirror to a film or to a revolving mirror for visual checking of the action. If an a.c. wave is sent thru the element the motor action will cause the mirror to vibrate and the beam of light to deflect, thus tracing on the film the wave-form of the current passing through the wire. The element will give a true picture of any frequency up to 1200 cycles and a slightly less

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accurate picture of frequencies as high as 10,000. The falling off of accuracy with the increase in frequency is due to the inertia of the mirror. In use, the element is immersed in a bath of Nujol for damping purposes only.

There are also other types of oscillographs — the electrostatic, rather than the electro-magnetic as above; the string oscillograph; the cathode ray oscillograph; and a refinement of the latter in the Dufour oscillograph, which is about the fastest known. With it waves of a frequency of ten million can be taken.

Since I was fortunate enough to have a six-element Westinghouse portable oscillograph of the Duddell or electro-magnetic type in the laboratory in which I work, I decided to make a few pictures of the waves of amateur and commercial stations heard on short waves. This was done by passing into the oscillograph the output of a short-wave receiver through a special impedance matching transformer. In every case the reproduced wave is that of the beat between the oscillating detector of the receiver and incoming wave, and since all modulations of the incoming signal are reproduced in the beat note, it is possible to study the waves nicely.

The photographic apparatus used is that described by Travis and Hunter, and enables the operator to take a picture four hundred feet long if needed, but ordinarily one four-hundred foot roll of Eastman Super-speed, 32 mm., motion-picture film is sufficient to make a great many records. Because the camera is turned by hand it is necessary to have some sort of time line on the film, so the usual method is to pass 1000-cycle current from a General Radio Type 577 Low Frequency oscillator through one of the three elements focussed on the film. The signal being studied is put through another element and the third is used for anything else necessary. In our study it is left unactivated and shows up on the film as a white line. The use of the 1000-cycle time line is a great convenience, enabling one, as it does, to read the records in thousandths of a second. An illustration shows the oscillograph with the camera in place. When used to check visually the incoming wave-form, the place of the camera is taken by a revolving mirror which provides the time element necessary to make the wave-shape visible.

Trouble was had at first in getting sufficient amplitude for the correct recording of the waves received, but when a Type '40, a Type '12-A, or a Type '09 tube was used as detector in place of the Type '01-A, the amplitude of the signal was more than tripled.

The photographs shown are those chosen from a number of films because they illustrate a few things in regard to keying, transmitter adjustment, frequency stability, and plate supply. In all cases the receiver was untouched while the picture was being made, so that any change in the signal was due to the transmitter. Even though the receiver was supplied with d.c. throughout and no a.c. induction could be heard in the phones, the oscillograph shows that a slight bit of 60 cycle a.c. was picked up by the amplifier — just enough to cause a slight modulation of a wave of constant amplitude — of a known strength, so no harm was done.

In the pictures to follow the bottom line is the 1000-cycle timing line. The signal studied may occur on either of the two remaining lines, depending upon which of the two lines was used at the time the record was made.

In Figs. 2 and 3 we have pictured the waves of excellent stations. Fig. 2 is the wave of an amateur crystal-controlled station having a pure, unmodulated carrier. Notice how the amplitude of the wave remains constant except for the slight a.c. modulation due to amplifier pick-up. The frequency of the received audible signal is 900 cycles, that being the frequency of the tone most pleasing to the ear and the loudest. It stays constant during the entire time the key is down. This is as it should be and is the kind of wave that every station should emit. The keying is very excellent because the signal builds up gradually and stops gradually. Credit should be given W1ID for this picture, as the wave belonged to him.

Fig. 3 is that of a modern commercial station, WEZ. It is perhaps the best station heard yet. Here is a wave that has all the requisites of an excellent station: no keying surges, a pure d.c. (no modulation) wave of constant frequency; and perfect spacing. This was taken just after it stopped sending a machine-gun-like string of dots. The beat frequency is 1000 cycles within the limits of error. Our definition of an amateur Utopia would be one in which all amateurs had waves like this and had faxes as good as the machine that sent that "d". The spacing is perfect, each space being 0.015 second long, the total "d" consuming 0.192 second.

FIG. 2

1 A splendid explanation of the use of the oscillograph was given by G. F. Lampkin in Radio, August, 1929, page 28.

Just to prove that not all commercial stations are like WEZ, figure 4 has been inserted to show what WIZ’s wave looks like.

This is a beautiful illustration of key clicks and key thumps, such being very prominent at the beginning and end of each dot or dash. Notice that the amplitude of the signal decreases after the initial keying surge, gradually building up, only to be broken by the surge at the end of the dash. That it is not fading is shown by the fact that all the dots and dashes on the six feet of film of this station have the same shape of envelope.

"Wobulation" is defined as the change of carrier frequency on modulation; it is inherent in most amateur and commercial self-excited transmitters using incompletely filtered plate supply because of the change of frequency of the emitted wave with change of plate voltage. Also, dust in a variable condenser; some r.f. leakage somewhere; some poor contact or other hard-to-find loss may cause wobulation.

Fig. 5 is that of an amateur station’s wave which is afflicted with “wobulation,” due, probably, to some irregularity in the transmitter proper. The sudden change in frequency is marked, and is the cause of the roughness heard in the waves of some stations.

Fig. 6 shows that modulation of a wave may be complete provided some means of keeping the output frequency constant is provided. There is no "wobulation" at all, contrary to what one would expect, because the transmitter is crystal controlled. The beat frequency remains constant regardless of modulation; it is 1000 cycles and is modulated at — according to the film — 112 cycles. This is one of the Department of Commerce short-wave air mail radio stations which uses crystal control with 60(?)-cycle a.c. on the plates of two quarter-kilowatt tubes in push-pull as the final amplifier stage. Most of us have heard these stations on 88 meters in the evening and know how sharp and easy to copy they are. They would not be sharp if there were any “wobulation.”

It is to be seen in this film that every other cycle of modulation gives a “push” of greater amplitude than the preceding one. The only reason that can be assigned at the present writing for this difference is that one tube of the final amplifier is a little off tune and does not contribute as much power as the other tube does.

Another point of interest that we see is that rapid fading shows up beautifully, the amplitude of the incoming wave being reduced one-half in 0.13 second.

A very good example of a chirpy note is exhibited in Fig. 7. A signal sounds chirpy because
it changes frequency at the beginning or end of
the dot or dash. In the phones it is represented
by a change in beat note from low to high pitch;
and in Fig. 7 we have exactly that condition.
Spurious oscillations of a different frequency are
first to appear, then the set builds up to a steady
frequency after the first 0.009 second. This note
would be classified as "near d.c." or "very
smooth r.a.e." since its amplitude is practically
constant and it has a slight 120-cycle modulation.
The beat frequency changes very little and is of a
1000-cycle pitch as shown by the fact that every
peak of the wave touches a peak of the 1000-
cycle time line.

Most amateurs do not have the wherewithal
to purchase a motor-generator set, but those who
are fortunate enough to own one are sure to put
it to good use. Fig. 8 indicates the wave produced
by a station using one.

There seems to be a slight chirp at the begin­
ing of the transmission and perhaps a thump,
but it is not serious. The modulation is difficult
to analyze, but it is probably due to the com­
mulator ripple of the machine. It seems to me
that perfect keying is exemplified at the end of
the character, the amplitude decreasing gradu­
ally to zero while the frequency remains con­
stant. Notice the background noise when no sig­
nal is being received; it is due to tube noise and
local motor QRM.

If you have followed this discussion of notes
and waves closely you will have observed that as
we progress the waves shown get rougher and
rougher. This is because it was thought necessary
to set a good example first before exposing the
reader to the worst.

If you use no filter and have a "rotten recti­
er" (apologies to the Old Man), then take a look
at Fig. 9; see the peaks and change in amplitude
due to the 120-cycle modulation; the frequency
modulation; and then the poor keying; see for
yourself what happens and go to the nearest
"ham" supply store for some good chokes and
filter condensers. Be sure that you have a good
"hi-C" oscillator tank circuit and that you are
not overloading the tube; use loose coupling to
the antenna and make the tube oscillate easily;
then, and only then, look at Fig. 2 and 7 again
to see what improvement you have made in your
note. The chances are that your note will be
good, smooth, probably d.c., and steady.

To cap the climax (and this is no tobacco
advertisement), we have before us, ladies and
genlemen, in Fig. 10, just about the "world's
worst" wave, note, mush, or what have you, as
put out by some unknown commercial station.
operating in a 75-kilocycle band in the vicinity of
45 meters.

The plate supply sounded like it was 500
cycles, although the only man who knows is the
operator himself. Not only was this station as
broad as a barn door, but also it was as broad as
the door of a hangar built for housing tri-motor
planes.

I defy anyone to analyze this wave, because it
is due to a.c. on the plate and the result of such
a.c. on the plate is our old friend, Mr. "Wobble­
ation," except, of course, in the case of crystal
control. Compare this wave with the wave of
Fig. 6, the crystal-controlled, a.c.-on-the-plate
wave. Notice the difference — the beat frequency

(Continued on page 86)
Neutralizing Radio-Frequency Amplifiers

By Robert T. Foreman, W9ZZE

The master-oscillator power-amplifier type of transmitter, and especially its crystal-controlled version, is becoming daily more popular with amateurs; wide-spread adoption of this arrangement would do much to solve the problem of congested bands. Apparently the biggest obstacle most amateurs encounter is the problem of neutralizing the final amplifier or amplifiers. It is a simple matter to set up a crystal-controlled or self-controlled tube and get it to work smoothly, but when its output is connected to the grid of the amplifier or buffer tube, one of two things usually happens: Either the crystal stops oscillating and remains intact, or it continues oscillation, assisted by all sorts of feed-back from the amplifier, until it cracks into several pieces. A thorough understanding of the principle involved in neutralizing will do much to simplify the problem, and with that end in view the writer presents the following summary of his experience with dozens of circuits and tube combinations.

SINGLE-ENDED AMPLIFIERS

Starting with the usual type of crystal-controlled or self-controlled tube, it is assumed that the succeeding tube is to be operated at the same frequency. In the case of a tube acting as a frequency multiplier neutralization is obviously unnecessary, since any energy which may be fed back through the tube capacity will not damage the crystal or seriously affect operation. The discussion is equally applicable, however, whether the tube to be neutralized is directly excited by the crystal-controlled tube or is excited by a frequency multiplier tube; it also applies to any number of cascade amplifiers operating on the same frequency.

Two methods of neutralizing triodes are in common use and are indicated as "A" and "B" in Fig. 1. In "A" the neutralizing inductance $L_n$ is placed on the plate tank of the exciting tube and is connected to the grid of the amplifier tube (to be neutralized) through the neutralizing condenser $C_n$. In "B," however, the neutralizing inductance is placed on the plate coil of the amplifier tube (tube to be neutralized) and is connected to the grid of that tube through the neutralizing condenser. The adjustment and theory of operation are the same in each case, and both methods have their merits. The writer prefers the second arrangement since it keeps all apparatus relating to a particular tube in one shield — an advantage where the crystal oscillator, and perhaps each stage, is shielded. The first method, however, is preferable for a tube which is to be modulated.

![Fig. 1 — Two Methods of Neutralizing Single-Ended Amplifiers](image)

In "A" the neutralizing inductance is coupled to the tank circuit of the amplifier or oscillator preceding the stage to be neutralized. This is known as the Rice Circuit.

In "B" the neutralizing inductance is coupled to the plate tank of the stage to be neutralized. This arrangement has the advantage in that the complete neutralizing circuit is associated with the stage to be neutralized. This is known as the Roberts Circuit.

Now for the simplified theory of operation. In Fig. 2 the inductances and capacities in Fig. 1 have been arranged to show the equivalent circuit. It is obvious at a glance that if $C_n$ is made equal to $C_{gp}$ and $L_n$ is made equal to $L_{mp}$, the bridge will be in balance. Any feed-back through the inter-electrode capacity $C_{gp}$ will be balanced by an equal feed-back of opposite phase impressed on the grid through $C_n$. It is realized that the actions involved in the two cases are not identical but for the sake of simplicity they are so assumed.

And there we are! In order to neutralize the

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1 Method B has another advantage. Adjustment of the neutralizing condenser has less effect on oscillator tuning. This is a particularly valuable feature in sets using self-controlled oscillators. B is O.K. for unmodulated amplifiers if the neutralizing condenser has sufficient spacing to prevent flash-over to the grid circuits on the modulation peaks. A fixed blocking condenser connected in series with the neutralizing condenser will help here. — Eunox.
tube, we can construct our plate inductances so as to use the same number of turns in \( L_p \) as in \( L_n \). Then by making \( C_n \) equal to \( C_{np} \) we can be reasonably certain that the tube is neutralized, since stray capacities will usually be small enough to be neglected. However, on the lower frequency bands especially, it is usually more convenient to reduce the relative sizes of neutralizing and plate coils, making the former smaller than the latter and increasing the neutralizing capacity to balance the bridge.\(^7\)

A good working rule is to make the number of turns in the neutralizing inductance half the number of turns in the plate inductance. This insures plenty of feed-back for neutralizing purposes without making the plate coil too bulky. If the neutralizing coil is too small compared to the plate coil it will be impossible to realize enough voltage to compensate for the inter-electrode feed-back. The size and number of turns for the plate coil are easily obtained; it is then necessary simply to add half that number of turns (diameter remaining the same) and the neutralizing coil is finished. Halving the number of turns reduces the inductance of \( L_n \) to approximately one-fourth that of \( L_p \) and consequently we must increase the neutralizing capacity to four times the inter-electrode capacity in order to keep the two arms of the bridge balanced. Assuming the above rule is followed (one turn in neutralizing coil for every two turns in plate coil) the necessary neutralizing capacity will be about as follows for some of the commonly used tubes:

<table>
<thead>
<tr>
<th>Tube</th>
<th>Grid-Plate Cap. ( C_{op} ) (µfd.)</th>
<th>Neut. Cap. ( C_n ) (µfd.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>'01-A</td>
<td>10.0</td>
<td>40</td>
</tr>
<tr>
<td>'12-A</td>
<td>11.0</td>
<td>44</td>
</tr>
<tr>
<td>'10-</td>
<td>8.0</td>
<td>32</td>
</tr>
<tr>
<td>'03-A</td>
<td>22.5</td>
<td>90</td>
</tr>
<tr>
<td>'11</td>
<td>18.5</td>
<td>74</td>
</tr>
<tr>
<td>'52</td>
<td>2.5</td>
<td>10</td>
</tr>
</tbody>
</table>

If other ratios of \( L_n \) to \( L_p \) are used, we need only keep in mind the relation between number of turns and inductance. The value of inductance varies approximately as the square of the number of turns. From which the following relation can be obtained:

\[
C_n = \left( \frac{\text{Plate turns}}{\text{Neut. turns}} \right)^2 \times C_{op}
\]

This equation will serve adequately for a rough approximation. It is assumed that the diameters of the plate and neutralizing coils are the same.

**PUSH-PULL AMPLIFIERS**

A typical push-pull amplifier arrangement is shown in Fig. 3. The output of the oscillator is made symmetrical about a nodal point at its center so that each tube of the amplifier will receive its proper share of excitation. The balancing condenser, \( C_n \), should be of a capacity value approximately equal to the plate-filament capacity of the oscillator tube. This is necessary to make equal the capacities between each end of the tank circuit and the oscillator filament. The amplifier neutralizing circuit makes a perfect capacity bridge, with the neutralizing condensers equal in capacity to the grid-plate capacities of the tubes. The neutralizing circuit of a push-pull amplifier is very near ideal. The equivalent neutralizing circuit of the push-pull amplifier is shown by B of Fig. 2.

**THE NEUTRALIZING ADJUSTMENT**

Now for the routine of neutralizing. It is assumed that the inductance of the plate coil is of such value that it will tune to the desired frequency at some setting of the plate condenser; that the neutralizing coil contains half as many turns as the plate coil; and that the neutralizing condenser has a range such that the values given above do not lie too close to the upper or lower end of its range. That is, the neutralizing con-

\[\text{FIG. 2.—THE EQUIVALENT NEUTRALIZING CIRCUITS}\]

A is the equivalent circuit for a single-ended amplifier and \( B \) is that of a push-pull amplifier. The latter is a perfect capacity bridge.

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\(^7\) The neutralizing inductance can be included in the tank circuit, the tank condenser being connected across both \( L_p \) and \( L_n \). This considerably simplifies mechanical construction.— Botton.
denser for a Type '10, for example, should have a maximum of 50 or 60 µfd., and a minimum of 15 µfd., thus permitting some compensation for errors.

A two-turn pick-up coil connected to a flashlight bulb as described on page 13, September, 1928, QST, should be constructed. With the crystal (or self-controlled) tube oscillating properly, the filament of the amplifier tube should be lighted and grid excitation and bias applied. Plate voltage must not be applied to the amplifier tube until it is properly and completely neutralized. That statement has been printed in QST dozens of times, and if it were heeded it would eliminate almost every possibility of cracking a crystal. So, without plate voltage, stick the pick-up coil near the plate end of the plate inductance and rotate the plate condenser until the bulb lights. Then increase the neutralizing capacity a few degrees and retune the plate tank until the bulb again lights; the necessary change in the plate condenser will probably be slight but must be made carefully, always setting it at the point that gives maximum brilliance of the pick-up lamp. The smallest possible coupling should be used between pick-up coil and plate coil, using just sufficient coupling to cause the lamp to glow faintly when the plate tank is in resonance.

Continue increasing the neutralizing capacity in small steps, retuning the plate tank each time, until the point is reached where any further increase in the neutralizing capacity causes the lamp to go out completely. This value will usually be from 10% to 20% less than the values given above for \( C_n \). Now continue increasing the neutralizing condenser, constantly retuning the plate condenser, until the point is reached at which the light again begins to glow. This higher value will be from 10% to 20% greater than the values given for \( C_n \). Now set the neutralizing condenser half-way between the points where the light went out and came on, and the tube is neutralized. This value will be very close to that specified for \( C_n \).

Plate voltage still remaining disconnected, let's make another test to see if neutralization is as complete as it appears to be. Disregard the neutralizing condenser, leaving it as last specified, and rotate the plate condenser through resonance, meanwhile watching the plate milliammeter of the preceding tube (the one supplying excitation to the tube being neutralized). If the amplifier tube is neutralized, the needle on the meter will not change; but if the amplifier tube is not neutralized, the needle will get a slight kick when the amplifier tank goes through resonance.

Still another test, probably more accurate than either of the above, is to watch the grid meter of the tube being neutralized. If the tube is neutralized, there will be no deflection of this meter when the plate tank is tuned through resonance. It is realized, however, that most amateurs do not use d.c. grid meters, and if the plate meter of the exciting tube is closely watched, complete neutralization can be secured. In any case, the flashlight method must be used at first, since the two latter methods cannot be used until neutralization has at least been approached.

If in the latter two cases either or both meters show any variation as the amplifier tank goes through resonance, the neutralizing capacity can be varied in very small steps, the amplifier tank being carefully tuned through resonance each time, until no deflection occurs. The final setting of \( C_n \), may be slightly above or below that previously found, due largely to the detuning effect of the pick-up coil.

Neutralized in this manner, the tube stays neutralized as long as \( L_p \), \( L_n \), and \( C_n \) remain unchanged. That is, variation of the plate condenser has no effect on neutralization. It is thus possible to choose a value of \( L_p \) which permits tuning to both the 7000- and 3500-ke. bands simply by varying the amplifier tank condenser. The writer uses a coil of 4.5 inches mean diameter, consisting of 12 turns of \( \frac{3}{4} \)-inch copper tubing, using eight turns for the plate coil and four turns for the neutralizing coil. With a plate tuning condenser of 500 µfd. maximum, it is possible to cover both 7040 and 3000 kc., the two frequencies on which the station operates. The same plan is followed in the crystal and two buffer stages, the values of inductance being such that both frequencies are covered without changing coils. A two-point switch permits change from one crystal to the other and further simplifies matters. Probably the plate efficiency suffers under these conditions, but the flexibility secured outweighs that disadvantage.

However, if it is preferred to use separate coils for the different bands, one need only make each coil such that the neutralizing coil contains half as many turns as the plate coil, and the neutralizing condenser need never be changed, even

FIG. 3.—A TYPICAL NEUTRALIZED PUSH-PULL AMPLIFIER CIRCUIT

The neutralizing condenser must be adjusted simultaneously. The capacity of each is approximately equal to the grid/plate capacity of one tube.
when coils are changed for the different bands. Such small variations as may occur will be too slight to throw the tube very far off neutralization.

The neutralizing adjustment for the push-pull amplifier is exactly the same as for the single-ended amplifier except that there are two neutralizing condensers which must be adjusted simultaneously. The two condensers should be kept at approximately equal capacity values while they are adjusted. For Type 10 tubes, this capacity is approximately 8.5 µfd. One adjustment of the neutralizing condensers will hold for all bands.

In tuning the plate tank of any amplifier, operation is desirable at the setting of plate condenser which gives maximum output, of course. This point is identical with the setting at which the tube draws lowest plate current, so that by watching the plate milliammeter, maximum output can be secured even when it is difficult to determine the actual value of output.

It should be noted that series plate feed, with the by-pass condenser and r.f. choke at the low end of the plate inductance, is indicated. It is the writer's opinion that this practice is worthy of more general adoption. When the choke is placed right next to the plate it is called on to block considerable r.f. energy, and unless plug-in chokes are used for each band, it is quite certain that some energy will leak past and find its way into the power supply. Under such conditions, perfect neutralization is almost impossible, and the danger of fracturing a crystal is materially increased. With series feed, however, the choke must block only a small amount of r.f. energy, and the low-impedance path provided by a by-pass condenser of .001 µfd. or larger will take care of all that remains. In the grid circuit it is impossible to use anything but shunt feed, and at this point it is far better to have too many turns on the choke than too few. The by-pass condenser, shown from the low side of the grid choke to the center-tap helps to confine r.f. currents to the proper circuit, and since ordinary receiving condensers may be used even with large tubes, it is not an expensive addition.

In conclusion the writer acknowledges his thanks for the assistance and criticism given by M. W. Bannister, W6CDY, Station Engineer of K GAR.

W9BRU is using two Type 80 rectifiers hooked in parallel to rectify the output of his 550-volt transformer instead of the usual pair of Type '51's, and says that the voltage is higher and the current output is greater. OK, except that the rating of the tubes is being exceeded. It's worth a trial, anyhow, because a pair of '50's can be bought for only a little more than half the price of one Type '51.

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**ELECTION NOTICES**

To all A.R.R.L. Members residing in the CENTRAL, HUDSON, NEW ENGLAND, NORTHWESTERN, ROANOKE, ROCKY MOUNTAIN and WEST GULF Divisions of A.R.R.L.:

1. You are hereby notified that an election for an A.R.R.L. Director, for the term 1931-1932, is about to be held in each of the above Divisions, in accordance with the Constitution. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors: Sec. 2 of Article IV, defining their eligibility; and By-Laws 10 to 19 providing for their nomination and election. Copy of the Constitution and By-Laws will be mailed upon request.

2. The election will take place during the month of November, 1930, on ballots which will be mailed from Headquarters in the first week of that month. The ballots for each Division will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in that Division.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one Division have the privilege of nominating any member of the League in that Division as a candidate for Director therefrom. The following form for nomination is suggested:

**Executive Committee, American Radio Relay League, Hartford, Conn.**

**Gentlemen:**

We, the undersigned members of the A.R.R.L. residing in the Division, hereby nominate , of , as a candidate for Director from this Division for the 1931-1932 term.

(Signatures and addresses)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the first day of November, 1930. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. Present Directors from these Divisions are as follows: Central, Mr. D. J. Angus, W9CYY, Indianapolis, elected in April, 1930, to fill unexpired remainder of term of late Clyde E. Darr; Hudson, Dr. A. Lafayette Walsh, W2BW, New (Continued on page 78)
Preparing an Article for QST

By James J. Lamb, Technical Editor

At least once in the career of every true ham comes the urge to dash off something he just knows “ought to be in QST.” Perhaps it is just a little squib on a new constructional kink and then again it may be an exhaustive treatment of transmitter design—or just a wail for “Correspondence” on some such moot question as Long CQs or The QSL Problem. Whatever the subject, the urge is a good one and should be followed by action. However, most of the ideas die aborning and the stories never arrive in Hartford. It is our hunch that the reason for this failure to come through with the article is not that the idea wasn’t any good in the first place—the same idea invariably shows up with some other fellow’s name on it—but that the article was never started because of the inertia of tackling the job of writing. It is the purpose here to give a few hints on the making of an article in the hope that this writing business can be made less obnoxious to hams who have ideas which the rest of us want to know about but can’t use until we see them in QST.

The first thing necessary, of course, is to have clear in your own mind what you want to tell. If your idea is all befogged with uncertainty before it gets on paper, what chance is there for anyone else to get useful information from it? If there are theories about the transmitter or receiver circuit which you don’t have clearly in mind, dig through the Handbook and back files of QST and find out what already has been published about them. It often happens that a lack of understanding of fundamentals is responsible for wild guessing on the part of authors—and wild hair-pulling on the part of editors.

If you can’t be sure of the theory behind the thing, leave out the theory part and stick to describing the construction and performance.

MAKE AN OUTLINE

Once you have a clear mental picture of the idea as a whole, crystallize it by putting it down on paper in the form of a rough outline, arranging the topics in some sort of logical sequence. This will forestall scrambling up the article when the actual writing is begun and guarantee against the omission of important features. If the subject is to be a receiver, don’t start off with the output circuit, then jump to the antenna coupling, next hop to the audio amplifier and finally wind up with the detector circuit. Here is a good type of general outline:

1. Introduction: Give an idea of the purpose of the article and outline its scope. Mention unusual features and advantages of the equipment (or experiment) to be described. The introduction “sells” the article to the reader. If he isn’t interested by the opening paragraph he probably turns the page without reading further.

2. General description: If the subject is a piece of apparatus, such as a transmitter or receiver, give a short word-picture of its makeup. Something like this, “The receiver has a stage of tuned radio-frequency amplification, a screen-grid space-charge detector and a single stage of peaked audio-frequency amplification. It may be operated with either a.c. or d.c. filament supply and has a continuous frequency range from 1.7 to 80.5 megacycles. The set is completely shielded and weighs 8.5 pounds.” (This is a fictitious receiver, as far as I know, but might work at that.)

3. Detailed construction: (a) The chassis and cabinet. Give all essential dimensions and mechanical specifications. (b) Circuit sections. Start with the input circuit and work up to the output circuit. Give all essential specifications, particularly for the coils and condensers. The coil specifications should be listed in a “coil table.” Specify the diameter of the form, the exact number of turns, spacing between turns and frequency range—for each coil. The complete schematic diagram should be given. Do not mark the condenser capacitances or any other specifications on the drawing itself. Indicate each part by lettering on the drawing and make up a list of specifications on a separate sheet. Follow the method always used in QST. Be sure to make the description complete—and carefully check everything.

Point out possible pit-falls and precautions which must be taken. If you ran into troubles others are likely to do the same.

4. Operation: Describe the adjustment procedure you have found most satisfactory. Call especial attention to any adjustments of an unusual nature.
5. Conclusion: Describe what has been accomplished with the apparatus and suggest possible further improvements or other adaptations.

So much for the outline. Now for the actual writing of the article.

WRITING THE ARTICLE

Once the author's thoughts have been crystallized and logically marshalled, the expansion of the outline into the article itself is comparatively easy. Contrary to general belief, the composition of the article does not require a particular talent for writing or an extensive knowledge of the dictionary. The best technical writer is one who writes simply. Use short sentences and avoid hackneyed phrases. Beware of ambiguity. That is, do not get yourself into involved expressions which may be misunderstood. Here is one horrible example of the ambiguity resulting from poor composition:

"The grid bias and plate current are often wrong, due to the fact that it is not properly adjusted." What is not properly adjusted, the grid bias or the plate current? And beware of such writer's itch as "due to the fact that." "Because" is much simpler and means more. Long sentences should not be attempted by an inexperienced writer and even the competent should use them economically, especially in technical writing. Beware of unusual words. Remember that the purpose of the article is to convey information to others, not to impress them with the magnificence of your vocabulary.

A working acquaintance with grammar and rhetoric is valuable. There is one book which could be used to advantage by anyone really interested in writing well on technical subjects. It is "English and Science" by Philip B. MacDonald, reviewed in QST, Jan., 1930. I find this book a constant source of practical aid to the business of writing and editing. Its nominal cost represents a sound investment for the technical writer.

The article preferably should be typed with double spacing between the lines. The double spacing is absolutely essential for editing. If the article must be written in long-hand, make the writing legible and leave a double space between lines. Always remember that editors are very much like normal people; they are apt to be influenced by first impressions. A neat and legible article is going to get attention more readily than a messy illegible one. Write on only one side of each sheet and number the sheets.

DIAGRAMS AND PHOTOGRAPHS

Make each diagram or sketch on a separate page. Do not draw them in the manuscript because the typed pages go to the printer and the diagrams go to the draftsman. Number the diagrams and refer to them by their numbers. The circuit diagrams or other sketches can be penciled. Ink drawings are not necessary because our own draftsman does the drawings from which the plates are made.

Good illustrations often "make" an article and most apparatus articles are useless without them. Nothing "sells" an article to both the editor and the reader as do good photographs. Remember that the photographs must be reproduced by printing and are bound to lose clarity in the process. The originals should be at least of post-card size and preferably larger. The ones used in Headquarters articles are 8 inches by 10 inches and are made by a commercial photographer. Several articles on getting good apparatus photographs have appeared in QST: "Photographs for QST," March, 1929, and "How To Photograph Your Transmitter By Electric Lights," June, 1929. A reprint of the first article will be sent on request. The main idea is that the photographs should be "hard," showing up the details, but free of heavy shadows. Flash-light photographs and those taken in direct sunlight are generally unsatisfactory. Portrait photographers are notoriously poor at making satisfactory apparatus pictures. They are addicted to having everything out of focus and must be brow-beaten into making "hard" negatives. Commercial photographers are more amenable to suggestion.

Do not attempt any retouching on the photographs. If retouching should be necessary it will be done by our staff. Above all things, do not...
type on the back of a photograph, or mark it with ink. The typing may show through — and the markings may not be satisfactory from the editorial point of view.

When the article has been finished, hand it over to a ham friend with the request that he give his criticisms. If there isn’t a ham available perhaps you can get your high-school English teacher to go through the story. The teacher may not know what it is all about but can point out errors in construction and grammar. When the article has been modified to the satisfaction of everyone, it is ready for mailing to QST.

It is best to mail the complete article, photographs and diagrams included, in an envelope sufficiently large to accommodate all the material without folding. There is no real objection to folding the typewritten pages or diagram sheets, of course, but do not fold the photographs. Be sure that your name, call-sign, and complete address are attached to the manuscript. Call-leters alone are insufficient. All technical articles should be addressed to the Technical Editor. Your article will be acknowledged on receipt but a promise of definite publication cannot be made before the article has been gone over thoroughly.

If you are not reasonably certain that the subject of a contemplated article is suitable for publication, it is a good idea to send in an outline before starting the article itself. This procedure is followed by some of QST’s best contributors.

Since QST is the official organ of the A.R.R.L., a non-commercial organization, and is “of, by and for the amateur,” articles are regarded as contributions to the advancement of amateur radio and no payment is made for them. This has been QST’s inviolable policy through all the years of its existence and is in conformity with the policies of the publications of the leading technical societies.

There are no QST articles quite as fine as those QST receives from its amateur membership. We hope that the suggestions that have been made will start a lot of pent up contributions on their way to Hartford.

Doings at Headquarters

August and September found a number of Hq. members away from the office, either on vacation and business trips or convention round ups. Budlong left in late August to attend the Northwestern Division Convention at Spokane, Washington, and arrived back in Hartford in mid-September, after stopping over in several midwestern cities and enjoying hamfests with A.R.R.L. members. Dave Houghton left in the first week of September to make a survey of QST circulation and newsstand sales. His itinerary included most large cities in the east and central states. He is due back at Hq. the last week in September.

Jim Lamb and George Grammer of the Technical Department attended the I.R.E. Convention at Toronto during August. Many new acquaintances were made, not to mention renewing old ones and picking up useful material for QST’s pages.

Ev. Battey went to the Maine Convention, held in Portland during August. Warner and Rodimon travelled to Dayton for the Central Division Convention.

“Bob” Parmenter, “rp” of WlMK, drove to Chicago during his vacation.

Probably no face is more familiar in amateur radio circles than that of A. A. Hebert, Treasurer-Fieldman of the League. How many recognize him all “decked out” ready for a sail? This, by the way, is just one more of his hobbies.

The Communications Department has just put the finishing touches on the new 500-watt crystal-control transmitter at WlMK. We are hoping to have a description of this transmitter in QST before long.

— C. C. K.
THE completion of the new A.R.R.L. Standard Frequency System is in sight. As this is being written (it's a hot night in August) word comes from the boys at Elgin that their new frequency standard has been received from the Bureau of Standards, where it was given its official calibration, and that the final touches are being given to W9XAM's 500-watt standard frequency transmitter. Transmissions will have begun before this is printed and it is hoped that they will be put to the good use they deserve. The accuracy of these transmissions will be well up to expectations, since the Bureau of Standards calibration on the frequency standard is 100,000 kc. or accurate to within less than 1 cycle in 100 kilocycles.

The license for the Pacific Coast Station has not been issued at this writing but assurances are given that everything will be set for inauguration of the schedules to be transmitted by Harold Peery and his gang by November 1. Tentative schedules for November are given this month for the benefit of the gang who live a month's mail time from QST factory. Although the complete call of this station cannot be given at this time there should be no difficulty in identifying it over the air. When you hear a "W6X-" sending S.F. signals on the schedules given and using the characteristic letter "F" you will know that it is the A.R.R.L. Pacific Coast S.F. Station. The complete call will be sent out in a W1MK broadcast as soon as it is known and will be published in November QST. The standard for this station is completed and we expect notice of its calibration from the Bureau any day.

W1AXV is discontinuing the QRG service effective October 1 to allow the transmission of additional standard frequency schedules from Round Hill. Howard Chinn and his gang have come to the conclusion that the time required for the direct QRG service can be employed to better advantage in transmitting more schedules. Although reports on W1XP-W1AXV transmissions are becoming more and more numerous there aren't enough yet. Mark the dates of the following schedules on your station calendar and use as many of them as you can. Do not take any chance of having that new dynatron frequency meter go off calibration. Check it at every opportunity.

### DATES OF TRANSMISSIONS

<table>
<thead>
<tr>
<th>Date</th>
<th>Schedule</th>
<th>Station</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 3, Friday</td>
<td>A</td>
<td>W1XP (W1AXV)</td>
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<tr>
<td>Oct. 10, Friday</td>
<td>BB</td>
<td>W9XAM (W9SI)</td>
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<td>C</td>
<td>W9XAM</td>
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<tr>
<td>Oct. 17, Friday</td>
<td>B</td>
<td>W1XP</td>
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<tr>
<td>Oct. 18, Saturday</td>
<td>A</td>
<td>W9XAM</td>
</tr>
<tr>
<td>Oct. 19, Sunday</td>
<td>C</td>
<td>W1XP</td>
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<tr>
<td>Oct. 31, Friday</td>
<td>BB</td>
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<td>W6X-</td>
</tr>
<tr>
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<td>C</td>
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<td>Nov. 8, Saturday</td>
<td>RX</td>
<td>W9XAM</td>
</tr>
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<td>Nov. 9, Sunday</td>
<td>C</td>
<td>W1XP</td>
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<td>Nov. 14, Friday</td>
<td>C</td>
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<td>Nov. 21, Friday</td>
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<td>Nov. 28, Friday</td>
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<tr>
<td>Nov. 29, Saturday</td>
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### STANDARD FREQUENCY SCHEDULES

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<tr>
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<th>B</th>
<th>C</th>
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<td>8:48</td>
<td>4000</td>
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</tbody>
</table>

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 (Continued on page 80)
TUNED ANTENNAS FOR RECEIVING

AMATEUR radio seems to pass through cycles much after the manner of the earth and its seasons. Ten years ago the receiver without antenna tuning would have been unthinkable — five or six years later the reverse was true. The general adoption of the Hertz antenna for transmission suggested the use of the same type of antenna for reception to a number of experimenters, as has been reported in QST at various times, and all who have tried it report results beyond their expectations. Tuned antenna systems are being revived.

Aside from the increase in signal strength which a tuned receiving antenna can be expected to give, there may be further benefits for those who are bothered (a mild term!) with power QRM. Read what Don B. Knock, VK6NK-VK2NO, of Wyndham Meatworks, N. W. Australia, has to say about the doublet in this connection:

"I don't usually rush to pen and paper about things that happen to me, but in this case I feel that it may be of help to others who may be facing the ham's worst bête noire — power QRM! This extensive meatworks in the far northwest of the wildest country in the world is a little city of its own, and it carries with it somewhat more than the average city's complement of power induction at high — and a truly awful amount at low — frequencies.

"Early this year I arrived here to establish a system of radio communication between the works and mobile launch and car stations. There was only one possible location for the control station, which was unfortunately right in the middle of things — less than 100 feet from a power house with two 100-kw, 230-volt d.c. generators and 50 odd motors. Hitching up a modern screened tuned-r.f. receiver confirmed my worst fears — the racket was terrible. But something had to be done about it. Furthermore, having been a ham two-thirds of my life, I wanted to at least bridge the 2000 miles between here and the gang down south.

"A vertical aerial consisting of single lead-covered wire was erected with the inside wire as the aerial and the lead connected through a variable resistance to earth. This served moderately well, cutting the noise level down about 40%, and it is remarkable what a great amount of noise a pair of long-trained ham ears can work through. Still, on 7000 kc, it was often too strong to be comfortable. Then I came across the reference to a doublet designed for reception on 7000 kc, in QST.\(^1\) Down came the lead-covered arrangement and the doublet with its twisted-flex feeders erected. The result absolutely astounded me. The noise level went down to a mere whisper on 7000 kc, and the signal strength actually went up considerably. At 14,000 kc, the receiver is so devoid of power QRM that if there are no signals to be heard on the band at the time one is inclined to suspect the receiver of being 'dud.' It tells a different story at signal peak periods, though.

"The receiver I use employs a tuned screen-grid r.f. stage with the aerial coupled through a three-plate midget variable condenser direct to the grid of the r.f. tube. With this receiving doublet, one feeder is connected to this and the other to the receiver chassis and screening. One side of the doublet is vertical and the other directly underneath in the form of a horizontal circle — the feeders running horizontally from the mid-point into the receiving rooms. I found that by erecting the doublet in this fashion far better results are obtained than if slung in the usual horizontal manner. Since erecting this, I am able to copy an R2 signal quite normally, and this with the power house batting out d.c. at a few hundred kilowatts only a few feet away, accompanied by the sparking commutators of sundry motors operating machinery, etc. It sounds like a fairy story but is true, and I am certain that in the future reception in any city full of power leaks holds no errors for me. Where I go, this doublet system goes.

"After this I shall feel like the Old Man if I QSO many hams who come back too often with 'Sri OM, power QRM too bad.' My hearty regards to the originator of the idea and QST."

So much for the doublet. Lyle Geary, VE5AW, of Whitehorse, Yukon Territory, writes as follows concerning the Zeppelin for receiving:

"The article on page 48, April QST, entitled 'Ham Band Antenna' prompted me to write this note. Here at VE5AW we have been using a somewhat similar arrangement except that we are using a Zeppelin antenna instead of the current-fed system described by Colonel Foster some time ago.\(^4\)

"An antenna coil of four turns of bell wire was
made to slide to or from the grid coil and the feeders are tuned with a pair of 250-µfd. variables, which are controlled by one dial for ease in tuning. After tuning in a signal the feeder dial is varied from maximum to minimum until the receiver is about to stop oscillating (resonance) and the resulting signal strength is marvellous, sometimes being as much as 40% greater than with the usual arrangement. Signals of the usual R5 to R6 can be brought up to a full R8.

"Stations may be separated very well by varying the feeder condensers and primary coil; and the coupling may be made extra close without much effect on the oscillation of the set.

"I should like to hear from any of the gang who have tried this stunt — and possibly others have, although I have never seen it mentioned. The Zepp has a fundamental of 7200 kc, and the feeders are each 46 feet in length."

A third arrangement is suggested by L. M. Wilson, VK2LM, of Malbooms, N. S. W. Here is his letter:

"On the 14-mc. band I use a full-wave Zepp with half-wave feeders. The receiver is 3-coil (tube-base variety) with throttle condenser control of regeneration. The aerial coupling coil is 12 turns wound round a tube socket. For receiving I close switch marked S, Fig. 1, thus using part of the Zepp as an antenna. By placing the condenser C1 across the coil L1, and providing L4 has a suitable number of turns, a very large increase in signal strength is obtained.

"This arrangement properly adjusted gives more increase in signal strength than one stage of tuned screen-grid r.f. It is the only receiver I have ever seen on which it is possible to copy signals which are unreadable with the straight three coil arrangement.

"The operation is as follows: adjust C1 until a resonance click is heard in the phones. Then adjust the regeneration condenser, C2, until the same resonance click is sharp. Now forget about the reaction condenser C2 and manipulate C1 to keep the receiver oscillating and C2 to cover the band. It is important to note that unless L4 has the right inductance to give the resonance click referred to the addition of C1 to the receiver will not benefit reception at all.

"I have noticed also that even when the switch (S) is open and the C1-L4 combination is three feet from the transmitter there is likely to be a heavy absorption of feeder current at certain C1-L4 settings."

THE SINGLE-WIRE-FED HERTZ

One difficulty with the single-wire feeder is that the system sometimes refuses to act as a Hertz antenna with a non-radiating feeder, but insists on gumming things up by acting as a simple grounded antenna, directly coupled to the oscillator. If there is no direct ground on the filament center-tap, r.f. may feed back through the power supply and eventually find its way to ground through the house wiring, which is not so good. Evidently this is what happened to WSOG when he tried this type of feeder. His letter follows:

"Perhaps this is 'old stuff' by now, but again it may help some of the fellows who are trying to get a good d.c. note with a Hertz antenna per Windom in September, 1929, QST.

"The space here for an antenna is very limited and it must be put up in such a manner as to almost prohibit, on account of the short feeders, Zepp feed. When the above article came out an antenna was constructed according to the charts — and what a fine a.c. and r.a.e. note I had. Practically everything was tried to get the same d.c. note as with the antenna feeder disconnected, but unless the antenna was run quite a bit off its fundamental, the r.a.e. was still present. When run about 50 or 75 kilocycles off the fundamental I would usually get near d.c. reports, but the efficiency was very low, due perhaps to the feeder trying to act as the antenna.

"Various sizes of chokes were tried, varying in turns from 50 to 300, but none of them helped. Evidently something was seriously wrong, so the antenna was taken down again to determine if all measurements were exactly right. They were, so work started on the set. It was noticed, by touching a screwdriver on the filament terminals, that some r.f. feedback was present. Chokes were tried in the filament leads but only served to cut down the filament voltage and helped very little. Then a 'misfit' choke of about 75 or 80 turns was put in the negative high voltage lead. Lo and behold, the carrier was pure d.c. and has been ever since. The size of the choke does not seem to make very much difference, and the antenna can be run smack on the fundamental. The carrier is pure d.c. and has been so reported by every station, not 75% or so, but every station I have worked."

— D. G. Room

An A.C. Combination Receiver

By H. A. Wall, W9EIV

The receiver to be described is a combination of a traffic tuner, a short-wave broadcast receiver, and a broadcast band receiver. As a traffic tuner, the amateur bands are spread over the full scale. As a short wave broadcast receiver, hair-line selectivity is obtained. As a broadcast receiver sufficient volume is obtained to operate a loudspeaker for a small room.

As will be noted by reference to the diagram, Fig. 2, the set employs four tubes. The first is a Type '24, used as a partially untuned r.f. amplifier. The second is also a '24 used as a grid-leak detector. The third is likewise a '24, as a resistance-coupled amplifier, and the fourth is a Type '27, used to couple the headphones or speaker to the screen-grid stage of audio-frequency amplification.
Regeneration is controlled by a 50,000-ohm variable resistor varying the screen-grid voltage on the detector tube. Volume is controlled by a similar resistance which varies the screen-grid voltage on the first audio amplifier.

Dimensions of the plug-in coils are the same as for any receiver, and should be wound a trifle large, taking off a turn or two later if necessary. Every conceivable combination of constants for all parts of the circuit were tried, and those shown in connection with the diagram were found to give the best results.

The amplifier is not of the peaked variety because of its effect on phone reception, but a peaked amplifier could easily be used. Reference to the diagram will tell everything else.

**THE SPACE-CHARGE DETECTOR**

While a great deal of interest is being shown in screen-grid tubes as detectors, the space-charge arrangement has been generally neglected in favor of straight screen-grid detection. Now and then we hear of experimenters obtaining good results with space charge detection, however, and one of these is George Leander Smith, 251 South Hill St., Los Angeles. Mr. Smith has been trying various circuits with a view to finding the best combination of constants, and the one shown in Fig. 3 seems to be about the best.

Coil and condenser sizes will depend on the frequencies to be covered, and do not differ from those used with other detectors. Factory-wound coils have been found to function very nicely, although, of course, not generally the right size if the amateur bands are to be spread over the dial. If the usual precautions as to elimination of losses are observed in laying out the receiver the tickler will require rather less turns than is the case with other detectors, although the exact number does not seem to be critical. Shielding has not been found to be beneficial, and in fact...
seems to introduce losses at the higher frequencies and prevents the detector from oscillating.

Many forms of coupling between the detector and audio amplifier were tried, and the impedance coupling shown in the diagram is one of the most satisfactory. Good results have been secured without any audio amplifier at all, the phones (Balduhn's) being inserted directly in the plate circuit of the '22. Microphonic noises are reduced by the use of good quality resistors, impedance coupling between detector and amplifier, and an audio tube in the first stage which operates at low filament temperature, such as the Type '12-A.

Mr. Smith writes that the space-charge detector is noticeably more sensitive than a three-electrode tube, and although it is sometimes a little tricky to get going, is well worth a trial. The drain on both filament and plate batteries is low, which makes it economical to operate.

**FILAMENT BY-PASS CONDENSERS**

The following letter from Bayard Allen, W3ATJ, raises an interesting question regarding filament by-pass condensers:

"In building a new transmitter, a high-C Hartley with about 750 volts on the plate, I was troubled with bad r.f. feedback into the filament of the Type '10 oscillator. This was especially noticeable on 14 mc, because every time the key was pressed the '10 lighted very brightly. I removed the .002 by-pass condensers across the filament leads, and that eliminated the trouble very nicely.

"Not having a double-pole switch handy and wishing to operate on all bands, I decided to try the thing without the condensers on other bands. As my filter condensers had blown a few days before and my new ones had not yet arrived I was using r.a.c. and obtaining good results, so tuned the transmitter to 3500 kc, and tried it without the by-pass condensers. The set seemed to function as well as it did with the condensers, but every station I worked commented on the sharpness of my wave, and practically all of them said that the wave was almost as sharp as xtal d.e. and unusually sharp for plain r.a.c. I do not have any method of measuring this width, so thought that perhaps you could check up on it and if it is true and is not just a freak condition at my station, surely this information would be valuable in sharpening some of the terrible r.a.c. and a.c. notes we hear on the air."

When and why are filament by-pass condensers necessary? In W3ATJ's case the filament wiring and the by-pass condensers probably formed a loop which was nearly resonant to the transmitting frequency, since the current flowing in the leads was sufficient to cause a noticeable difference in the filament temperature when the key was pressed.

We rather think that the use of filament by-pass condensers is a heritage from the dark ages of c.w. — one of those things that are done simply because they have always been done, and not because there is any real necessity for them. We found that there was a real advantage in omitting filament by-pass condensers in the push-pull transmitter described in June QST, and the omission may be just as helpful with a single-tube transmitter.

Since the filament lead in an oscillatory circuit is brought out from a voltage node, there should be no r.f. potential at the filament which can be attributed to the external circuit. Lack of symmetry between the two halves of the filament itself may cause an r.f. potential difference across parts of the filament because of its position in the electric field within the tube, but it is difficult to see where the addition of by-pass condensers will aid such a condition because they simply lower the reactance of the external circuit and so help the flow of unwanted r.f. in the filament, whereas it would be better to choke it off. Therefore it would seem better to leave the condensers out of the circuit entirely because they are useless so far as the oscillatory circuit is concerned, and simply aggravate a bad condition if r.f. current is induced in the filament.

We should be glad to hear further from experimenters who have occasion to investigate this subject.

**A USEFUL LAMP BANK**

Myrton Billings, W2BIV, sends us some information on a lamp bank which has proved to be a very handy thing to have around the shack. A quantity of lamps, sockets, and single-pole double-throw switches, all of which can be obtained cheaply at the "5 and 10" stores, are required. The number of lamps in the bank can be made as small or large as desired, but the larger the number the more flexible is the bank.

The connections are shown in Fig. 4. By proper switching it is possible to connect the lamps in series, parallel, or series-parallel in a great many different arrangements, depending of course on the number of lamps in the bank. A dozen or more lamps will be useful.

Fig. 5 shows a few of the possible combinations. The series connection is obtained by throwing $S_1$, Fig. 4, to "A", counting off the number of lamps wanted in series, and throwing the corresponding switch to the opposite side. All other switches must be open. To place four lamps in series, as in..."
Fig. 5, S₁ would be at “A” and S₅ at “J”. If all the lamps in the bank are to be series connected, S₁ is at “A” and S₅ at “Z.”

To place any number of lamps in parallel, alternate switches are thrown in opposite directions. The three in parallel shown in Fig. 5 would be obtained by throwing S₁ to “A,” S₃ to “D,” S₅ to “E” and S₆ to “H,” all other switches being open. Any number could be placed in parallel by following the same procedure.

For the series-parallel arrangement each series group is connected in as described above, with alternate switching between groups. For instance, the arrangement shown in Fig. 5 could be obtained by throwing S₁ to “A,” S₃ to “F,” and S₆ to “K.” Other combinations will readily suggest themselves to the experimenter.

Lamp banks are useful in any case where a variable resistor is needed. One application suggested by W2BY is in reducing plate voltage on a transmitter while making tests or adjustments. The secondary voltage of the plate transformer can be reduced to practically any desired value lower than the rated voltage by the use of a suitable number of lamps in series, parallel, or series-parallel arrangements, on the primary side of the transformer.

**LINE PAD FOR REMOTE CONTROL**

The following letter from R. H. McConnell, KGFW, Ravenna, Neb., will be interesting to amateurs connected with broadcasting stations or installation of sound systems, as well as phonemen:

“During the past year I have had many requests for information on how to construct a line pad for remote control work. These, of course, can be purchased but are quite expensive, and we have succeeded in constructing one that works very well and which costs less than $5.00.

“The resistors were purchased from Electrad, Inc. These folks will set the adjustable taps at whatever resistance you require if you instruct them to do so when ordering the resistors. To make this line pad, five resistors, four Fahnestock clips, four metal mounting brackets, two straight mounting brackets and one 5 x 7 bakelite or hard rubber panel are required. The photo shows method of mounting resistors and how the finished product looks. Fig. 6 gives the values of resistors and proper connections to line and amplifier.

“The line between the output of the tube-to-line transformer and the input to the remote-control amplifier should be shielded and the shield grounded. Lead-covered cable is best for this work, but if not available BX will do. The cases of both tube-to-line transformer and microphone transformer should be grounded.

“This line pad is being used with very good success by several broadcasting stations and public-address and theatre sound systems in Nebraska.”

**WINDING FORM FOR COPPER TUBING**

Here is a device which a friend of mine evolved one day while watching me curl copper tubing on the traditional piece of 3-inch pipe.

This coil winding form (wood) is 2 ½ inches in diameter with grooves to accommodate ½-inch tubing and giving automatic—so to speak—spaking of turns. It has the unique advantage that the copper tubing need not be straightened before winding. When the required number of turns has been wound the coil is then unscrewed from the form, and is ready to be installed in the transmitter.
Such a form can be procured at small cost from a wood-turning shop.

— John C. Stadler, VE2AP

THE COIL FORM

LEAD-IN INSULATORS

One of the most effective and inexpensive forms of lead-in insulator is the familiar Pyrex custard bowl, or a pair of them on each side of a board with a brass rod running through. The difficulty is to drill the necessary holes through the cups, a difficulty which is perhaps more imaginary than real. Several methods of drilling glass have been suggested previously in QST, and here is another one called to our attention by Ray West, W1AMF.

Procure a round file of the same diameter as the hole to be drilled and break it into pieces about an inch and a half long. One of the pieces is placed in a bit brace and used as a drill. The cutting end should be ground down to an edge similar to that on a cold chisel for best results. Put a little turpentine in the Pyrex cup turn the brace in the same way as in boring wood. Slow speed with a little pressure seems to work best. If the file does not cut when rotating the brace in the usual manner try turning it the other way. A hole can be drilled through the cup in a minute or two.

To enlarge a hole already drilled, use a file of the proper size and, with little or no pressure, rotate the file backwards, that is, so the spirals will tend to back out of the hole.

A SIMPLE PRIMARY REACTOR

John Oigard, Jr., W9ASW, needed a means of controlling the filament voltage on his Type 90 rectifiers and constructed a primary reactor which did the work very nicely. The filament transformer, which was homemade, was built to deliver 10 amperes at three volts, and the problem was to cut the voltage down to 2.5 for the rectifier filaments and still allow some adjustment to take care of variations in line voltage.

A dummy load was first made up to take 10 amperes at three volts to take the place of the filaments while adjusting the reactor. The reactor itself and its connections are shown in Fig. 7. The iron core is a 1½ x 6 bolt, although any piece of iron or bundle of iron wire of about the same dimensions will do. The winding form is a piece of fibre tubing 1½ inches inside diameter and 6 inches long, with end pieces of fibre or wood fitted over it to hold the winding in place.

With the core inserted all the way in the form, No. 20 d.c.e. wire is wound on until the voltage across the dummy load, as shown by a voltmeter, is two volts. About 450 turns were sufficient in this particular case. When the core is pulled entirely out the inductance of the reactor is very low and the secondary voltage is practically the same as when the primary of the transformer is connected directly across the line. It is possible, therefore, to regulate the secondary voltage to any value between 2 and 3 volts, which will take care of rather drastic changes in line voltage.

FIG. 7

The same idea can be applied to other transformers as well, but the size of the reactor may require some modification to take care of different loads. The wire in the coil must of course be large enough to carry the primary current of the transformer without excessive heating.

Huber Resigns

LOUIS R. HUBER, W9DOA, Director of the A.R.R.L. Midwest Division, has moved to Seattle for the purpose of attending the University of Washington for the next two years. As a result of his removal he has felt it necessary to present his resignation as an A.R.R.L. Director. The resignation cannot become effective until his successor is chosen. Special notice is now appearing in QST, soliciting nominations for new director, and an election will be held at the same time as the regular winter elections in other divisions, resulting in the selection of a successor by middle December. Meanwhile, of course, Mr. Huber continues the Midwest Director.

Strays

W9CKG discovered an ad in his local newspaper which offered a short-wave converter with slug-in coils for sale! The papers are still manufacturing "Strays."
LIKE most amateur stations, W7GP is the result of gradual growth and modernization from a small beginning. The owner, Mr. Allan D. Gunston, of Olympia, Washington, began his radio activities back in 1912; on Thanksgiving Day to be exact, with typical low-power equipment for those days—a couple of spark coils with a straight gap hooked directly to the antenna. The receiving equipment was built around a galena detector and a telephone receiver snaffled from the house phone. During the intervening years the station has passed through the familiar transition from spark to c.w. and from low to high power, and the present station is modern in every respect.

One corner of the basement has been finished off with plaster-board for the radio shack. The room is ten feet square and has a 5' x 10' workroom off one end. A daybed, writing table, built-in operating table and a bookshelf are installed in the room in which the apparatus is located. All a.c. wiring is brought in through conduit to eliminate the possibility of induction hum in the receiver from the power wiring. One of the photographs is a view of the operating table and shows the transmitter and receiver. The power-supply equipment is installed under the table.

The station is located in a specially-built room in the basement of the house. Only the receiver and transmitter are visible in this photograph, the main power supply being located under the table. The monitor-frequency meter is on the table to the left of the receiver, but lack of room prevented its being included in the photograph.

One of the photographs is a view of the operating table and shows the transmitter and receiver. The power-supply equipment is installed under the table.

The transmitter is controlled by a 3500-ke. crystal, working up through successive amplifier and doubler stages to a Type '04-A final amplifier, and may be used on either 7180 or 14,360 kc. The diagram is shown in Fig. 1. The oscillator tube is a Type '10, supplied by plate power from 225 volts of "B" batteries. The next tube is also a Type '10, with 380 volts of "B" batteries on its plate, and functions as a 7180-ke. doubler. The third tube is a Type '03-A, and may be used as an amplifier on 7180 kc. or as a frequency doubler for 14,360 kc, feeding the '04-A on either of these frequencies.

The first three tubes and their tuning equipment are all carefully shielded from each other to prevent oscillation caused by stray feedback. The rear view photographs of the transmitter show how these shields are constructed. There is a door in each shield compartment to allow the operator to get at any part of the transmitter without difficulty. The shields are made from sheet copper. The '04-A stage and the antenna tuning equipment are mounted on a shelf above the other three tubes.

The rack which holds the transmitter is made of wood, and is 20 inches high, 30 inches long and 18 inches deep. All meters and variable condensers are mounted on the bakelite panel. The tuning condensers are all National double-spaced transmitting type, with the exception of the neutralizing condenser, which is a Cardwell which has been triple-spaced to prevent arcing. R.f. chokes are all home-made, and are wound on old 500-volt cartridge fuse bases. The inductances for the various stages are copper tubing of a size large enough to carry the tank currents of the different tubes without much heating. While tubing is not entirely necessary on the low-power stages for electrical reasons, it is used because of its rigidity.

Separate tank coils for the two bands are provided for both the '03-A and '04-A stages. To change from one band to the other is simply a matter of changing two coils and resetting the
feeder tuning condensers and the tuning condensers on the last two stages. It can be done in a few minutes.

The plate power for the two Type '10 tubes in the transmitter is furnished by a bank of storage "B" batteries which are located outside the operating room in the basement. The high-voltage plate supply for the '03-A and '04-A is a rectifier-filter system, a diagram of which is shown in Fig. 2, and which is located under the table. The long leads shown in the photograph of the power supply are not left that way normally, but were made longer than necessary to

![Diagram of the Crystal-Controlled Transmitter](image-url)
allow the transmitter to be turned around on the operating table for a rear-view photograph without disconnecting it from the power supply. The wires have since been straightened out and made ship-shape.

The high voltage is furnished by a 2-kw. line transformer supplying 2300 volts on the high-tension side. The rectifier consists of four Type '06 mercury-vapor tubes in a bridge connection. A 50-henry choke and a 5-mfd. condenser form the filter. A drain resistor is connected across the output to keep the peak voltages on the filter condenser to a safe value. Radio-frequency chokes are mounted on the filter condenser terminals to prevent stray r.f. from getting into the condenser and causing breakdown.

Each of the tubes in the transmitter has its individual filament transformer, with the exception of the Type '10's, which have a common filament supply. The rectifier tubes are all furnished with filament power from the same transformer, but a separate filament winding is provided for each tube. All the filament transformers were constructed at home.

Fig. 2 also shows the keying system, which is designed to be semi-automatic and prevent damage to the rectifier tubes by applying plate voltage to them too quickly after the filaments are lighted. It is similar to the system described in QST for July, 1929. R3 and R4 are time-delay relays, and are adjusted so that the armatures are released about two seconds after the current to the magnets is shut off. When the switch S is closed Relays 1 and 2 are energized, closing their respective contacts. R1 closes the primary of the rectifier filament transformer, lighting the filaments of the rectifier tubes. R4 at the same time closes, making it possible for R4 to control the power for the rectifier plates. When the key is open the contacts at "A" on R3 are closed, thus completing the circuit through R4 when S is closed, and opening the 110-volt line to the plate transformer, since the contacts of R4 are open when its magnet is energized. When the key is pressed the keying relay operates in normal fashion, and at the same time contacts "A," which in turn energizes R4, and thus closing the line to the plate transformer after a two-second interval. The lower contacts on R4 also close, completing the 110-volt circuit to the filament transformers for the transmitting tubes.

If the key is released for more than two seconds the armature of R4 is released, closing the contacts at "A," which in turn energizes R4 and opens the primary of the plate transformer. The filament voltage on the transmitting tubes is also removed when the lower contacts on R4 open. R2 is in the circuit simply for protective purposes, since it prevents the application of plate voltage to the rectifier tubes when the filaments are not lighted.

The filament center-tap lead of the '03-A stage is broken for keying.

**RECEIVER**

The receiver is a manufactured outfit which has been remodelled to permit easy tuning in the
amateur bands. The diagram is shown in Fig. 3. It is an adaptation of the four-tube receiver described in QST for November, 1928, using throttle-condenser control of regeneration and tuned r.f. amplification. A midget condenser tunes the r.f. stage, and is controlled by the knob on the lower left-hand corner of the panel. The r.f. coil is mounted on the left side of the aluminum cabinet, and the detector coil on top. The peaked audio stage uses a Type '22 tube, with a Ford spark-coil secondary tuned by a fixed condenser to obtain a peak at about 1000 cycles.

In rebuilding the receiver, pigtails were added to the condensers to eliminate noises from poor bearing contacts, and plates were removed from the detector tuning condenser until the bands were spread satisfactorily. This also necessitated re-winding the coils, but was well worth the trouble, since the 7000-kc. band now covers 90 divisions on the tuning dial and the 14,000-kc. band 40 divisions, making tuning easy.

The relay in the antenna circuit disconnects the antenna when the key is pressed, allowing break-in operation without blocking the receiving tubes.

MONITOR AND FREQUENCY METER

The combined monitor and frequency meter, a diagram of which is shown in Fig. 4, does not appear in the photograph of the station, but is located on the operating table to the left of the receiver. The oscillator uses a Type '99 tube in the usual tickler circuit, with a calibrated absorption meter which is coupled to the oscillator through a fixed condenser in the system described in QST for October, 1928. Both monitor and frequency meter are thoroughly shielded, and since the coupling between the two is fixed the meter can be calibrated much more accurately than is possible with the usual absorption meter.

ANTENNA SYSTEM

The transmitting antenna is a Hertz with a single-wire feeder, constructed for operation on 7150 kc. The second harmonic is used for 14,360 kc. The wire is No. 12 enameled, and Pyrex insulators are used.

A separate outside antenna, running at right angles to the transmitting antenna, is used for receiving.

OPERATION

An accurate log is kept of all stations worked and the conditions obtaining at the time, so that the operator has a constant check on the performance of the station. Two objects were kept in mind in building up the apparatus; first, maximum performance according to the best amateur practice and second, simplicity of operation. Visiting amateurs can operate the station with ease whether the owner is there or not.

Twelve countries in four different continents have been worked.

Every now and then (but fortunately infrequently) it becomes our unpleasant duty to report the death of some fellow-amateur who has been electrocuted while erecting an antenna near a high-tension line because proper precautions were not taken to insulate the antenna or guy wires. The case of William Gaffery, W6DTS, was much worse than most because his mother and cousin, who were helping put up a new mast near an 11,000-volt transmission line, were instantly killed when one of the uninsulated guy wires touched the line. Gaffery rushed to the assistance of his mother and was fatally burned. His two sisters, who were also helping, received severe burns as well.

For heaven’s sake, gang, use a little ordinary care in putting up antennas or masts near high-voltage wires, or better yet, don’t erect antennas near them.
Conducted by Clinton B. DeSoto

A result of 10 affirmative votes received from member-societies of the Union in response to Proposal No. 3 in Calendar No. 3, dated December 31, 1929, it is with pleasure that Union Headquarters announces the admission of the following additional societies as full-fledged members of the I.A.R.U. effective August 15th:

- Lwowski Klub Krotkofalowcow (L.K.K.), Biełostockiego 6, Lwow, Poland.
- Sveriges Sandare amateurs (E.A.I.), Stockholm 8, Sweden.
- Union Schweiz Kurzwellen Amatuer (U.S.K.A.), Postfach, Zurich 22, Switzerland.
- Wireless Society of Ireland (W.S.I.), 12 Trinity Street, Dublin, Ireland.

The present members of the Union join in welcoming the new organizations, which are well known as active, energetic, and representative of the flourishing amateur interest in their respective countries. The addition of their forces marks a distinct advance in the strength of international amateur radio.

Union Headquarters wishes to state that it will be pleased to consider applications for membership from bona-fide national amateur organizations, in other countries, who are truly representative and inclusive in their scope, and whose membership in the Union would benefit both themselves and amateur radio as a whole. Applications for membership should be sent to the I.A.R.U. Secretary at Hartford, Conn., U. S. A.

In reference to the new members, it is pointed out that reports from all but the last have appeared in this and the September issue of QST. We have received reports to the effect that an amalgamation between the L.K.K. and the Polski Klub Radjo Nadawcow, a regional Polish organization, is contemplated to take effect soon, possibly incuring a change of name.

Union Headquarters has received several letters from the secretary of the International Amateur Radio Association of China, containing a great deal of interesting information on the Association and Chinese amateur conditions. The active members of this Association are those who reside and operate in the vicinity of Shanghai, while those residing in other places are accepted as associate members without the powers and privileges of membership. Our good wishes for the future of the I.A.R.A.C.

A somewhat similar organization was organized on May 3d in Hongkong, the Hongkong Amateur Radio Transmitting Society. The official organ, D.X., is an interesting publication of surprising size and scope for such a new venture. The first issue contains several good technical articles, interesting local news, and well-chosen features and special items. Union Headquarters extends its congratulations to the H.A.R.T.S. and its new publication.
George W. Mesher, W6ERK, of 2949 Sacramento Street, San Francisco, Calif., advises that he will forward QSL cards to any place on the globe. He has a chain of stations in operation under his supervision to do this work, and will be glad to reply to all requests for calls and new calls.

The Réseau des Emetteurs Français (R.E.F.) held its second annual convention at the municipal building of the sixth district in Paris on the 30th and 31st of May under the chairmanship of Mr. J. Levebvre, president and founder of the league.

A series of resolutions were drawn up and passed upon for presentation to the Minister of Posts, Telegraphs, and Telephones. They included requests for conformity of the French amateur French amateurs be accorded representation and official recognition at all meetings and conferences called for the discussion of matters affecting them, particularly those bearing on the next international conference at Madrid in 1932.

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AUSTRALIAN REPORT
By W. G. Sones, Dir. Fed. Publicity, W.I.A.

In common with all other sections, Australian amateurs have much to find fault with in prevailing atmospheric conditions as reported in overseas magazines. Both the 7- and 14-mc. bands are particularly subject to interference at the present moment, when for this season in Australia just the reverse should be true. The reason is hard to account for, but is evidently due to the prevalence of sun spots. When conditions are good "W's" come through well from about 0530 to 1100 G.C.T. "G's" and "F's" and other European stations can be worked much later, up till 1700 or 1800 G.C.T.

For local work the 7- and 3.5-mc. bands are the most used, and the 14-mc. band is silent of either local or overseas stations. Australian amateurs are plugging away at 28 mc., with fair success, and much interesting data is being accumulated. Among the members of the section working in that band, interest is being shown in the high frequency tests from American stations. The reports so far have been slow in coming in, but if any are made they will be reported in due course.

All divisions of the Wireless Institute of Australia report increasing membership and continued enthusiasm. While no figures are available for the total membership of the Commonwealth, it must be in the region of 400 to 500 out of a total number of 1000 licensed stations, active and inactive.

Quite a lot of phone work is being undertaken by local men on the 7-, 3.5- and 1.8-mc. bands. No restrictions are placed on Australian experimenters in regard to the broadcasting of gramophone records other than in the protection of copyrights, etc., so that amateur stations are rather popular with the B.C.L.'s for their programs. Phone transmission of course does not consist entirely of broadcast records, but they provide a useful method of modulating while testing without the continual necessity of constantly speaking into the microphone, and a relief from the limited amount of rag-chewing which is permitted under the regulations. As a matter of fact, a good deal of the broadcast telephony is really excellent, especially on the lower frequency bands.

We note with pleasure that it is requested that regulations with the provisions of the Washington conference; revision of the system of taxation of transmitters as distinguished from receiving stations; automatic yearly renewal of licenses until voluntarily discontinued, with an interval of two years after expiration without renewal before the call letters are re-issued; and that amateur activity in all countries be brought periodically before the Berne Bureau by the respective governments. Requests are made for close surveillance of commercial and broadcast stations to prevent their interference with or unauthorized occupation of amateur territory. The final request is for a special rate for the handling of QSL cards by the postal service.

We note with pleasure that it is requested that Lusca, Angel Radaelli, Paraguay 2233, Buenos Aires, has worked 61 countries in all continents.

Three transmitters, two of 50 and one of 300 watts power, are used on 7 and 14 mc. The two receivers employ the Schnell and Hartley circuits respectively.

(Continued on page 64)
Correspondence

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

S. F.
2504 Crane Avenue,
Detroit, Mich.

Messrs: Howard Chin, Paul Hendricks and Roland Hill Gang:

This is just a word of appreciation for your standard frequency transmissions, the first of which I received on the afternoon of July 18th. I own only an S.W. receiver and have puttered around with it for some little time now, but I soon gleaned the fact that even for receiving alone a fellow has to have some sort of frequency meter to know where he is located in the various kc.'s. So I put together one of the meters so well described in the Handbook and tuned in on your W1AXV signals on above mentioned date. Imagine my surprise and feeling of gratitude for the work you fellows are doing when I, a perfect duffer, not even able to read the code, found myself able to make out your call and frequency designations with ease and to calibrate my own meter's 7000- to 7300-kc. band and its harmonics! Your signals came in moderately loud, no fading, and very readable due to your elegant d.c. note and transmitters — as contrasted with some of the other peculiar mutterings still to be heard on the amateur bands, and off of them, but still emanating from amateurs nevertheless. F.B. I will keep on listening to these S.F.T.'s of Yours until your shack caves in.

A million thanks OM's and again as many hopes that you will continue your work for both those that know and appreciate the effort you are exerting — and those that don't but who may, after they feel the prod of the radio inspector.

— Norman C. Grove

A Comment on “Marine Operating”

822 Broadway,
McKees Rocks, Penn.

Editor, QST:

Having read the letter written by Mervyn Rathbone, Jr., I could not help making a few comments on marine radio operating myself.

To begin with, like the advertising that Mr. Rathbone speaks of, some of the statements he made are somewhat misleading.

He states that the steamship lines allow from 40 cents to one dollar a day for meals. I personally was never on any ship that allotted more than fifty-three cents per day and, though I did not receive “turkey with the trimmings,” I did, on every boat I was on, receive “chicken with all the trimmings” and every Sunday at that, which I think is more than the average person has on land. Of course there are some “starvation lines,” but an operator does not have to take out any old tub.

The same applies to the living quarters on the boats. I was on a tanker when I left the sea, and the quarters I had were as large and well-equipped as the average small hotel room. Of course the walls were painted white instead of being papered and there was no rug on the floor, but it was furnished with a bunk with four drawers under it, a settee, chair, sink with hot and cold running water, a large clothes press and a cabinet for shaving material, etc.

As to the engineers and officers, some of them are uneducated, but then I know a lot of radio operators who do not have such excellent table manners. Mr. Rathbone seems to forget that engineers have to take just as stiff an examination as any radio operators ever had to, and at present where a radio operator takes two exams to obtain a first class ticket, an engineer is required to take four before he obtains a chief's ticket. In my own seagoing experience, I never was treated as anything but the equal of any of the other officers of the ship.

I am at present operating broadcasting station WJAS and also instruct code in a radio school, but intend to go back to sea again just as soon as I get the — urge which I don’t doubt will be very soon, as I know I still can get a thrill out of visiting Hamburg, Antwerp, Rouen and Paris.

— George J. Shannon, ex-W8BJT, ex-KJ6E

A Commercial Op Speaks

S. S. Atlas,
Providence, R. I.

Editor, QST:

The August, 1930, issue of QST has a few items in it which have tempted me to write.

I have received so much enjoyment and knowledge from articles in all issues of QST — technical or non-technical — that I would not like to see you change the style in which you have been writing them.

I am rather below the average in higher mathematics, having forgotten what I did learn at high school, but even so can generally get information out of the “too technical” articles by
The control transmitter of the radio network at the 1930 National Air Races used nine Jewell Meters to watch circuits continuously wherever it was desirable to check voltage or current.

This transmitter, especially built for the occasion, used two 50 watt tubes in parallel for the power amplifier stage inductively coupled to an antenna counterpoise system. They were preceded by an 865 shield grid tube master oscillator, controlled by a 210 tube in a crystal oscillator circuit.

During the day this transmitter maintained communications between the radio room located near the judges' tower, the three pylons, and the judges' car. At night it was used to maintain amateur broadcasting programs.

Jewell Instruments have long been the favorites of radio amateurs and experimenters. Mail the coupon for descriptive bulletin.
POPULAR!
—new, improved TRIAD RADIO TUBES

EVERY development known to radio tube science — you will find them all built into the new, improved TRIAD line. Types T-24 and T-45 have been entirely redesigned to assure greater power output and less distortion at higher signal voltages. The new construction and thoriated tungsten filament makes T-210 an easy oscillator and guarantees a longer life. The construction of T-50 has been strengthened to withstand the most severe usage.

All through the entire TRIAD line you will find the same sensational improvements carried out. No wonder TRIAD tubes have won the confidence of the tube-buying public!

We have designed a 210 tube for strenuous service under transmitting conditions. The filament is thoriated tungsten and the plates are molybdenum. At exhaust, each 210 is individually treated and evacuated for the highest possible vacuum.

For further information send for our bulletin T-10. Special prices 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.

reading them three or four times. In fact, I get my greatest kick by going back and recalling different technical articles I have read in QST — which, by the way, did not have any algebra or calculus in them.

I am a radio operator, in fact have put in so much time that I think I am in the old-timer class now. I started in 1912. 1913 saw me with a ham set; 1914 a railroad telegrapher; 1917, assigned to signal section, Balloon Corps; since 1920 at sea most of the time, but managed to have an amateur station from 1921 to 1926. The last four years I have been steady at sea.

Which brings me to the letter on "Marine Radio Operating" on page 66 of the August issue.

I have read articles in QST by marine radio operators before which were interesting and this one is so true, so out-rightly true, that I would think QST might need to retire to the "bomb-proof dugouts" which you use when you write those "too-technical articles." The radio schools and others might see in this letter a bad blow to their interests — however, I would like to back Rathbone's letter as it is — for it could not be made any plainer, nor more truthful. The only way one could really understand it is to have had an operator's life at sea.

Then I would like to add that although all he has said will be verified by thousands of us in marine operating, where can anyone go in any occupation and not find conditions which are just as bad as those encountered at sea? There are thousands working in different occupations on land under circumstances which are just as difficult and obnoxious to them as conditions are to us at sea. Some wish they just had an opportunity to go to sea, and who can hold back the young hopeful who has been tinkering with radio since his grammar-school days and at last secures his operator's license — without even going to radio school — and then takes out his first ship? It may be quite a disappointment — but he will get over it.

I think from my experience that these occupational difficulties can never be cleared up to our satisfaction, even in a life time. It would be great if all those at sea could trade places with all those wanting to go to sea — so each one could get the experiences of the other and be somewhat more satisfied — but that, of course, is an impossibility. Those with experience in work on both land and sea know that there are certain advantages in both.

— G. W. Stewart

"Too Technical"

Editor, QST:

Well, well, well and well! Congratulations on your editorial in the August issue. What is a "ham" anyway? Is he a guy who doesn't know anything, can't think for himself, etc., or is he a real radio man? Not necessarily an engineer — but at least a man who believes in experimentation and one who is willing to work out problems
Inferior resistors introduce noise.

Bradleyunit Resistors are different
<< they're Noiseless >>

Modern radio receivers utilize many fixed resistors. If these resistors are of poor quality, they introduce unnecessary and disturbing noises in the receiver. Comparative oscillograms of current variation in receiver circuits are shown above. The upper oscillogram portrays the silent operation of a receiver equipped with Bradleyunits. The lower oscillogram portrays the irritating noises introduced in a receiver circuit by poor resistors.

Bradleyunits are solid-molded resistors that are unaffected by moisture, temperature or age. They are noiseless! Millions of these units are used annually by the leading radio manufacturers.

Bradleyometer
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A new step potentiometer of approximately 50 steps. Each step is separately controlled and any resistance-rotation curve can be obtained.

The resistor comprises a series of resistance discs interleaved between thin metal discs. A moving arm makes contact with the resistor.

Two or more Bradleyometers may be assembled in tandem, for volume control, mixer control, T-Pad and H-Pad attenuators and for every type of radio circuit.

Bradley Suppressors for Radio Equipped Cars

Prominent motor car manufacturers are providing their radio-equipped cars with Bradley Suppressors. Individual Bradley Suppressors for each spark plug and for the common distributor lead minimize the disturbing oscillations in the circuit and thus suppress interference in the receiver from ignition systems. When used with by-pass condensers in other parts of the ignition circuit, shielded ignition cables are not required. The power of the engine is not affected by Bradley Suppressors.

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277 Greenfield Ave., Milwaukee, Wis.

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ALLEN-BRADLEY RESISTORS
Produced by the makers of Allen-Bradley Control Apparatus
Learn Radio Telegraphy

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for himself. Let us hope that every A.R.R.L. man is in the latter class—and may QST have more "tech!".

73, etc. — M. O. Sharpe

Things in General

Cleveland, Ohio

Editor, QST:

The current QST arrived yesterday. As usual, I sat down and read the book through, cover to cover, specially noting the editorial and the detector tube article. The PMZ story is the kind we should like more of, but I was told sometime ago by K. B. W., not to expect many such, due to the fact that good operators and good story writers rarely are included in one man. H! The dummy antenna problem is a good one; all in all it was a very good issue.

Leaving the house I was joined by a beginner, a man in years, a pre-war ham and now holder of a temporary. See the Quest? I asked him.

"Yep, outside of the dummy antenna there's not a darn thing in it," he replied. Then I blew up. No, he hadn't read the Editorial Page. The contest held no interest for him, the technical articles dealt in phrases above "2 turns on a 2-inch coil," hence over his head. You men have the correct attitude. Make the gang come up to a level on a par with what a 1930 amateur should be. I am rusty on math, physics and such, but believe me I read 'em all—all of it will soak in.

Then we tried to calibrate a frequency meter from W1AXV's signals. The 7000-ke. signal was fine—7100 was jammed so bad that it was a very hard task to hear W1AXV. Some durn' phooij was on top of them, adjusting his transmitter to their wave. Sometime ago you published a word or so about such practice. I want to add my bit. Such idiocy should be a crime. I know you men try. But why in the name of old Betsy can't the lads learn to behave like gentlemen. This is a man's game, a gentleman's game, if you please.

No, the lowdown cuss didn't sign. He wouldn't, but I hope he reads this letter.

Night after night I hear held-down keys, hash on the air, meaningless signals. There is a law that says, "no superfluous signals—also another law that says, "no malicious interference." I believe there are more lads on the air to-day than ever, in proportion to the number of good amateurs. One hears many stations operated and built properly, but too many are the other kind—sloppily built and rottenly operated. Why can't a drive be made by the operators who are playing the game against the "lids" that crowd and wobble on the 7000-ke. band? Boycott them—answer no low QO's—drop a man who sends hash—give him an "SK" and leave him calling the wind. What say, gang?

This thing has run on like the proverbial brook, but I'm through now—till next time.

— A. D. Middleton, W8UC, W8AKA
CRYSTAL CONTROL TONE for C. W. Transmission

REL Cat. No. 215 Basic CW Telegraph Unit is the typical modern multi stage transmitter for the amateur who desires to use the best. Frequency flexibility throughout each amateur band with crystal controlled note at all times. Shift quickly and easily anywhere in the bands.

The REL Cat. No. 215 transmitter kit is furnished with all necessary parts including metal case, drilled and engraved aluminum front panel and a very concise instruction booklet giving information on the assembly and operation. Extremely simple to operate. Consumes minimum amount of power. Employs standard broadcast receiver tubes. May be operated from B batteries, ordinary B eliminators or other similar sources delivering 300 volts D.C. A complete low power transmitter ready for immediate operation. Employs UY-227 master oscillator tube, UY-224 screen grid buffer tube and UX-245 power amplifier tube. Will deliver 10 watts to the antenna as a CW telegraph transmitter.

The Cat. No. 215 CW transmitter kit has been specially priced to meet the demands of every amateur. The price including one set of plug-in coils for any of the three popular bands is $56.00. (When ordering specify for which band you desire the coils.) Additional coils to cover other bands may be purchased at $7.00 per set of three.

100% MODULATION for Phone Work

REL No. 225 modulator and speech amplifier unit designed to operate in conjunction with Cat. No. 215 CW telegraph transmitter functions as 100% system modulator. When used with Cat. No. 215 unit will deliver 30 watts on modulation peaks into the antenna.

The REL, Cat. No. 225 modulator and speech amplifier kit comprises all apparatus necessary and also includes metal cabinet and drilled and engraved aluminum front panel. The cabinet has the same height and depth dimensions as the transmitter. The modulator may be placed directly alongside of the Cat. No. 215 thereby giving a very neat appearance.

The same type of power supply may be used except that the plate voltage necessary will be 550 to 600 volts. The UX-250 tube is employed as modulator and the UY-227 tube is employed as speech amplifier. The No. 225 modulator kit sells for $42.00.

The amateur who desires a modern station should install both of these units. He will then have a perfect CW transmitter and a clear 100% modulated phone set. REL will be glad to forward you literature describing these two units. Mention Booklet No. 50.
How Filters Work

To Whom It May Concern:

I have built me a filter for my transmitter in compliance with the new regulations requiring hams to have a nice d.c. plate supply, and from all outward appearances here's how it works:

I sit down and tap the switch marked "power" and the juice starts to run around the primary of the transformer. After a few trips around it jumps over to the secondary, and in jumping over it seems to get all het up. This is accompanied by an increase in voltage — guess it even gets as much as ten times the original; anyway it’s there, and seeing there’s no place for it to go it makes a bee line for the nice new 866 I paid so much for.

The only reason I put this 866 in there is someone told me it would come in handy. These 866’s are funny tubes, seems they will only pass the juice in one direction, so some of it has to wait, but the rest runs merrily through.

After pushing and fighting to pass through this limited space the current meets its first obstruction — one of those things called chokes. Now when the current comes out of the 866 it is hopping around and making all sorts of fancy curves. The choke doesn’t like this worth a darn, so the only thing for said choke to do is to oppose it all it possibly can, which it does and how!

After the juice has been squeezed a little it passes through and comes to a condenser and just keeps on crowding into this poor condenser until it can’t hold any more. Naturally after it can’t hold any more the current must go somewhere, so the condenser starts to push it out, and lo! it isn’t making all those fancy curves now; it is beginning to act quite nice. These condensers act a lot like a pitcher of water when you are filling it from the faucet — the water runs in rather harshly and when the pitcher is full, it naturally runs out, but it runs out so much smoother than it ran in. This is just what happens in the condenser.

After passing out of the condenser the poor overworked juice only meets another one of those chokes like before, and this choke isn’t a bit more partial to currents that are making funny curves than the first one was, so it just tends to oppose the current until it gives in and acts at least a little better. Now after all this trying to get out, the current meets up with another condenser and goes through about the same lot of red tape. After all the choking and condensing this current has been put through any one would think it had had enough, and I think if I had to go through all this I would myself be willing to calm down and act good, but there is one thing more for this current yet. This current isn’t always tamed completely and after getting through is apt to get up a little spunk and act naughty, so we just keep it busy. This is easily accomplished by putting a resistance of the proper value right across the output of this here power supply. This keeps the juice busy and I suppose helps to keep it down-hearted so it won’t rise up and revolt.

And I get nice DEE CEE.

— E. E. Ester, W1CFI, W1F1B
A New and Better Short-Wave Condenser

Heavy, widely-spaced plates for strength.
Less chance for accumulation of dust causing capacity changes in close tuning.
"Parmica" insulation, the remarkable new material which so closely matches the ideal dielectric efficiency of dry air; current loss greatly reduced; sensitivity and selectivity much improved.

Double cone, smooth-operating bearings — easily adjusted for wear, non-corrosive brass plates with tie-bars. Strong aluminum alloy frame.

A real short-wave condenser in the three most desirable sizes: 150, 125 and 100 mfn.

Write Dept. Q-10 for Details of Hammarlund Short-Wave Equipment.

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A New
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TRANSMITTING
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This new "Acracon" oil impregnated transmitting condenser has been designed and built to meet the demands of amateurs for a condenser that can be depended upon for long service.

The units are remarkably low priced because they are sold direct from the factory to you.

Write Today for Information!

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The Ham Spirit
Lineville, Ia.

Editor, QST:
Permit me to extend my views on a question upon which I have heard some comment.
I recently heard some old-time "hams" expressing the opinion that hamfests were dying out and that they didn't receive any benefit from attendance at them.

I am a new ham and attended my first convention of the Midwest Division last May. I can certainly say that although I didn't assimilate all the vast amount of technical talks which were given for my benefit, I caught the spirit of the convention in no uncertain way. After hearing the speakers at the banquet and seeing the fine fellowship shown by everybody to everybody, even including the "scrubs" like myself, the good old League suddenly blossomed out into more than just $2.50 a year for QST. The inspiration carried back home by me has re-kindled my ham ambitions and thoroughly sold me on ham radio.

— Joe Duncan, WYDDX

Low-Loss
Auckland, N. Z.

Editor, QST:
In the October, 1923, issue of QST under the heading "Short Wave Tuner Design," K. E. Hassel started the "low-loss" revolution in receiver construction, the influence of which was felt wherever QST was read, and need I add, wherever radio apparatus was bought and sold. This low-loss campaign is forgotten now, but while it did last its effect was one of universal benefit. At the risk of being accused of looking forward backwards I might say that I consider the years 1924 and 1925 the most momentous in all amateur radio history and the low-loss tuner had quite a lot to do with that. But what of it anyway — we have real high frequency amplifiers to-day, plenty of gain per stage and so on, and nobody can deny that it is better this way.

Advances? Certainly—but what I want to draw attention to is this — that evidence of taking pains in design and construction is less apparent in a modern receiver than in a low-loss receiver of 1924, and this is a very undesirable sign. I am disappointed to see QST publish descriptions of a tube-base receiver with no footnote pointing out that a fast job and not absolute efficiency has been the first consideration. Of course this kind of construction is the easy way, but I can't believe that it is the best way; high-frequency coils wound around tubes of doubtful composition, fields writhing among contact pins and terminals and taking in the baseboard and shield on the way, oversize ticklers — these things are OK in the monitor but — shades of Ballantine — how about the response to weak signals? I see the grid variometer on its way back and shudder as I contemplate the possible return of a revamped tens and units switch.

During 1929 Hull did for the transmitting side what was done in those pioneer low-loss receiver
NEW adaptations of long known fundamentals continually reveal some necessity for condensers different in form from the usual standard types heretofore found adequate.

Are you keeping abreast of modern developments in the fascinating field of ultra-shortwave radio communication? Up-to-date experimenters will at once see the advantages of a variable condenser with an adjustable stator allowing the maximum capacity to be set anywhere from 10 to 50 mfd, and "spreading" the tuning correspondingly—such a condenser is our 201-E, shown below.

With the ever-increasing traffic on the shortwave channels—selectivity and sensitivity become of paramount importance in the modern radio receiver. Many operators acclaim the merits of the push-pull system, using double section variable condensers in the tuning circuits. To meet this demand our 202-E has been developed giving a total capacity of .00075 mfd, with 2 sections in series. With interchangeable coils a tuning range of 5 to 80 meters can be covered readily.

CARDWELL CONDENSERS
THE ALLEN D. CARDWELL MANUFACTURING CORPORATION
81 Prospect Street, Brooklyn, N. Y.
Since broadcasting began
"THE STANDARD OF COMPARISON"
More Mental Fading

Editor, QST:
Just received August QST and was reading the letter from ex-W2ADH entitled "Mental Fading." While reading it, it struck me that one could apply the old adage "There are two sides to every question." In this case, I took the funny side (as ever!). On one side we have the reception (or deception) of fading signals. On the other side (the funny side) we have the transmission of fading signals.

I don't think there is anything so amusing at times (although sometimes exasperating, too) than to try to copy a fellow who sends part of a word and then forgets either how to spell it or how much of it he has already sent. In a few minutes you can time these "mental fadings." And some of the spelling would do credit to Einstein when it comes to figuring it out.

But I cannot say all this without saying I'm no exception. Often in the wee hours, when everyone is asleep, and when every touch of the key sounds like a wheel going over a joint in the track, I find that I begin to have spells of mental fading. I have traced this to a difference of opinion in my brain cells. Half of them want to call it a day and pull down the shades, while the other half are trying to keep up with the key. The deciding factor in this domestic struggle is whether DX is in order or not. If not, then I do a complete mental fade-out. Hi!

There is just one more thing in connection with articles. That is, he showed how simple apparatus, if given care in design and construction, can return first class results. I hope that the excellent advice included in the High-C issues will last a year or two before going the same way as the real genuine low-loss principle! The transmitters illustrated in recent QST's are certainly excellent models and I look forward to seeing again in QST receivers which could stand searching criticism as to constructional design, just as these transmitters can stand it.

My critics might suggest that air-space coils, etc., are not necessary now we have amplifiers which amplify, but I say that many amateurs do not use amplifiers and that they should have good information on simple tuners. Moreover, such information might foster that characteristic of the real amateur of every realm of recreation, namely the desire to finish his work to perfection. This idea should pervade every amateur radio station. If the low-loss doctrine can be resurrected, good simple receivers will make worthy companions for the High-C transmitters and the crystal control station will be equipped with a superlative radio-frequency amplifier receiver.

Please excuse this criticism of things as they are; it is intended to be constructive and is perhaps just the result of early principles dying hard! But after all they were good principles.

—T. R. Clarkson, ZL1PQ
A SAFE
GUIDE
in the selection
of insulation for
Radio Transmitting
and Receiving Sets

OVER 300 broadcasting stations, leading radio telegraph systems, the United States Army, Navy, Air Mail, Coast Guard and Ice Patrol Services, explorers like Commander Byrd, and exacting amateurs everywhere have utilized PYREX Insulators in many spectacular achievements.

Regardless of whether you are sending or receiving — on land, sea or airplane — you should be thoroughly familiar with the PYREX Antenna, Strain, Entering, Stand-off and Bus-bar Insulators that are helping these leaders to make radio history.

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Return the coupon for your copy, and if you want further advice on any insulation problem, our Technical Staff will answer your questions promptly.

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Please send me copy of your new bulletin on Radio Insulators.

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QST 9-30

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BUILD YOUR POWER-PACKS WITH
PUNCTURE PROOF
FILTER CONDENSERS
AND ELIMINATE, ONCE FOR
ALL TIME, THE DANGER OF
HIGH-VOLTAGE BREAKDOWN

Prominent Radio Manufacturers, who have been using Mershon Electrolytic Condensers for years (over 3,000,000 of them in use today), continue to do so, for they provide better filtering, greater reliability and almost unlimited life — at lower cost.

In building power-packs for receivers, transmitters or power-amplifiers (or in repairing them) your problems closely parallel theirs.

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THIS NEW
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It is the most complete, helpful booklet on Electrolytic Filter Condensers ever published. In successive chapters it deals with voltage surge effects, condenser life limits, moisture, safety-value action, cost and size, and carefully and completely analyzes them from a very practical point of view.

It contains complete descriptions of the newest types of Mershon Electrolytic Condensers, and shows effective circuits for their use. Although priced at 10 cents, it will be sent FREE on request to QST readers.

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Please send me a FREE copy of your new booklet, "Puncture Proof Filter Condensers."

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

---

this mental business, more or less funny, as it has to do with the psychological nature of the individual operator. I mean when one has company. It seems that while your visitors are looking at the cards, certificates, etc., they are comparatively quiet, but as soon as you start to "show 'em how it's done" they begin to ply you with questions. I haven't yet found an op who can talk and send simultaneously except on CQ-CQ.

Hi.

Guess I'll stop rambling now before someone sees I've got a case of permanent mental fading, so 73's and I'll see you some more.

— Emil F. Scholz, W1AMQ

---

A Mere Youngster

Curtice, Ohio

Editor, QST:

Well, here I am for another year in good old QST and can now say I am in my 80th year young. Have you any member older and if so can they pen a letter like this without glasses? Hi!

— Dr. Geo. W. Kirk, WSARJ

The handwriting was PB — much better than the samples we get from most young squirts.

— Editor

---

I.A.R.U. News

(Continued from page 60)

mentors were granted temporary permission by the local radio authority to use the whole band of frequencies from 1000 to 1200 kc. outside of broadcasting hours. The temporary permit expires shortly, and it is not known whether it will be renewed, but in the meantime considerable use has been made of the upper end of the spectrum which comes within the tuning range of the average broadcast receiver. Spasmodic working has been undertaken around 1990 kc., but as long as favorable conditions exist on the lower frequencies it is not expected that much activity will be shown there.

From one of the 1200-ke. stations in Victoria an interesting experiment is being undertaken in conjunction with the University of Melbourne, in the measurement of the height of the ionospheric layer over Australian territory, which will provide interesting knowledge.

Australian amateurs are getting ready for the next annual convention of the Federal Council, which will take place in Melbourne in September, and Victorians will have the opportunity of entertaining visiting delegates at that time. The Federal Council corresponds to the A.R.R.L. Board of Directors, and the various items discussed will be advised later.

The following British Notes combine the reports for June and July, as both were received within the month.

(Continued on page 66)
"Our CeCo Radio Tube sales have increased 30% in the last 2 years—proof of CeCo's high reputation."

Moroisky, AMCO RADIO STORES, INC., NEW YORK, N.Y.

Another recent development of the CeCo Engineering Laboratory—the non-electrolytic press, used in the CeCo type 280 Rectifier, prevents stem air-leakage, insures this tube against abrupt failure ... and protects power packs against a fault which has been largely responsible for their destruction."

DO YOU KNOW?

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2. Forty-two specialty engineers are constantly working to improve CeCo Radio Tubes.

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

PRESIDENT
CECO MANUFACTURING CO., INC.
PROVIDENCE, R. I.

1930
in “Westons,”

Byrd found the

DEPENDABILITY he needed

WHEN Commander Byrd formulated plans for the long stay in the Antarctic, a very important task was the selection of equipment that would give service under the most adverse conditions.

There were no service organizations, factory representatives, nor extensive repair facilities in Little America; but a group of men, thousands of miles from civilization, whose lives and hopes depended upon the reliability of their equipment.

Only Radio could penetrate their isolation. It was radio that carried daily messages to the waiting world, that kept exploring parties in touch with Little America, and with Commander Byrd in his flight over the South Pole. And Weston points with pride to this important and unfailing radio service which was controlled with Weston Instruments — instruments not made especially for the expedition but taken directly from our standard stock. Again Weston has kept faith.

Chief interest during June centered around the Loyal Birthday Relay and with the Southern Cross transatlantic flight. In connection with the former, we are pleased to record that nearly all B.E.R.U. groups succeeded in forwarding via British stations, messages of greeting to our Patron, H.R.H. the Prince of Wales, on the occasion of his 36th birthday. The messages were delivered to St. James Palace, by Mr. Arthur Watts, our Publicity Manager. The Prince in acknowledging the messages asked that the following be sent to all B.E.R.U. groups:

"The Prince of Wales sends you sincere thanks for your good wishes which his Royal Highness much appreciated."

The members of the R.S.G.B. were asked to cooperate with the wireless operator on the Southern Cross, and it was indeed pleasing to find that a large number were enabled to supply useful and interesting information at the completion of the flight.

During July the annual summer outing took place when the Dorchester and Somerton Team stations were visited.

The summer months in Great Britain are normally periods for spasmodic activity, local conventionettes, and station visits. The social side of amateur radio would appear to be even more valuable sometimes than the experimental side, judging by the vast number of new "ham" friendships which have sprung up throughout the world. The value of these personal contacts cannot be underestimated and should be encouraged at every opportunity. Recently in London we have had the pleasure of meeting Mr. Larsen (ZT5S) of Durham, and Mr. Lederer (UN7XO) of Zagreb, but we feel that many of our overseas colleagues slip into our country without giving us a chance of bidding them welcome. We do earnestly suggest that it is the duty of each Headquarters Society to give letters of introduction to their members who may be traveling to other countries. The members of the R.S.G.B. are most anxious to welcome such visitors, and through the medium of these notes we invited all who journey to Britain to get in touch with our Hq’s at 55 Victoria Street, S. W. 1, if they have no definite address to visit.

Within a few weeks the Fifth Annual Convention will be held in London. We would impress on all who may be interested the importance of the various European countries being represented, in order that they may place before our members the opinions held by their Society. At the London Convention many subjects which have been recently discussed in Antwerp will be reconsidered, and recommendations can be put into operation. The London Convention commences at 5 p.m. on Friday, September 29th, and is to be held in the Institute of Electrical Engineers. Intending visitors are requested to write to the Hon. Secretary at the Hq. address.

Interesting work on 56 mc. and 112 mc. has been carried out by groups of British amateurs
25 TESTING INSTRUMENTS IN 1
ONLY ONE METER TO READ

PUTS ALL OTHERS IN THE "OLD MODEL" CLASS.

Supreme
Set Analyzer
Model 90
Size 4 1/4 x 9 1/4 x 11 1/4
Weight 6 lbs. Dealers' Net Price, F.O.B.
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$78.50.
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THROUGH the selection of a single meter, used only in costly laboratory equipment heretofore, the Supreme Set Analyzer offers a smaller, handier, one meter analyzer, that gives a vastly greater number of tests and functions than any other set tester or analyzer, regardless of the number of meters employed!

WORDS can't adequately detail its superlogies. Comparison will convincingly prove that the Supreme Set Analyzer Model 90 provides 79 distinct readings and ranges as compared with a maximum of 20 readings and ranges by its nearest competitor. This vastly greater range is obtained with a smaller number of switches and with much greater ease and speed. In only one way can the Supreme Set Analyzer be compared with other analyzers or set testers. The price, $78.50. Ask your jobber to show you this revolutionary Set Analyzer, this super-value in testing equipment — "Supreme by Comparison."

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SUPREME TUBE CHECKER MODEL 19

NO other Tube Checker selling below $40.00 can rival its facilities. Designed to be so extremely simple in operation that any layman can check tubes with quick, positive results, yet Model 19 appeals to the most precise demands of the advanced technician. Large 3 1/2" D'Aragon movement meter in bakelite case. Full size transformer: every type of tube tested at correct filament voltages. The double purpose Tube Checker you have been waiting for — Calls and Counter work.

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SUPREME DIAGNOMETER MODEL 400-B

Service men, manufacturers, and technicians unite in recommending the Supreme Diagnometer Model 400-B as the most advanced and complete radio testing instrument ever produced. It is the one instrument chosen by the service man who seeks leadership in his shop and laboratory work. It soon pays for itself in extra profits and greater prestige.

All the leading jobbers have complete information and stocks on Supreme Testing Instruments — "Supreme by Comparison." If you're not prepared, write direct to

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Complete Phone and CW Transmitter 15 to 30 Watts $95.00, including tuned plate, tuned grid oscillator with provision for crystal control. Wired for one or two UX 210 tubes. One or two UX 250’s as modulators, two stages of speech amplification, mounted in beautiful two-tone Walnut cabinet. Has ample space for AC power supply. Price includes one Stromberg-Carlson microphone.

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World Wide Triple Screen Grid Short Wave Receiver. A three tube short wave receiver for the highest efficiency for code, phone and auxiliary output for television experiments. Uses BU in K.F. stage, a 224 detector, a 223 resistance coupled audio feeding into a 245 power tube. Tubes used make a minimum of microphonie tubes 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 550 meters. Other coils can be made to cover lower frequencies.

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Tubes UX type, 30 day replacement guarantee. No. 210, $2.25; No. 250, $2.25; No. 259, 95c; No. 215, $1.25; No. 224, $1.25; No. 227, 75c; No. 226, 65c; No. 227, 75c. Low Power Transmitter, adaptable for phone or code, With plug-in Coils. $14.75

Short Wave Sets. one tube complete with 5 coils, 14 to 550 meters. $4.45

Auto Radio—Uses 3-224, 2-227 tubes and 1-245 Power tube, single diode, tremendous volume, Compact, fits any car. We guarantee this set to perform better than sets selling up to $150. Stromberg Carlson telephone on dash stand. $2.75

B Eliminator, 600 volts, will operate up to 10 tube set, with 280 tube fully guaranteed. $6.75

250 or 245 Power Condenser Blocks, 13 Mfd., 1000 volt A.C., tested, tapped 2, 3, 4, and 1 mfd., 1 ffd. 4.75

2 Mfd. Condenser Packs, 2000 volt A.C. test. 7.90

1500 volt test. 3.00

Double Chokes, 30 henry each, 160 mfd., 1500 volt test, shielded. 4.95

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No. 1003 Power Transformers, shielded, 600 volt, for one 384, one 250, one 227, four 226 tubes and 2 chokes. 5.90

AC-A. B. C. Power Packs, completely assembled. 8.75

250 V. also has A. C. filament for up to 9-tube set. Can be used as B eliminator. Make your battery set all electric, or build your A. C. set around this pack. 280 tube for this pack, 95c extra.

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all of whom appeal for cooperation outside of their immediate vicinity. Mr. Powditch, GSVL, our Contact Bureau Manager, Porth House, Porth, St. Colum. Minor, Cornwall, will be glad to introduce overseas members to the central operators of these special groups.

During July 7 mc. showed a marked improvement as far as local Europe was concerned, whilst on some few occasions many interesting DX stations were logged. The 14 mc. band was generally poor, South America producing the only consistent results. On 28 mc. much rebuilding is planned for the coming winter, but in general no activity has occurred mainly due to poor conditions.

NORWEGIAN NOTES

By G. H. Petersen, Vice-President N.R.R.L.

During the summer months there has been a general improvement in the rather bad conditions which seem to have prevailed over Europe during the spring, and we in Norway may report of much activity and many newcomers to our ranks. No interesting DX or other feats occurred, however.

Our negotiations with our government regarding the license conditions have been happily terminated, and the result is very favorable to the hams, conditions remaining practically as before The Hague Conference. The most important points are that the 3.5 mc. band is still open for special licenses, that a good monitor may be accepted as a wavemeter, and that the power remains at 50 watts maximum for the last stage power input. Besides, some questions regarding message handling have been cleared, correspondence regarding personal and club activity being permissible, and the N.R.R.L. has been granted a certain controlling and qualification testing power, which is probably rather unique,
NATIONAL CO. engineers designed this new High-Frequency Receiver in collaboration with Robert S. Kruse.

Write today for new Bulletin 143-Q on NATIONAL Amateur-Equipment.

High Quality Phone Reception

Full A. C. Operation — No Hum — Push-Pull Audio

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A true A.C. Amateur Instrument, tunes and logs as easily as a broadcast receiver. Actual single control; — set and forget the antenna trimmer. There are 1080 dial degrees available between 21.2 m.c. and 2.61 m.c. Easily adapted for still wider spreading of the amateur bands if desired. Very smooth control of sensitivity either on c.w. or phone. No grunting or backlash — no hand capacity. Double screen-grid, with 224 grid-leak detection. Equipped with push-pull audio, and special phone-jack after first stage. Made also in new battery-model, using the now UX 230, 231 and 232 tubes.

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Standard set of four pairs covering from 21.2 to 2.61 m.c. Special coils also available for 33-21.2 m.c. and the 2.61-1.5 m.c. ranges. Forms are moulded R-39, the new low loss coil material developed by Radio Frequency Laboratories. Blank forms also available for winding experimental coils.

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Model SE, a special high-frequency design, not a cut-down broadcast job. Insulated main bearing and constant impedance pigtails. 270 degree straight-line frequency plates. Model ST has 180 degree equitune plates. Either model available in capacities up to 180 mfd.

PRECISION VELVET-VERNIER DIALS, Type N
A four inch solid German Silver Dial, for use in amateur and experimental equipment requiring maximum accuracy in logging. Equipped with real vernier, reading to 1/10 division. Easy and simple to mount.

THE POWER UNIT
A separate unit with cable and soft rubber covered connecting plug, especially designed for humless operation of high-frequency receivers. 180 Volt B, 2.5 Volt filament supply. Licensed under R.C.A. Patents.

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Ah, that Figure!\(^1\)

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and a fine proof of the friendly spirit of our government.

Much interest is being shown in our General Meeting and Convention, which will be held at Oslo on August 9th and 10th this year.

---

SWEDISH NOTES

By Goran Kruse, Vice-President S.A.A.

To secure closer cooperation between our members and the headquarters, and also between members in the same localities, we have started an organization with District Leaders (DL's) similar to section communication managers, who are elected for a term of two years. The election took place in March, with the following results:

For Districts 1, 2, and 3: G. Ekland, SM2YK
   " District 4: B. Lindholm, SM4XX
   " 5: B. Arvidson, SM5RH
   " 6: J. E. Karlson, SM6UA
   " 7: S. Malmberg, SM7RV

The organization has already been helpful, and we expect much of it during the coming season, when we hope to arrange contests between districts, and similar activities.

Our members are still mostly using low-powered outfits, with a medium input of about 20 watts. One of the few higher-powered stations is our "Grand Old Man," SM6UA, who by this time is probably known to most amateurs in the world for his unfailing enthusiasm and skill in spite of his age, which is over 60. At his home on Orust there are always amateurs to be found during the summer, enjoying his hospitality. Thus, G6YL is visiting old "UA" during August.

A number of short-wave tests on trains have been made recently in Sweden, there being no commercial radio on the trains in this country. The results with simple arrangements have been astounding good, although reception is always difficult when the train is moving. The most successful test was made by four amateurs from SM5UX, the Technical University at Stockholm. They maintained a reliable QSO with a Norwegian station at a distance of 700 km, with an input of 4 watts to a Hartley oscillator, using an antenna of 12 meters hung up inside the wagon. The signals from this train station travelling in the middle of Sweden were also reported R5 from the Swedish ship, XSM4ZI, at 1400 km distance. Tests with small portable apparatus on autos, motorboats, and motorcycles are also very popular among our amateurs at present in spite of the very poor radio conditions prevailing this year.

When 28 mc. was good in February and March, several SM's were active on that band. The most successful station was SM6WL, who worked EAR and FM with 10 watts input, getting good QRK's. No W stations have, as far as is known, been heard in Sweden on this band, but FM, SU, YL, and ZS come in very strongly when Father Heaviside permits! SM6WL is also a good QRP-station, having made the WAC Club with 10 watts in a short time.

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RCA RADIOTRON
UV-872

A hot-cathode, mercury-vapor rectifier

This new Radiotron is capable of supplying to the amateur transmitter a rectified current larger than that obtainable from any rectifier Radiotron hitherto used by amateurs. Because it has more than four times the rectified current capacity of the well-known UX-866, amateurs will be more than pleased with its reserve of power.

Like the UX-866, Radiotron UV-872 possesses a low and practically constant voltage drop which insures a stable source of plate voltage—full load or no load.

The strength built into its simple structure, the low temperature at which its rugged, coated-ribbon filament operates, the extremely low voltage drop resulting from its composite design—all these are contributory factors to the remarkable performance amateurs will experience from Radiotron UV-872.

We will be pleased to send our instruction book on this tube to any interested amateur. Kindly send your call letters when writing.

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<td>Max. Peak Inverse Volts</td>
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Power Cystals, anywhere in the 3500 K.C. band........ 85.25
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Say You Saw It in QST — It Identifies You and Helps QST

Many SM's are hampered with BCL QRM as crystal sets are still widely used here, and the Telegraph Administration is very drastic in cases of interference, prohibiting all transmission during 1C time.

For some time we have been using the abbreviation "RDI" in Sweden as a substitute for the old QRV. Meaning "ready," it is built up like "sri," and we would like to have the opinion of amateurs in other countries on this practice.

Since 1927, S.S.A. has been transmitting a weekly radio-news-bulletin in Swedish. This broadcast, now takes place at 0900 G.C.T. every Sunday. The general call for S.S.A. members, SN98AS, is being used, and reports of reception of the broadcast are very welcome.

DUTCH EAST INDIES
By Elg. A. Krjgman, Sec'y Treas. N.L.V.I.R.A.

The future of amateur radio here does not look particularly bright, since the government refuses to promise anything definite in the way of legislation, but advises us to wait and be patient.

Our expectations of what will happen when something is eventually done are far from optimistic, but in the meantime we are doing all we can and hoping for the best.

The Indies are very beautiful, and offer splendid opportunities for amateur radio. A wide archipelago, with many small islands, is covered by a net of amateur operators. They bring the most lonesome places in contact with the outside world, and replace modern life among the workers.

The government has ordered 3,500 'phone stations for their very lonesome posts, to bring their officers nearer to the Government offices. Thus they gather the power into their own hands.

The constitution of the N. I. V. I. R. A. is an exact copy of that of the N. V. I. R. in Holland, reproduced with their permission, but without any clause altered.

The many troubles in our Union have brought us new members to replace the old ones who have...
Radio needs more men like you today... positions now open for "radio fans" who want to get somewhere in radio... men who think radio... who are radio minded... men who play and work at radio. Why not use the knowledge you already have as a stepping stone to success in radio? All you need is the practical up-to-the-minute training that RCA gives you. RCA Institutes actually trains you for success in radio... you learn under the direction of RCA experts. You get the practical as well as the theoretical knowledge... the "how" as well as the "why" of radio. You, too, can make good in radio... so, why not start today!

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Prices range from $1.25 for 100 ohms to $4.00 for 500,000 ohms
Send us your dealer's or jobber's name and we will send you a copy of containing complete information regarding the conversion of milliammeters into multi-range ohmmeters, multi-range voltmeters, and multi-range millimeters.

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Frequency Measurement Box, 7 x 10 x 1/4
Monitor Size 6 x 10 x 1/4
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1/8 x 1/2 plug in forms, 44 grooves to the inch, either UX or UV,
prices for that new timer, only 45c
65 ohm resistors, to use 230 type tubes on 6 volts, 29c
Neon Test Lamp, 100 to 550 volts, indicates polarity, $1.00
0.01 Variable Condenser, $1.25
Please include postage.
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STANDARD QRH CRYSTALS

Power Type Crystals Power Type Crystals Power Type Crystals
$10.00 $10.00 $15.00
1700-Kc. band 3500-Kc. band 7000-Kc. band
Guaranteed — easy oscillators, carefully selected for maximum output, and ground to your approximate frequency. Accurately calibrated within one-tenth of one per cent of frequency delivered. Crystal Holders $3.00.

Precision Piezo Crystals for BROADCAST BAND; AIRCRAFT and COMMERCIAL RADIO CORPORATIONS; from 14000-Kc. to 15-Kc. With temperature ranging from 23 degrees centigrade to 50 degrees centigrade. Temperature control units. Prices on request. (Precision crystals checked against a 30-Kc. standard.)

Standard QRH Crystal Laboratories 37-64 83rd Street
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left us. Many of the old ones have remained faithful, and we now have a membership of 109. This is not at all bad, but it is very hard to get the contributions in. We have forty very good members; these are the old-timers.

The Board of Directors has been reorganized, with the new members elected forming the old guard of the N.I.Y.I.R.A. They are as follows:

President: A. J. A. Schoevers, PK2AJ
Vice-President: A. J. H. L. Rosenquist, PK1JR
Secretary-Treasurer and Communications Manager: Egbl. A. Krygerman, PK6AQ

All correspondence, including QSL cards, should be sent to the Secretary at the following address: c/o Batavische Petrol Co., Boela, Ceram, D. E. I.

The N.I.Y.I.R.A. would appreciate greatly corresponding with other foreign amateur organizations, and make arrangements for tests, and similar activities. We would be grateful for any communications concerning this.

The most outstanding feature of the past year is the DX work with our friends at home. Many of our stations worked PA stations. The most contacts were made by PK4A9Z and PK1JR.

28 mc. has been the order of the day, but results have been negative to date. PK1BBI and PK4A4U kept things going in fine style, and we can hardly blame them for at last coming to the conclusion that fading affects 10-meter signals at this time of year, and giving 28 mc. a rest for a while.

We are in the habit of receiving publications from other amateur organizations, but would like to have more. We will surely appreciate it very much if the radio clubs will send us their papers.

14 mc. is improving, and the 1930-31 season should see the PK's drifting down to this excellent DX band.

High Frequency Notes
(Continued from page 29)

We bring to a fitting climax the shrudded reports of the 28-mc. tests with the following report:

"I wish to report that during the A.R.R.L. 28-mc. tests no 28-mc. signals were heard.

"Weather conditions in Shanghai during the days of the tests were bad and, in light of past experience, it was not expected that any signals would be heard."ннн P. Redman, XU32U,.

We cannot help from commenting at this time on the splendid spirit in which these and other reports were sent in. In not a single case was the person begrudging the lack of results; in fact quite the reverse was the air. In nearly all cases the experimenters were clamoring for more information, tests and good wishes. It is just that spirit which has dominated the amateur each and every time that a new and harder job has been cut out for him. It is from experience that we
Put It Up to the SPRAGUE Condenser

Our specialty is solving condenser problems thru the Sprague Electrolytic Condenser. At your service is 8 MFD capacity, with a rating of 430 DC — boiled down to a space only 1 1/8" diameter by 4 1/4" high. And packed with mechanical and electrolytic superiorities that make it the outstanding condenser today. The one-piece round-edged anode is absolutely free from all soldered or welded joints. The protected rubber vent (integral with the top) makes liquid leakage impossible. The individual container of standardized size enables the Sprague to easily fit into any receiver design. And a screw-type socket mounting renders attachment in any position a matter of seconds only.

Write for illustrated folder showing how the Sprague electrolytic condenser will solve your condenser troubles speedily at the lowest cost.

SPRAGUE SPECIALTIES COMPANY
Manufacturers also of the well-known SPRAGUE PAPER CONDENSER
One hand...

slides the shoe...or...turns the screw in this Newer, Better RHEOSTAT

Grasping the slider knob with one hand automatically engages the screw selector mechanism, for rapid adjustment of the new HH Tubular Rheostat. Release of grasp restores the screw engagement as soon as the screw knob is turned—and again one hand quickly selects the desired turn. The phosphor bronze contact shoe will not tear the wire. There is no binding. The pressure springs carry no current; they cannot lose their resiliency through overheating.

Here is a logical application of sound engineering principles to rheostat design. Have us send full details on types, capacities and prices.

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EVERY SIZE AND PRICE FOR EVERY POSSIBLE USE
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A. R. R. L. Log Book
See Inside Back Cover This Issue

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All our merchandise is of the highest quality and NEW, no seconds or used apparatus in our store.

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learn our lessons. And with the results of the June 28-mc. tests reported we want to say that we are planning future experiments here at Hq. on frequencies above 56 mc. As soon as any results are collaborated they will be reported immediately within these pages, and shall need every bit of cooperation that can be secured.

All those who did not digest the 56-me. lead article in September QST had better get the facts as soon as possible and become “high-frequency minded.”

“Beep” Phelps, W2BP has worked W2NM on 56-me. phone.

Please report all results on work on 28-me. and above to A.R.R.L. Hq. with time of day and weather conditions noted. This is most important for we have several contradictory reports and it is impossible to definitely draw conclusions until results are “checked and double-checked.”

How Our Signals Look

(Continued from page 91)

remains constant in spite of the modulation in one, while in the other it varies “all over the lot.” Again I repeat: “Wobbulation” is the cause of broad waves.

As soon as the amateur wakes up to the fact that he must do something to sharpen up his wave and to smooth it out, the sooner will the QRM decrease. At the present time the screen-grid tube used as a dynatron oscillator for frequency control in an m.o.p.a. circuit offers intriguing possibilities to the amateur; and I believe that the time will soon come when we will all have steady, clear, notes.

When time permits I intend to solve the problem of why a sixth district station can always be identified before he sings, just by his note, no matter what kind of plate supply he is using. To some extent this applies to the Australian and New Zealand stations also, and when good weather comes around I hope to make some pictures of a few DX waves.

I wish to express my appreciation to Dr. Lee Edward Travis for the help he has given me and the facilities extended to me.

Silent Keys

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

Walter Stevens, W1BOK, Norway, Maine.
L. R. Gravette, Fort Worth, Texas.
William Gaffery, W1DTS, Merced, Calif.
Frederick E. Van Stone, W6EVB, San Fernando, Calif.
Lester Picker, W6ZH, Hollywood, Calif.
Leeds Listening MONITOR

For checking your note, its stability and whether D.C. or not. THE ONLY SURE CHECK. Gives you an accurate idea as to what your signal sounds like to the other fellow. The Leeds Monitor is enclosed in an aluminum shield, 20 x 12 x 9" overall. Completely shielded, with batteries self contained, supplied with A. & B. batteries, but without UX-199 tube.

Special .................. $15.00

Make your own transmitting and receiving coils. Copper tubing transmitting inductance.

Size of tubing
Inside Dia. 3/16" 1/4" 5/32"
2 1/8" 9c 10c 12c
2 3/8" 9c 10c 15c
3 1/8" 10c 12c 17c
Prices per turn

Thordarson B-Filterator Transformer ..................... $1.65
Thordarson 150 watt Transformer, Limited quantity — over 1000 sold at $3.95, for specifications see previous issues — a few left at $3.50
Leeds 50 watt socket specially priced. See previous issues of QST for details.

DUBILIER HIGH VOLTAGE FILTER CONDENSER

4 MFD. D.C. Working Voltage 500 V

These Filter Condensers are designed for use in filter circuits in Transmitters, and all High Voltage Socket power devices and Power Packs.

TYPE PL 571
List Price $9.75
Several thousand sold at $8.25, the balance at $7.00.

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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.

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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

G. R. No. 557
Short Wave Condenser
Covers 25 to 85 meter band. Condenser consists of 6 stator plates, 2 rotor plates of the "straight line wave-length type and 2 additional rotor plates which are complete circular discs. Min. capacity 14 MFM to 70 MFM maximum; size 4" x 8" x 4 1/4" for panel mounting only. Price $3.25.
Have You Seen Our Radio Bargain Bulletin No. 31?
Here Are a Few of the Items It Contains:

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THORDARSON High Voltage Power Transformers, 250 Watts — for 2-UX-250 or 210 and 2-UX-261 Tubes...

| Description                        | Price  
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| THORDARSON High Voltage Power Transformer | $8.75  
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**FILTER CONDENSERS**

DUBLIER 114 Mfd. High Voltage Filter Condenser Block, D.C. Working Voltage 1000, 600 and 160...

| Description                        | Price  
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| DUBLIER 114 Mfd. High Voltage Filter Condenser Block | $3.57  
| DUBLIER 114 Mfd. High Voltage Filter Condenser Block | $3.57  
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| DUBLIER 114 Mfd. High Voltage Filter Condenser Block | $3.57  

**FILTER CHOKES**

THORDARSON Double Filter Chokes, Model T-2458, Double Filter Chokes, 100 Henry 100 Mill Chokes...

| Description                        | Price  
|------------------------------------|--------
| THORDARSON Double Filter Chokes | $2.50  
| THORDARSON Double Filter Chokes | $2.50  
| THORDARSON Double Filter Chokes | $2.50  
| THORDARSON Double Filter Chokes | $2.50  
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| THORDARSON Double Filter Chokes | $2.50  
| THORDARSON Double Filter Chokes | $2.50  

**MISCELLANEOUS**

KOLSTER — R-5 — Electro-Dynamic Speaker, complete with 210 or 250 Power Amplifier and "B" Supply Unit...

| Description                        | Price  
|------------------------------------|--------
| KOLSTER — R-5 — Electro-Dynamic Speaker | $74.50  
| KOLSTER — R-5 — Electro-Dynamic Speaker | $74.50  
| KOLSTER — R-5 — Electro-Dynamic Speaker | $74.50  
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| KOLSTER — R-5 — Electro-Dynamic Speaker | $74.50  
| KOLSTER — R-5 — Electro-Dynamic Speaker | $74.50  

**AMERICAN SALES CO.**

19-21 Warren Street, New York City
BARGAINS
ARMY AND NAVY
RADIO SURPLUS

Magnetov anti-noise microphone, good for home broadcasting. .......... $1.50
Condensers, Mica, op. volts 12,500 cap. 0.004, new ............. $17.50
Distributor, new .................. $15.00
Wireless spools, New ............. $25.00
Western Electric Electric Hand Microphone, Home Broadcaster. .......... $3.50

V.I. LAST—Genuine Western Electric Hand Microphone, Home Broadcaster. $3.50 used, $6.00 new.

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

Switchboard, 8 line portable Western Electric, magnetor ringing; dry cell talking circuit; 8 drops, 20 anti-capacitance key switches, regular price $175.00, special .......... $30.00
Switches, W.E., toggle, anti-capacity contacts, 12 terminals, special .......... $9.50
Sounders, telegraph 10 ohm .......... $2.50
Sounders, Western Electric 900 ohm .......... $3.50
Oscillators, radio phone, "Duraline", 5,000-60,000 meters, regular price $160.00, Special .......... $25.00
Generator, 1 K.W. Navy Gen. Elect., input 24 volt, output 1,000 volt at 1 amp. with shaft and pulley, wonderful value .......... $12.50
Motors 1-50 H.P. backward geared 110 A.C. variable speed, auto reversible (coconut oil burner type) has over one thousand uses, a very good buy. Regular price $55.00, Special .......... $7.50
Rheostat, variable, Ward Leonard, 800 ohm 2 to 1.5 amp, 35 tap field reg. type .......... $5.00
Rheostat, variable, Ward Leonard, 6 ohm 15-1.5 amp, last change type .......... $3.50
Resistors, variable Ward Leonard, with leads, as sizes per doz. .......... $1.50
Relays 2 and 5 low (110 or 220 volt) 4 silver contacts .......... $2.50
Relay West, Elec. low voltage, 2 upper and 3 lower platinum point screws, 3 contact arms .......... $5.00
Extra platinum contact screws or arms .......... $.35
Amplifier, W.B. Soundence, C.W. 926, 3 stage, 15.000 watts .......... $15.00
Heterodyne, Signal Corp, Type B.C. 104, 1000 to 3000 meters, with detector .......... $15.00
Air compressor, Seego, Model T, 1½ cu. ft. per min. weight 6 lbs., 600 R.P.M., 125 lb., Requires 1½ h.p., $5.00
SPECIAL—11, S. Army instruction book on telephony or telegraphy. Hundreds of pictures and diagrams .......... $1.00
Microphones, Army Trench, sensitive .......... $1.50

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

NEW LOW PRICE
Dynamotor 32/350 volt, ball bearing, 80 mills, Special $9.00 Per pair .......... $15.00

EDISON NON-SPIILL
Storage Battery Cells
Type M-8, 1.2 volts, 4½ amp. Filter condenser, per cell, 3.50
Type A-8, 1.2 volts, 150 amp. 30 cells, 3.50
Type A-6, 1.2 volts, 225 amp., nickel alkali .......... $4.50

Ammeter, R.F., 0-10 amp, zero adjuster. 5 in. diameter. A real buy at .......... $4.50
Charging Board, 32 volt, complete with Weston No. 269 voltmeter 0-50, auto cutout resistances, switch, etc. on slate base.......... $15.00
Generator, airplane, Signal corp, with shaft, can be used as motor, 12 volt 3.6 amp, 3000 R.P.M. .......... $10.00
Generators, 12 volt, 60 amp, has automatic cutout, special .......... $20.00
West, Elec. switchboard, control panel for above dynamotors, has switchboard, 6-350 volt, complete panel with wattmometer, etc. Special .......... $8.00
Ammeters, D.C. portable, new Weston model 48, 3 scale (0-15-150) with 3 scale external shunt and leads ¾ of 1% accurate .......... $4.00
Ammeter, Weston No. 125 thermo-couple 0-12 arm, with large bakelite base with D.P.B. hi voltage switch .......... $7.50
Ammeter 50-0-50, Watttre, B.T. flash mtg. .......... $.75
Ampere hour meter, Langano, battery charge and discharge, type PS 0-500 scale, capacity 15 amp .......... $10.00
Milliammeter, Westinghouse, 0-150 surface mtg., b. con. ..... $5.00
Generator, Crocker Wheel or Holtert, 100 volt, 50 cycle, 150 w.t., complete with 2 speed motor, etc. Special .......... $4.50
Transformer, General Electric, 125 to 2500, with primary center tap, 60 cycle, 300 watts .......... $7.50
Transformer, American, oil immersed, 1 K.W., 50 cycle, 230/250/100 volt .......... $15.00
Condenser, transmitting, Morlock 500 mfd. ........ $2.50
Condenser, Ditzyler, mica, on volta, 8000 cap. 200 volt .......... $10.00
Headphones, West, Electric No. 1283 worn as C.W. 891, 4200 ohms, D.C. slightly used, Navy type .......... $5.00
Holter Cabot, "Ape" Utah type, carbon granular transmitter, Special .......... $.95
Western Electric Radiophone Transmitter unit, 326 V. .......... $1.50
Dynamotor, aircraft 32/375 volt, with shaft .......... $10.00
NAVY Dynamotors General Electric 34/1500 volt, 233 mills. (Extended shaft—$5.00 extra) .......... $27.50
New space armatures, G.E. 24/1500 volt .......... $12.50

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

MANHATTAN ELECTRIC BARGAIN HOUSE, Dept. Q, 105-7 Fulton St., New York City

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

79
SEND FOR NEW 1931
Radio and Electrical Wholesale Trade Catalog

皇家-东部的新1931年一般性贸易目录已经编纂，提供您所需最全面的商品，包括高品质、全国广告的货物，且价格最低。

每件可拆卸的无线电、电子和电子产品均以批发价提供。我们是最大的无线电和电器批发商，因此我们可以为您提供最好的服务。

我们拥有大量的仓库，并以三十三年的人工制造和三十三年的工业经验，确保了我们能为客户提供同样的服务。

管推荐新发布手册（第六版）

方向：

意识到手册必须提前准备，然后按照如下步骤操作：

1. 填写下面，撕下。
2. 装入口袋，产生美国$1的新旧纸质钞票（我们不在乎）。
3. 剪下并邮寄，免费邮寄给手册工厂，哈特福德，康涅狄格州。

发送手册今日！

皇家-东部电气供应公司
16-18 W. 22nd Street, New York, N. Y.

分支仓库：
布卢明顿，N. Y.
马萨诸塞州达特茅斯，南达特茅斯，马萨诸塞州

标准频率系统新闻（续自第38页）

主要针对欧洲业余无线电爱好者，并从1100 G.C.T.开始。它们由W9XAM和W6X-在1200 G.C.T.传输。这些特殊的时间表特别受到海外业余无线电爱好者的欢迎，但是也影响到美洲。

尽管传送站的频率不保证准确性，但每努力保持在宣布的频率的0.01%以内。这些频率由国家标准局在华盛顿，D. C.的频率标准实验室校准。

传送时间

每条传送占用8分钟，分为以下部分:

1分钟-QST QST QST de (站台呼叫信件)。
2分钟-特征字母的站台，中断并恢复呼叫信件。特征字母的W1XP为“G”，W9XAM为“D”，W6X-为“F”。
1分钟-频率声明的周期和频率的声明。
2分钟-允许改变到下一个频率的时间。

传送站

W1XP: 麻省理工学院研究局，南达特茅斯，马萨诸塞州。霍华德·查宁负责。
W9XAM: 埃林天文台，伊利诺伊州埃林，弗兰克·D·厄里负责。
W6X-: 朗利广播系统，洛杉矶，加利福尼亚州。哈罗德·皮埃尔负责。

不要忘记QSL传送。所有报告应寄至A.R.R.L.标准频率系统，哈特福德，康州。一个记录将被记录在头等和报告将被发送到适当的站台。S. F.报告的空白将由头等免费提供。

— J. J. L.

西湾地区分会

休斯顿，德克萨斯州，10月10-11日

WELL，我们已经准备好了，我们希望这次第四个年度的西湾地区分会成为历史上最大的活动。因此，休斯顿业余无线电俱乐部向你发出一张诚挚的邀请。
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>12 1/2</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>37 1/2</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>
</tr>
<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 845
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.

AMERICAN TRANSFORMER COMPANY
172 Emmet Street
Newark, N. J.
DIRECT-COUPLED AMPLIFIER

Build Your
LOFTIN-WHITE
Direct-Coupled Amplifier
with the
Approved ELECTRAD KIT

The Electrad-Loftin-White A-245 Amplifier Kit provides assured performance of the revolutionary L-W Direct-Coupled System recently perfected by Edward Loftin and S. Young White. Includes all parts, except tubes, including drilled metal chassis, assembly and operating instructions. For A.C. operation, using one 74, one 75, and one 780 tube, $35.00.

If your dealer can’t supply you, write us. Address Dept. Q10 for descriptive literature.

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ELECTRAD INC.

LAFA YETTE
Wide World
SHORT-WAVE
RECEIVER

It’s here! Perfect short-wave reception with the new Lafayette Wide World Short Wave Receiver. A.C. Push-pull amplification. Double Screen Grid, 9 to 550 metres. Absolutely guaranteed. Fully wired, complete with power unit, at a sensationally low price. Write for full particulars TODAY.

MANY OTHER BARGAINS

Wholesale Radio Service Company, the reliability house of radio, is featuring short wave apparatus of known quality. Write for our 1931 Radio Catalog — “the guide book of radio quality” — sent absolutely FREE. It’s yours for the asking.

WHOLESALE RADIO SERVICE CO. INC
36 VESEY ST. Dept 4-11 New York.

Pacific Division Convention
Sacramento, Calif., October 17th-18th

ALL ABOARD for Sacramento! The Sacramento Valley Amateur Radio Club, under whose auspices the Eleventh Annual Pacific Division is to be held, extends a cordial invitation to all amateurs to attend this annual affair. An extensive program has been prepared and every effort will be made to give those who attend their money’s worth.

First of all the registration fee has been set at $4.00, and will cover all attractions including the banquet, boat ride, etc. The good ship “Static” will sail down the Sacramento River. There will be a smoker and stunts on board on Friday evening; that boat trip will be worth the price of the convention alone. A trip through the local railroad shops, which are said to be the second largest in the United States, will be made; a parade through the city streets and a trip to a local park, where races and other amusing contests will be held. The guest of honor will be F. E. Handy, Communications Manager.

The registration headquarters will be at the Hotel Land, at 10th and K Streets. Special rates have been arranged for and by doubling up in rooms, rates as low as $1.25 per night may be obtained.

Good prizes have already been donated, and the Committee reports that an award of a complete transmitter, ready to operate, will be made; but the details of this transmitter are a dark secret and will not be divulged until the winner receives it. The Wouff Hong trophy from the Modesto Radio Club will be awarded at this convention.

And so, there you are, fellows — everything lined up. All that is needed to make the convention a success is your presence.
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 Boeck, 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, 5838 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.
Do You want to be a High Class Radio Operator?

You can be a Clear, Fast Sender, able to work with the best of them. You can be a Rapid, Accurate Receiver, able to copy the fastest stuff with pen or typewriter. The Successful Methods used by the fastest and highest paid Radiomen are taught to you in the

**The Candler System of High-Speed Telegraphing**

It is a Post Course of intensive training for developing Reception and Sending Speed quickly through scientific Methods (not trick theories). It trains the Brain, Muscles and Nerves to Co-ordinate in doing fast, accurate work. It develops the power of Concentration; gives you Confidence by making you sure of yourself at all times. No matter what your speed now is, we guarantee to increase it.

In big land stations and on ships at sea are successful operators who have taken and are using the Candler System, "I owe my speed (55 wpm) to your System." - Theo. McIlroy, World's Champion. "Can copy fast stuff 3 to 5 words behind easily. Radio-Typing Course is best for radiomen." - Raymond H. Bell, U.S.S. Idaho. Thousands of letters like these pour into our offices from all over the world. There's no substitute for the Candler System of High-Speed Telegraphing.

If you want to get out of the "low class" and do something, write for further information about this great Course and what it has done for over 6,000 operators. Give your present speed and tell us what you want to accomplish. Also ask about Radio-Typing Course.

**The CANDLER SYSTEM CO.**
Dept. RL
6343 South Kedzie Avenue Chicago, Illinois

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**BOOK REVIEWS**

By Jas. J. Lamb, Tech. Ed.


The autobiography of an amateur who had his license cancelled (at his parents' request) because he skipped up on his school-work, who subsequently almost went on an expedition, and who amassed a lot of notoriety in the process. It makes interesting reading for the fellow who stayed at home.

---

**RECTOBULBS**

Type R3 for the transmitter: Mercury Vapor Hot Cathode, indirectly heated; standard filament voltage of 10 volts; durable and trouble free when used within specified limits:
- Plate voltage: 3000
- Filament voltage: 1.0
- Maximum Plate load (Mils): 250
- Inverse peak maximum: 7000
- Drop per tube 15 volts at full load.

Type R81 to replace standard UX281 Rectifier tubes; a wonder for the heavy duty amplifier and small transmitter.
- Plate volts: 750
- Filament volts: 7.5
- Plate mils: 150
- Drop per tube 10 volts full load.

Specialists on Tube Reconditioning. We invite you to use our Service.

**Priced low for the Ham** $12.50

All products and reconditioning fully guaranteed against defects.

**NATIONAL RADIO TUBE CO.**
3420 18th Street
San Francisco, Calif.
The Service Man’s Visit With

The Resistor Replacement Guide

With the purchase of 10 Durham Metallized Resistors (until November 15th, 1930) you receive our complete Resistor Replacement Guide free; or you may buy it for 50¢.

This remarkable booklet shows clearly and concisely: (1) how to locate cause of trouble in radio sets, (2) proper types and values of resistors to use in all popular types of radio receivers manufactured in years 1927, 1928, 1929.

Never before were radio men offered such a complete guide for service work.

Send your order today for 10 resistors—or send 50¢—and get this valuable Guide now.

INTERNATIONAL RESISTANCE COMPANY

"No Other Resistor Has All of Metallized’s Advantages"

Metallized Resistors are used by the largest radio manufacturers, and more are used by service men than any other make.

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Radio engineers and laboratories with real records of accomplishment use Pacent Duo Lateral Coils. They come in all standard turn ratios.

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Scientifically prepared for maximum power and uniformity (guaranteed 1 in. square sections, close to your specified frequency), supplied promptly at the following prices:

- 1 inch, $7.50
- 100-200 meters, $10.00
- 200-600 meters, $15.00

Dustproof Bakelite mounts $3.00

PACENT ELECTRIC CO., INC. 91 Seventh Avenue, New York City

ASTATIC MICROPHONE LABORATORY
Type AX3P
21 Olive Street, Youngstown, Ohio

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

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

85
Smooth Sailing DEMANDS Control

Regattas are won when Control is at the Helm. Every careless gust of wind must be controlled... every aail bellying properly, working the sloop smoothly, surely around the final buoy and down the long leg, the winner. In millions of homes radio weather is cruising around the dials with CENTRALAB Controls at the helmman's hand.

With CENTRALAB Control at the helm, there is always smooth, noiseless reception.

Be sure it's a CENTRALAB Control.

Write Dept. 320-F for Free booklet, "Volunteer Control, Volition Control, and Their Uses".

Centralab
Central Radio Laboratories
Dept. 320-F, Keefe Avenue and Humboldt
MILWAUKEE, WISCONSIN


"A general treatise on the physics and chemistry of secondary batteries and their engineering applications." written by a physicist of the U.S. Bureau of Standards who knows his batteries. It is filled with useful information, too.

Photo-electric Cells, by Norman Robert Campbell and Dorothy Ritchie. Published by Isaac Pitman & Sons, New York, 201 pages, 41 figures and illustrations. Price, $1.50.

This book intends to supply greatly needed practical information on the useful applications of the photo-electric effect and the intention is adequately accomplished. The authors are members of the Research Staff of the General Electric Co., Wembley, England, and obviously treat their subject as one with which they are entirely conversant. Only those principles and theories which bear on the practical applications of photo-electric cells are considered; the work is consequently not complicated by involved mathematics and information on useful applications.

It is the most satisfying practical treatment of photo-electric cells that we have seen.

Calls Heard
(Continued from page 51)

...W8BTJ, Kenneth Neubrecht, 1/14 Utah St., Toledo, Ohio
7000-kc. band
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QST Oscillating Crystals

"THE STANDARD OF COMPARISON"

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)
- 500 to 4000 Kc band: $20.00 (unmounted)
- 7000 to 7200 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 $55.00. In ordering please specify type tube, plate voltage and operating temperature. All crystals absolutely guaranteed regards to output and frequency and delivery can be made within two days after receipt of your order.

CONSTANT TEMPERATURE HEATER UNITS:

We can supply heater units guaranteed to keep the temperature of the crystals constant to better than a tenth of 1 degree centigrade for $300.00. Two matched crystals, 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 regarding 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 to your specified frequency accurate to plus or minus .05%. 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

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, 651, 852, 860, 865.

CORNELL ELECTRIC MFG. CO.

Long Island City New York

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Guaranteed — Mounted — Complete

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Auto-Transformers, Chokes, Polyphase and 25-cycle Transformers. Add $2.00 for ill wading WOSES FRANK GREENE

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The Best Radio Bug on the Market!

Order one of these modern instruments; increase your speed and improve your sending.

The man at the distant end will be as pleased as you will be when he copies your improved transmission.

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Varnished Insulations
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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 truth 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.

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Transformer Specialists Since 1895

Oscillating Quartz Crystals
For Commercial Stations
For Dealers
For Amateurs

POWERTYPE CRYSTALS ARE RECOGNIZED AS THE BEST
No off frequency operation with a POWERTYPE crystal.
Guaranteed — easy oscillators, carefully selected for maximum output, and ground to your approximate frequency which is stated accurately to within one-tenth of one percent.

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Dust-proof, plug-in Crystal Holders as illustrated below.................. 6.00

We also supply "POWERTYPE" crystals to broadcast and commercial stations.
With all crystal blanks we furnish grinding instructions.

This is the Powertype, plug-in, dust-proof crystal mounting now being used in hundreds of amateur and commercial stations throughout the world.

FREE
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American Piezo Supply Company
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The smoothest, easiest-working bug on the market. Easy to learn. Easy to operate. Make sending easy.

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Special Martin Radio Bug — Extra large. Specially Constructed Contact Points for direct use without relay. Black or Colored.

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825 Broadway, New York City
Cable Address: "VIBROPLEX" New York

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The Photolytic Eye for Every Industry
MADE BY THE MAKERS OF ARCTURUS BLUE TUBES

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SEND TODAY for valuable information on the new Non-Inductive Vitrohm Resistors in plaque form. Lower prices, more efficient operation in transmitters and Vitrohm quality are factors you can't overlook. Get the dope now.

WARD LEONARD ELECTRIC CO.
Mount Vernon, New York

Have you received your call cards yet? The new design is attractive and easily read. A supply is yours for the asking.

IF
You are an experienced radioman;
You are ambitious to get ahead rapidly in radio;
You realize the necessity of a directed training in the engineering principles of radio but are unable to take advantage of college training,

Then—
send in the coupon for our new illustrated book, "Modern Radio."
It will give you complete details of an advanced home study course in Practical Radio Engineering WRITTEN FOR THE EXPERIENCED RADIOMAN.

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First Instructor at Bellevue (NKF). Three and one-half years Instructor in Charge of the Navy's advanced course for Chief and First Class Radiomen at the Naval Research Laboratory, Bellevue, D. C. Developed for the Navy what is recognized as the finest residence course in advanced radio for the experienced radiomen in the country. In radio since 1913.

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PLATE power for your set, the very heart of its performance. For quietness, DX ability, life-long permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list Shopper's Guide to Radio Models, apparatus, filament wire, silicon transformer. Available immediately, filament plate cleaning, $2.00. Send for free catalog, radio service, radio W5ML, 4527 Rockwood Road, Cleveland, Ohio.

THE finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophone CW transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designed for you, just the thing you want. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Isaac Radio Laboratory, 1557 Grandview St., E., Warren, Ohio.


CRYSTALS with a guarantee of complete satisfaction, 7000 kg., $15; 5500 kg., 12; blanks, 4. W9DRG, Herbert Hollister, Edwardsville, Illinois.

OPENING sale — Ward Leonard 10,000 ohm gridleaks for 7½-watt transmitters, 40c.; Guaranteed UX210s, $1. UX281s, 75c. Guaranteed UX20s, 50c. $1.25 milliammeter 200 microamps, 10c, 15c. $1.25 milliammeter 100 microamps, 25c. $1.25 milliammeter 50 microamps, 50c. $1.25 milliammeter 25 microamps, 75c. $1.25 milliammeter 10 microamps, 1.25. All tubes new and guaranteed. M. F. Kuhne, 209 Clinton Ave., Newark, N. J.

WANTED—Kennedy 150-25,000 meter Universal receiver with 2 step — cheap, W6AHZ, 398 N. Eighth St., San Jose, Calif.

SALE — Pilot super-weak d.c. wired, $21, W9EGD, Bartonville, Ill.

WANTED — Kennedy 150-25,000 meter Universal receiver with 2 step — cheap, W6AHZ, 398 N. Eighth St., San Jose, Calif.

HAN-ADS

(1) Advertising shall pertain to radio and shall be of such character as to be of interest to amateurs.
(2) No display or any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which tend to make one advertisement (or part of an advertisement) stand out from others.
(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph 1.
(4) Remittance in full must accompany copy. No cash or checks will be accepted, except for advertising orders of $50 or more, 20¢ per word.
(5) Closing date for Ham-Ad is the 25th of the second month preceding the month in which the advertisement is to appear.

(6) A special rate of 7¢ per word will be applied to advertising which, in our judgment, is obviously non-commercial in nature and is not in keeping with the spirit and character of the American Radio Relay League. Thus, advertising of bona fide surplus equipment, equipment used by an individual, or apparatus offered for exchange or advertising inquiries for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus for profit, even if by an individual, is considered commercial and takes the 15¢ rate. Provisions of paragraphs (1), (2), (4), and (5) apply to all advertising in this column regardless of which rate may apply.

7½-watt xmitter and tuned screengrid receiver, for $25. Neal Brown, Richland Springs, Texas.

CANADIANS—some apparatus still unsold. What's yours? W8DJ, 3938 Cleveland, Oak Park, III.

FOR sale — Dynamoform, 6/360 volt, 40 watt. Perfect condition. $20, W9ACU, Browning, Ill.

WA4GG selling out. Ultrafiltration MOPA, 750 volt d.c. powerpack, Grebe Type Receiver, Wavefeter, $75. Parts cost double. For list of available order, W9WLB, Blacksburg, Va.

JEWELL No. 54 voltmeter, 1000 ohms per volt, with external resistor, 0-2000 v., $14, 0-1000 v., $13, GR247W wavefeter 6/360 volt, $12, 6/200 volt, $10, 6/300 volt, $8, Transformato, 2½-5 volts, 2-7½ volts, $3.95, 2½-7½ volts, and 2-5 volts, $2.95. Chokes — 30 H., 100 M. A., $2.90; 30 H., 100 M. A., $3.95; 20 H., 200 M. A., $3.95. 60 volt Edison Dynamoform, $4.50. With charger in mahogany case, $19. All guaranteed goods. Write for list of used meters. M. Leitch, Park Drive, West Chatham, Mass.

TRADE—Silver-Marshall 750 Round World Four complete tubes, battery extra cost 6 to 647 meters. Want 10 mm. or 35 mm. home movie projector. Victor C. Beasom, 109 E. Mikesell, El Paso, Texas.

SELL W. A. C. Hc. 25-watt Hartley, receiver, wavefeter, $45. W9DRG, Owatonna, Minn.

QUALITY eighty meter crystals at seven dollars. Also chokes, $2.50 each, $25.00 dozen. W9SFL, 1570 W. 58th St., Los Angeles, Calif.

SELL National S-W 4 cabinet, five coils, $20, Gerhard Eheberlin, Omena, N. Dak.

WANTED — Navy SE4200 or SE4501 receiver. New or slightly used. $65 D3RD 250-watt tube and 500 milliampere 250-volt plate supply $10, 600 milliampere 250-volt plate supply $15. Write for condition of apparatus. Frau, Nigeria, Radio W7DF, Auburn, Wash.

DYNAMOTOR wanted. 12-400 volts. State condition and price. K9BNP.

SELL — 150-watt xmitter (Aero Kit 52) uses two UX562s, $45. Power supply delivers 2000 volts at 250 M. A. Including power supply but no tubes, list price $250. Take $175. Also Aero 250-watt motor, $10. Cash. WIBWQ, 3424 W Adams St., Los Angeles, Calif.

SHORTCUTS to code reading speed — least time, effort, bar code. M. S. Radio, 2518 South Hanover, Salt Lake City, Utah. Users report it has boosted reading 25/35 one week. Tests results on request. Methods, $3 each, money order, C.O.D. if deposit $2. Dodge Radio Shortcut, Box 100, Mamaroneck, N. Y.

SELL or trade $605 Westinghouse motor generator. W9KCG, Baldwin, Kansas.


TRANSMITTING code; high-l: only $2.50 net each! ½ in. heavy ribbon wound on slotted bakelite framework. State band wanted when ordering. Write for literature. W6BY, Arthur L. Tenney, 3828 W. 26th Pl., Chicago, Ill.

RADIO course free: Free $85 radio correspondence course given with our sensational code-teaching machine. Prepares you for FCC license, and gives you the exclusive license to use our own method. Best C.O.D. with days free trial. Radio Instruction Bureau, Winchendon, Mass.

TRANSFORMERS, peaked audio, also microphone, $1 each; panel mounting d.c. meters at $8 in following ranges: 50 volts, 10 milliamperes; 100 milliamperes; 1000 milliamperes; 5 ampere sockets, $14. WBNP.


SPECIAL, rectifier aluminum, $1.25. Lead, $1 square foot. Electrolytic capacitors, 1 or 5 values 1 cent each. All prepaid. Best silicon transformer steel cut to order, 25-35 cent pounds. Postage extra. E.H.

CRYSTALS with a guarantee of complete satisfaction, 7000 kg., $15; 5500 kg., 12; blanks, 4. W9DRG, Herbert Hollister, Edwardsville, Illinois.

SPECIAL, rectifier aluminum, $1.25. Lead, $1 square foot. Electrolytic capacitors, 1 or 5 values 1 cent each. All prepaid. Best silicon transformer steel cut to order, 25-35 cent pounds. Postage extra. E.H.


TWO amp. Tungar charger, perfect condition, $5, W9KJ.

FOR sale — Western Electric 211E 50 watters at $15 each. Oakland Radio, R.W. Z., 1426 West 57th St., Kansas City, Mo.


SALE — Pilot super-weak d.c. wired, $21. W9EGD, Bartonville, Ill.

WANTED — Kennedy 150-25,000 meter Universal receiver with 2 step — cheap, W6AHZ, 398 N. Eighth St., San Jose, Calif.

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

SILVER-MARSHALL 737 Breast A.C. short-wave receiver, wired, $85, 50, kit $70.27. All-8-M parts in stock, 40% and 2% to hams. Write for our special price list on standard parts. Radio Inspection Service Co., 153 Trumbull St. Hartford, Conn.

TRADE transmitting apparatus, receiver. Want typewriter, Teleplex, parts. W2BOI

TRADE 900 cycle alternator and transformer for receiver or what have you! WTPR

Q R A SECTION

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

W4WU — William W. Roper, 208 Eighth Ave., East, Springfield, Tenn.

W8ND — C. H. Wesser, 206 Tuscua Road, Bay City, Mich.

WAPLEX — L. H. Nihoj, 30 Willem de Zwijgerstraat, Delft, Holland.

WIMK

A.R.R.L. Headquarters

R. B. Parmenter, Chief Op. "rp"

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

WlAKW—WlKP Clyde J. Houldson "ch.

WlBAD—R. B. Beaudin.


WlDF Geo. Grant "ge."


WlWS—WlB1Z C. C. Rodimion "rod."

WlUE E. L. Battey "ev."

ATTENTION!

Due to typographical errors our August advertisement offered UV851 tubes at $1.75. This should have been $1.75.

Our September advertisement offered General Radio Stand-Off Insulators at 10c each, $1.00 a dozen. This should have read "General Radio Stand-Off Insulators."

UNCLE DAVE'S RADIO SHACK

115 No. Pearl Street

Albany, New York

SPECIALS

DUBIULIER MIA CONDENSERS

.002 Mfd., 6000 Volt Working, $1.95 each

IMPORIpc DREN HEADPHONES

4000 ohms. Very sensitive. Aluminum cases. Complete with double band and cord. ONLY 12.25

WESTERN ELECTRIC HAND MICROPHONES

Very sensitive. Push switch in handle. Six foot, four wire cord. Brand new in original box. Takes the life of a lifetime. 4.50. Same unit in metal case for panel mounting. 5.00

THORDARSON 30 HENRY, 150 MA CHOKES

F-2003A, Our Price 13.25

(Other Thordarson items at bargain prices)

A post-card brings

OUR BARGAIN BULLETIN

which contains many items at prices that

WILL SAVE YOU MONEY

SEND FOR IT NOW!

MONEY RETURNED IF NOT SATISFIED "QUICK SERVICE"

2% discttt for full remittance (plus postage) with order. A 2% charge is made on orders under $1.50. 20% deposit required

HARRISON RADIO CO.

35 Ft. Washington Ave., Dept. T

New York City

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

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

For Your Convenience

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S-M 738 S. W. Superhet Converter

A powerful short-wave superheterodyne out of any broadcast receiver—that's what the S-M 738 gives you. The antenna lead is merely removed from the broadcast receiver and connected to the antenna post of the converter; two leads are run from the 738 to the antenna and ground posts of the broadcast receiver. There you are—for short-wave broadcast, phone or i. c. w.

And all the sensitivity and selectivity of the broadcast receiver adds just that much to the performance of the converter. Tuning control is by a single dial, which tunes the oscillator circuit and an auxiliary midget condenser. Included in the list price are eight coils (four pairs) which cover the wave length range from 18 to 206 meters. Tubes required: 1—'24, 1—'27, 1—'26.

S-M 738 Short-Wave Converter, factory-wired, tested and RCA licensed, $69.50 List, less only tubes. Parts total $59.50 List.

S-M 724 (AC and DC) Superhet

There are nine tuned circuits in the 724—six (three dual pre-selector) in the i.f. amplifier, preceded by two tuned r.f. circuits, plus the oscillator circuit. Uniform selectivity and sensitivity over the entire broadcast band are features of great value in the 724 and the sharp r.f. amplifier keeps out any perceptible evidence of the second “spot” or resonance point which causes interference in many supers. And the 724 is available for either all-a.c. or battery operation. Tubes required in the AC model: 5—'24, 1—'27, 2—'45, 1—'80. In the DC: 5—'32, 1—'30, 2—'31.

S-M 724AC Superhet Chassis, completely factory-wired, tested and licensed, $99.50 List. Parts total $87.50 List. 724DC (for batteries), wired, $82.50 List. Parts total $68.50.

S-M 714 Superhet Tuner

The 714 Tuner is the successor to the famous Sargent-Rayment 710 and the 712 and incorporates a refinement never before achieved or even attempted: a dual pre-selector tuned-radio-frequency circuit built into a single-dial superheterodyne! And you can imagine what tuning control you get with eleven tuned circuits!

The 714 is ideal for use with the finest amplifiers and in locations where interference is worst. Tubes required: 4—'24, 2—'27.

S-M 714 Superhet Tuner (only), completely factory-wired, tested and RCA licensed, less tubes, $87.50 List. Component parts total only $76.50 List.

SILVER-MARSHALL, Inc., 6409 West 65th St., Chicago, U. S. A.

Send your new General Parts Catalog with sample copy of the Radiobuilder....6c enclosed; send Data Sheets giving complete information on the 738, 724 and 714 Superhets.

Say You Saw It in QST — It Identifies You and Helps QST
World-Wide Reception

with the NEW

Norden-Hauck Short Wave

SUPER DX-5

Size: 9 x 19 x 10 inches. Weight 30 pounds

Ideal for Amateur Reception

Entirely New Advanced Design New Pentode Tube

Sensational Distance Range 20-200 Meters Reliable Performance

Adaptable for Long Waves and down to about 10 meters for Experimental Reception

A-C and D-C Models

NORDEN-HAUCK, Inc., Engineers

5-7 South Street, Philadelphia, Pa., U. S. A.

Write, telephone or cable TODAY for Complete Information
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 fulfil 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 1/4" x 10 1/4", 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.

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American Radio Relay League, Hartford, Conn., U. S. A.
To the amateur and to every other user of dry cell batteries. Outstanding because of unequalled performance under most severe as well as all ordinary circumstances.

Ask any Radio Engineer

BURGESS BATTERY COMPANY
MADISON, WISCONSIN
Navy Day Competition
October 27th

A NAVY DAY program of telegraphic broadcasts to amateurs has been arranged just as last year under the auspices of the Navy League of the United States. To prevent any possibility of overlapping transmissions from different stations, the committee has a chance to get the messages, three transmitting stations have been selected this year. Each station will send a different Navy Day broadcast simultaneously on two frequencies in accordance with the schedule given below. Navy Day will be Monday, October 27, 1930. It is suggested that you mark the date in the log or on the calendar above the operating table, or wherever necessary to insure your participation.

The telegraphic broadcasts will be sent to all amateurs including the nearly two thousand members of the Naval Communications Reserve. All participants will be cited in the Navy Day Honor Roll, to appear in QST. Every amateur who listens and copies the broadcasts has a chance to "make" the Honor Roll. The more of the messages you can copy and forward to A.R.R.L. Headquarters, the higher will your name stand in the list. There will undoubtedly be other messages sent from the District Commandants through some of the District U.S.N.R. stations, and we shall be glad to have copies of these messages, but please be sure in mind that only the three messages sent from NAA, NPG, and W1MEK are counted in the receiving competition. There is a good chance that you may be one of the few operators to receive special commendation from the Secretary of the Navy for having submitted the most accurate and complete copies of the three broadcasts. If a large number of perfect copies are submitted, legibility and neatness will determine the relative standing of the high operators. Receiving conditions and difficulties peculiar to certain localities will be considered in making the awards. A sensitive receiver and an accurately calibrated monitor or frequency meter will enable you to get all the rest for the contest before October 27th. It will pay to spend a little time in preparation — in determining the receiver dial settings for the different frequencies which will be used. Listening in advance of the competition at the same time of day as these broadcasts will be sent will help to determine which of the several frequencies enumerated will give the most reliable signals in your location. Below is the schedule that will be followed.

It is requested that care be taken by other stations using these frequencies to avoid unnecessary interference with these transmissions. Please pass the word about the schedules around to other operators, too. It is hoped that as many amateurs as possible will participate in the Navy Day arrangements.

Check your timepieces before the broadcasts so that you will not miss out on any of the messages. All three stations will transmit at exactly the hours given. Your timepiece must be right if you want to get all of the messages.

Many of you belong to the U.S.N.R., but this is an opportunity giving us all a chance to show interest and pride in our Navy, whether we happen to belong to the Communication Reserve or not. We can demonstrate our skill in copying and perhaps learn some new facts about the Navy and the Naval Reserve at the same time we have idled time twirling the dial. To a few this contest may look "too easy," but let us add that to make 100% perfect copy requires a sincere effort and considerable proficiency. Copy everything that you can; U.S.M., and mail it next morning to A.R.R.L. Headquarters, Attention the Communications Department.

Traffic Briefs

Mr. Byron E. Dickensheets, custom radio set builder, piano tuner, Kodak finisher, and radio repairman, writes us under date of February 4th that he noticed that WSATUS has a free set up for February last euenture realizes that this sort of an offer will bring in many a selp from offending CQ hounds, and therefore the prize will eventually become harder to obtain. Suggestions are solicited as to the sort of prizes we should offer and further rules for the contest.

Byron solicits inquiries, which should be addressed in his care at Green Tree, Ohio (see unabridged atlas).

(EDITOR'S Note. — Viewing the tremendous volume of mail that has resulted from this free set in February QST, we have decided that WSATUS is not only "let us" but against us, too. Therefore we reserve the right to decline all requests for free publicity that may come as a result of the favor shown to Uncle Dickensheets, which was given only in consideration of the surprising results which have been obtained from this most amazing tube.)

SHALL WE HAVE A BOUNTY CONTEST?

In many states the authorities have been fit to offer specific bounties for the capture of particularly obnoxious and harmful rodents. This gives us an idea. For many years amateur radio has been pestered by the pernicious CQ hound. Should we offer a bounty for him?

WS6EUR sends in a report that he heard one the other night and, being in an especially good hour, he patiently stood by to the listener end and counted 110 CQ's. One hundred and ten CQ's!!

We shall consider offering a prize to the amateur counting the largest number of CQ's that are sent consecutively without interuption of swearing. Of course, we realize that this sort of an offer will bring in many a selp from offending CQ hounds, and therefore the prize will eventually become harder to obtain. Suggestions are solicited as to the sort of prizes we should offer and further rules for the contest.

Q S T FOR OCTOBER, 1930
Know the Law—and Take Heed
By Rufus P. Turner

OWNERS of amateur stations are reminded that too much must not be taken for granted in the operation of their transmitters under existing radio legislation. Unwise regulations and carelessness in operating amateur communication have been enacted, the most urgent and weighty of them appearing upon the station license. Practically all of them are liable to technical violation, through carelessness, as may be discovered on careful perusal. Too few have taken the time, however, to examine these laws printed on the license form for their attention. Not so many have gone beyond merely glancing at the license in the hope of being without a copy of the Radio Act. Antedates a new regulation must not be misconstrued. Otherwise, off frequency operation the heavy penalties prescribed in the Radio Act.

The writer calls attention to the following regulations involving technicalities:

1. That the station license authorizes use of the transmitter only at the location (both street and number) specified therein. To remove the sending apparatus over as short a distance as next door to the authorized address, resuming operation therefrom in absence of official sanction, is unlawful. It is just as much of a misdemeanor to sign one's personal call at another station.

2. Licenses issued to installations specified in the application as permanent in nature, do not authorize transportation of the apparatus as a portable station. Separate licenses are assigned portable.

3. Laws and regulations enacted subsequent to issuance of a station license also apply and the fact that the license antedates a new regulation must not be misconstrued. Amateur station owners are "subject to the provisions of the Radio Act of 1927." Subsequent acts and treaties and all regulations hereforeof or HEREBEHFORE made.

4. The frequency of the waves emitted must be as constant and free from harmonics as the state of the art permits. Unsteady waves are unlawful and must not be considered otherwise. Off frequency operation is unlawful and subject to the heavy penalties prescribed in the Radio Act.

5. A number of "phone operators should particularly note the regulation providing that "the station operator must announce the call letters and location of the station as frequently as may be practicable when the station is in operation." At the beginning and end of each transmission it is practicable!

If amateur communication is to be at all improved, if we are going to strive toward the attainment of the criterion of perfection, then primarily we must see to it that our stations are operated by men and women who know the law and who know if well enough to remember its provisions and put it into force during operation. It is quite an unpardonable sin for a live amateur who should be both prudent and vigilant to be without a copy of the Radio Act of 1927. Keep the pamphlet handy at all times and abide by Federal ruling.

W1MK

A.R.R.L. Headquarters' Station W1MK operates on frequencies of 3875 kc and 7150 kc. Robert B. Parmenter, "RP," is the chief operator: his list is familiar to most of the amateur fraternity. Occasionally other members of the Headquarters staff operate at W1MK. Their personal signatures may be found in the QRA Section of QST.

Through the following schedules Eastern Standard Time will be used.

OFFICIAL AND SPECIAL BROADCASTS are sent simultaneously on 5876 kc and 7140 kc at the following times:

5:30 p.m. Sunday, Monday, Tuesday, and Friday.
10:00 p.m. Monday and Friday.
10:00 p.m. (midnight): Sunday, Tuesday, and Thursday.

GENERAL OPERATION periods have been arranged to allow everyone a chance to utilize our W1MK Headquarters. These general periods have been arranged so that they usually follow an official broadcast. They are listed under the two headings of 3800 kc and 7000 kc. The writer is familiar to most of the members of the etmateur fraternity. Or casually other members of the "RP," is the chief operator: hill is known to most of them.

To remove the sending apparatus over any distance is unlawful and subject to the heavy penalties prescribed in the Radio Act.

The absence of loopholes in these rules might well be noted with care.

WANTED—Code Practice Volunteers

EVERY year at this season we devote space in this department to the listing of schedules of 1750-kc. amateur stations which broadcast information and code instruction to beginning amateurs. As this issue goes to press we are working over our old schedules preparatory to presenting a revised list in the November issue. Newcomers to the amateur ranks are learning to rely upon the 1750-kc. transmissions of stations sending code instruction, and during the last season many were able to bring their speed up suitably to enable them to secure their licenses to increase their proficiency in using their stations. Thus it is that we are calling for 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 c.w. and radiophone stations can engage profitably in broadcasting and two-way work for beginning "hams." Radiophone volunteers are really preferred, however, as they secure their licenses to increase their proficiency in using their stations. It is imperative that every amateur provide himself with a copy of the Radio Act of 1927 which is hardly excusable at this time, the regulations printed on the station license should be substituted. The absence of loopholes in these rules might well be noted with care.

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OFFICIAL BROADCASTING STATIONS

Traffic Briefs

W3BBW and W3BCX have been in partnership for over ten years without a break. Some record!

Some fellows say that DX schedules cannot be maintained on 14,000 with any assurance of regularity, but W3CBT held a daily schedule with SE2A in the Sudan, Africa, for a long time without a single miss. He has also had schedules with English amateurs which have run over a month without a break. W3BBW and W3BCX might try this band and stay there, even if conditions were supposed to be unfavorable due to climatic changes, 14 mc. would be far better for almost any kind of work than is 7 mc.

QST FOR OCTOBER, 1930

W2APK worked and took a message from the blimp Gossamer Defender KHDK, while it was at Miami, Fl., on April 5th. He also heard the Defender on April 3rd working CMSLC, the altitude at that time being 15,000 feet over Miami. KHDK works near the 7-mc. band.

From the Chair Warmer’s Club bulletin: W9FYM wants to know if a wooden antenna pole is a radio log!!

While QSO W2FN, K4KD heard HHK calling “CQ Goo,year Defender” KHDK, while it was at Miami, Fla., out of range of W3CBT. W3CBT, who was not aware of the fact, gave the message to W2FN, who immediately delivered to Rush Hartford, Conn.”

W9FYM
W4AEE tells of receiving a message from a new ham recently which was followed by a long string of OEs and OMs. The new fellow explained that all the messages he had been getting were OEs and OMs that he thought they must be of great importance, and not wishing to omit them but not knowing where to put them in, he sent them at the end so that W4AEE could put them in where he thought they belonged.

A WORD TO THE WISE . . .

"Off frequency operation is assuming serious proportions. I for one am sure that most of these stations will be found to operate without checking frequency at regular and frequent intervals. It is more than easy to be off frequency and be unaware of the fact unless frequent check is made. I found myself off frequency several nights ago, exactly on 7000 kc, and no doubt a bit lower than that after operating for a while. This, in spite of the fact that no adjustments had been in the least disturbed, since last operation when the frequency was 7052 kc. I am at a loss to explain the shift in frequency, as it was necessary in order to get back to 7050 kc to change the adjustments one whole degree on the dial of a 440-mfd. condenser. But the very fact is this, that I did not on that occasion check frequency with the monitor against the receiver.

Needless to say, I do exactly that every time I start up the set since that time. It happened that this occurred on my W4KX sked and "RP..." immediately informed me of my delinquency; for which I shall be externally grateful to him. The foregoing will serve to prove to the unbelievers that off frequency operation is due, in most cases, I believe, to utter carelessness. That was the reason in my case, I'll frankly admit."

--- KIKD

**BRASS POUNDERS' LEAGUE**

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<th>Call</th>
<th>Org.</th>
<th>Det.</th>
<th>Bal.</th>
<th>Total</th>
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<td>119</td>
<td>929</td>
<td>1177</td>
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<tr>
<td>KAIHP</td>
<td>174</td>
<td>184</td>
<td>316</td>
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<td>108</td>
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<td>127</td>
<td>140</td>
<td>102</td>
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<td>322</td>
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<td>77</td>
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<td>W6NX</td>
<td>11</td>
<td>15</td>
<td>102</td>
<td>212</td>
</tr>
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</table>

Deliveries count! A total of 290 or more bona fide messages handled and counted in accordance with A.R.L. practice, or just 30 or more deliveries will not assure you like for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.P.L. membership spots?

---

Traffic Briefs

W8ANZ received his Extra First Grade Amateur ticket and obtained the special 14-mc. phone privilege. He worked Brasil the first evening on the air with his new 14 mc. crystal-controlled 60-watt phone outfit.

A former first district amateur is now in Mexico signing XlNQ. W1CFT reports working X1NQ on December 4th and says his frequency is 7032 kc, and his tone r.a.c.

In the same mail, at the same second, minute, hour, day, week, month, year, etc., W5AJL reports coming from San Jose, California, and San Jose, Costa Rica! One was from W6ANL, the other T2ZWD. Can you beat this for a coincidence?

W1RWM has rigged up a high-frequency buzzer, battery and key in a brightly painted cigar box for the use of his two sons or grandchildren. This boy refuses to play with rattles and any other "kid" stuff now. FB! This will assure his early debut in amateur radio.

After reading in the I.A.R.U. News, December QST, how several of the headquarters staff talked with Secretary Warner at The Hague, W1KAN, it's time to realize that much of this news and government, W9BAZ asks if we would call that a "Dutch treat." Guess so, OM, but not the kind we are accustomed to.

W. M. Hardcastle, W6HZ, operator on the Grace Line to West Coast South American ports, asks why not have a page in QST devoted to traffic, press schedules, time ticks and notes on general operating conditions in various parts of the world for the gang at sea, said notes to be furnished by the gang. He feels sure that quite a few amateurs ashore would also use the information to advantage. He volunteers to do his part.

The idea has often occurred to us and such information as has come to our attention has always been used somewhere in QST. If we have enough suitable material, we should be glad to present it grouped under a heading, and perhaps these items would grow to the proportions of a department. Anyway, this is an invitation to all interested. Send your information to the Communications Department and we shall endeavor to do our part.

All stations are urged to develop the habit of covering the dial of their receivers after signing off with a station, or else making use of the abbreviation "RP." For instance, "CL," which means "I am closing my station." Many times a station will call you after you sign off another station, and if you but cover the dial once after each "SA," you stand a good chance of hearing some one calling you.

W7RP, Miles City, Montana, copies a weather report from NAA at 6:45 a.m. daily for the use of local airport officials in determining the weather conditions in other sections of the country. This is a service many other amateurs could very helpfully furnish their airports. FB, W7HP!

When meeting a friend on the street we do not hurry over to him, put him on the back, and say, "Hello, John, Old Boy, sure glad to see you again. You're looking fine. I'll see you again. Good luck. Good-by," and leave him with his mouth wide open in amazement. No, we are somewhat sociable and give him a chance to speak his piece also. By the same token it is not wrong to work a fellow and say, "GA OM UR SIBS Q5AA RAC HR IN SQUEFDUNK VILLAGE QRU CUL 73 VA" W1AY-W9PZN abbreviate this sort of QSO, or this "sounding," as he calls it, and pines for a little of the old familiarity of by-gone days. Let's forget our cravings for many QSOs and spend more time showing the chap at the other end that we know him.

The directional CQ can be of great help in traffic handling when used and answered properly. W5AIA recently answered a "CQ Alabama" hoping to collect a little traffic for his state, only to have the station come back to say "CQ Texas!" Being in extra good spirits, W5AIA took the message for Texas and sent a "CQ Texas." A "CQ Texas" is obtained. This is a good example of the improper use of directional CQs. Don't send a directional CQ unless you mean it, and don't answer one unless you can efficiently handle the traffic involved.

---

**QST FOR OCTOBER, 1930**
C. O. Wyman, operator at NN7NIC, is back in the states after 28 months in Nicaragua. He is stationed at Quantico, Va., and is anxious to renew contacts with the gang from W3A8W. NN7NIC will still be on the air with Operator Stillwell at the key.

WIAY-W9PZN believes that orderly stations and clean-cut operating practices are synonymous, and go hand in hand. Surely a neat station inspires one to neat operation, just as a neater operating setup seems inherent with a slavishly station layout. WIAY suggests that experimenting be confined to the laboratory or other fitting place so that the station may be kept immune from slipshod apparatus, which is the first step toward careless operating.

CPIAIA is the only active amateur station on the air in Bolivia. It is located at Tipuana, a gold mine city, situated about 130 miles by air line from La Paz. In order to reach Tipuana one must travel for one day by auto and five days by mule, over winding roads across mountains, covering a distance of about 250 miles. We can judge from this the great pleasure and help amateur radio must be to the people of Tipuana. The owner and operator of CPIAIA hails from Minneapolis, Minn., and would like a schedule in that city on 14 mc. You DX boys should watch for CPIAIA and add Bolivia to your list.

On September 8 W8VS took a message for PYIAW from J.L.V., located at an island north of Russia, and inside of half an hour gave the message to PYIAW. Nice work, OM!

Foreigners and operators on expeditions are always interested in the contents of the current issue of QST and like to get the dope just as promptly as anyone. On September 8 W6AM sent a complete summary of September QST (from cover to cover) to WFW Operator Mason on the Byrd Expedition. Why not follow W6AM's cue and help those at distant points to get the latest dope sooner?

An amateur station was installed and operated at the Philadelphia Electric and Radio Show, November 11 to 16, 1929, by W3PB, W3SM and W3ZF. An unusually large amount of interest was shown by those visiting the show. The booth was so crowded that it was necessary to rope it off in order to allow the operator room to operate. Reception was difficult because of the various types of man-made interference always present at radio shows, W3WQ was the official "barker" inasmuch as he stood on the table calling, "Here you folks, something for nothing! Send your folks a message." He got the traffic — and how! The station used the call W3ZP and handled 1675 messages.

Thanks are due the Raymond Rosen Company; the Electric Club of Philadelphia; Mr. George Conover, Managing Director of the Show; the Philadelphia Electric Company and the Postal Telegraph Company for their help in the installation and maintenance of the booth.

W8AAX of South Bend, Indiana, experienced the "thrill of a radio operator's lifetime" by sending an SOS when the steamer Scudder, on which he was operator, was sinking following a collision. Ellis, W8AAX, transmitted until the power went off and the Scudder started on her final plunge. He then ran to the rail and jumped and was rescued.

On October 19, 1929, 3000 A. & M. students from College Station, Texas, came to Ft. Worth to see their team play T. C. U. In the two days they were in town they managed to get the telephone numbers and addresses of several thousand Ft. Worth Y. M. C. A. (H.) When they returned to College Station W5AQQ arranged a schedule with W5HY to handle their Ft. Worth traffic. This started something! Every message required an answer, and in three weeks nearly 300 messages passed between W5AQQ and W5HY. The operators at those stations must feel like Dan Cupid by this time.

Have you heard VE9GW? This station, located at Bowmanville, Ontario, has a new crystal-controlled radiophone transmitter operating on 6956 kc. (approximately 49.3 meters) per the following schedules: Week days, 6:45 a.m. to 11 a.m. and from 5 p.m. to midnight or later; Sundays, 11 a.m. to midnight or later. The times given are Local Standard Time. Engineers at VE9GW are desirous of receiving reports from amateurs, particularly those in western United States and Canada, in order to check up on their range and field pattern. Your reports on reception of VE9GW's broadcasts may be mailed to A.R.R.L. Headquarters, or direct to Mr. W. A. Shane, Station Engineer VE9GW, Bowmanville, Ontario.

Operating Directive No. 1
Army-Amateur Radio System, 1930-31

EFFICTIVE Monday, September 8, 1930, the following procedure will govern the regular operation of the Army-Amateur Radio System during the active year 1930-1931.

1. Army-Amateur Net Control Station W3CXL has been moved from Fort Monmouth, New Jersey, to Washington, D. C. The Army-Amateur Net Control consists of two stations and three call letters. Station WLM and W3CXL are the same transmitter on two different frequencies, WLM being used for the 6000-kc. crystal frequency, and W3CXL being used for the 7000-7300-kc. amateur band. The frequency of the crystal used by W3CXL at present is 7136-kc.

Master Traffic Schedule, Army Amateur Radio System

<table>
<thead>
<tr>
<th>Operator</th>
<th>Station</th>
<th>Mode</th>
<th>Frequency</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>WLM</td>
<td>CW</td>
<td>6000 kc</td>
<td>WLM is Used for Crystal Frequency.</td>
</tr>
<tr>
<td>A</td>
<td>W3CXL</td>
<td>CW</td>
<td>7136 kc</td>
<td>W3CXL is Used for Amateur Band.</td>
</tr>
</tbody>
</table>

Station W3CXM is the station of the Army-Amateur Liaison Agent, located at Alexandria, Va., and acts as Army Net Control Station on the 5300-4000-kc. band. The crystal frequencies used at present by W3CXM are 5900 and 3150-kc.

2. The master traffic schedule will remain unchanged, except as modified by paragraph 4 below. (All time entries indicate Eastern Standard Time — not daylight saving time.)

3. From this schedule it will be seen that the Army Net Control Station has two twenty-minute schedules with the Corps Area Net Control Stations of the 1st, 2nd, 3rd, 4th, 5th, and 6th Corps Areas; one half-hour schedule with the 7th and 8th Corps Areas and one one-hour schedule with the 9th Corps Area. The Corps Area Nets, State Nets and District, Nets operate in the various corps areas at times indicated by C, S, and D for those corps areas.

During the time from 2:00 a.m. to 2:30 a.m., Army-Amateur Net Control Station will stand by on 6900-kc. (WLM) for direct contact with any Army-Amateur in the United States or Porto Rico for traffic that could not be disposed of through the regular operation of the net. From 2:30 a.m. through the rest of the night Army-Amateur Net Control Station will stand by for other foreign contacts.

4. In addition, Army-Amateur Net Control Station will broadcast a message from the Chief Signal Officer direct to all Army-Amateurs each Monday night. This message will be broadcast by station W3CXM on the 5250-kc. band at 10 p.m. EST and by station WLM on 6900-kc. at 11 p.m. EST. Nets affected by this transmission will so arrange their operation that all amateurs will copy this ZLY message. Acknowledgment of receipt of this message will be made by all Army-Amateurs to their respective net control stations and the corps areas will report on their weekly
reports to the Chief Signal Officer the results obtained on reception of these messages in their respective corps areas. The text of the message will be the same for both transmissions and until further notice the actual frequency of station W6AMM will be 2250-kc. and WLM 6990-kc. Station W3CXL operates until further notice on 7130-kc.

Traffic Summaries

JULY-AUGUST

Pacific led by Los Angeles.......................... 6165
Central led by Michigan.............................. 2980
New England led by Eastern Massachusetts........... 2045
West Gulf led by Oklahoma.......................... 984
Atlantic led by Maryland-Delaware-District of

Columbia............................................... 824
Dakota led by Southern Minnesota..................... 730
Hudson led by Northern New Jersey.................... 682
Northwestern led by Oregon......................... 579
Southeastern led by Florida.......................... 487
Delta led by Mississippi............................ 473
Midwest led by Missouri............................. 350
Roanoke led by Virginia............................. 265
Rocky Mountain led by Colorado...................... 175
Quebec................................................. 113
Ontario................................................. 63
Vanuatu led by British Columbia...................... 13
Prairie led by Saskatchewan......................... 114
478 stations originated 4341; delivered 3744; relayed 8412; total 16,497. (86.2% del.)

Los Angeles again leads the country in traffic and continues to claim the Traffic Banner. What makes the Traffic Banner so attractive? It is a tangible form of recognition of the outstanding work done by the operators in making QSO’s. At this contest, the total number of messages handled by every word of every one of the messages was something to be aimed at. The count of the messages Bruce Atone (W6AMM) submitted sworn affidavit in connection with the traffic handled in the contest. He and other operators have been sending a total of messages delivered by Knoch of W6BJX in 1927 and 1928, Stone of W6AMM in 1929 and Kahi’r’s operators for the three years constitute records that will stand in amateur radio history. The work of the three stations mentioned is something to be admired by all A.R.R.L. members and it should not be forgotten that every word of every one of these messages was received at a distance of about 7000 miles all year round and often through static and conditions that would discourage many operators.

The Roberts’ Cups

Won by Bruce Stone of W6AMM and by Sgt. Lino Cabling of KAIHR. Both the cups were awarded in consideration of the reliability and unusual performance of these operators in making QSO’s with the United States and in relaying traffic between the United States and the Philippine Islands. These trophies were presented by Lieut. Haydn P. Roberts and awarded under the auspices of the A.R.R.L. The award was announced at the Pacific Division Convention. Congratulations to the winners.

Among other things the contest has shown the great amount of traffic handled by several of our very best amateur stations. The total number of messages delivered by Knoch of W6BJX in 1927 and 1928, Stone of W6AMM in 1929 and KAIHR’s operators for the three years constitute records that will stand in amateur radio history. The work of the three stations mentioned is something to be admired by all A.R.R.L. members and it should not be forgotten that every word of every one of these messages was received at a distance of about 7000 miles all year round and often through static and conditions that would discourage many operators.

The count of the messages Bruce Stone (W6AMM) handled with KAIHR, KAIHR, KAIHR and KASAA during the period of the contest and after some messages handled with Philippine stations by visiting operators at W6AMM had been thrown out of the contest as follows: Originated, 1029; Delivered, 194; Delivered, 126; Total, 1298.

Six operators at KAIHR submitted sworn affidavits in connection with the traffic handled in the contest. Sgt. Lino Cabling, Sgt. Ramon Gallero, Corp. Mariano De- pean, Corp. Marcelino A. Espeso, Ex-Sgt. Alfredo Halbuen, and Master-Sgt. Angel D. Manungsan, the competition being keenest between the first two operators, and the last named being the Chief Operator whose operation is considered to be the best when new equipment is in use or when the regular operators are sick or on pass. Cabling and Gallero are credited with a total number of messages and QSO’s as follows: Cabling, 4890 messages (sent 2643, received 1917) and 7290 QSO’s; Gallero, 3775 messages (sent 2221, received 1545) and 681 QSO’s. In view of the fact that no additional entries have been made by other Philippine and U. S. mainland stations in the last two years of the competition, the Roberts’ Cup Award will be discontinued for the present. Possibly at some later date if there appears to be more chance of competition, the Roberts’ Cup Award will be renewed.

BEGINNERS, ATTENTION!

We are receiving many requests for information on how to go about securing amateur radio operator’s and station licenses. The January issue of QST contained Part 1 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 for your especial benefit will appear in November QST. A list of stations sending code practice will be gladly sent you, if you will drop us a line. 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.

ON THEIR TRIP THRU WISCONSIN

2U8 - "SAY BILL, ONE MORNING I WOKE UP AN' WORKED AN' QA WITH A 199."

1E1 - "GUAN WALT, YOU MEAN FIRST YOU WORKED TA QA AN' THEN YOU WOKE UP!"

QST FOR OCTOBER, 1930
DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND — DELAWARE — DISTRICT OF COLUMBIA — SCM, Forrest Caulbon, W3BBW — Well, fellows, the cool wx will soon be with us again. Better start now to dust the transmitter off and tighten the old antenna, for we are going after them this fall and winter. Make skeds and keep them. They mean traffic. District of Columbia: W3BWT still maintains the lead, but he has a close rival in W3CXL (old W2CXL). Knecht of W2CXL (quarter) can be heard on W3CAB reports handling some traffic from China. W3OZ enjoyed a vacation to Canada. W3ASO reported. W3AKR reports W3NR is on the S.S. Steel Age. W3PM will be heard soon. W3CAB handled the key of W3BWB for a short while. W3ZK is a promising station and will be O/S soon. Radio Inspector L. C. Quantum is on the air with call W3QJ at Washington.

W3AID is on when he can. W3BRE, W3WW and W3ARP are pork packers this gang from Tuckerton and is trying toIOR WSC hi. W3AKB sez his tic got drowned in the open waves on her vacation. W3ATJ — W3ASG is the high man this month. W3ATJ, W3AFP makes his trouble with his 281's and is shifting to 866's. W3AKR is working the Atlantic City Merchantville. Please keep the reports coming in on the W3CUD made his first report. W3FY reported too late to catch last month's report. A new man. W3BCF, makes his bow in ham radio. Welcome, OM. W3ALE's ORS application has been approved. W3AQN sent in a nice report. W3BL has the weather conditions in Canada. W3AVI makes his entrance into tlc circles and promises a steady bunch of skeds with lots of tic. W3WG is on the air using loop modulation on foe. W3MC was away on his vacation this month. W3AUR is working on airplane radio. Hi. W3MC will be on the air as much as his school work permits him. W3CUD enjoys a vacation to Canada. W3ASG sends a lot of news from Erie. He expects to have a crystal transmitter shortly. W3AXY is experiment with a low power and use the call W3EDK. W3DJ came to life again, but is still suffering from YL-itis. W3AOF is having trouble with his filter. W3API. W3BCB and W3BCA are new names in Tafferton. W3IQ needs some late skeds on 7000 kc. W3BBW is going again after a vacation in Canada. W3API and W3BBB did the shift of W3BWB for a short while. W3ZK is a promising station and will be O/S soon. Radio Inspector L. C. Quantum is on the air with call W3QJ at Washington.


W3CAB 8, W3LA 7, W3AW 6, W3DQ 6, W3OZ 2, W3AIO 2.

SOUTHERN NEW JERSEY — SCM, Bayard Allen, W3ATJ — W3ASG is the high man this month. W3ATJ raised his power from 270 volts to 750, with the result that practically everything went up in smoke. Trenton has several new stations helping with the tic — W3BAQ handled a few and says conditions are bad. W3EM is having trouble getting on 7000 kc. W3AWY is also having trouble. W3AID is in contact with the key of W3BWB for a short while. W3ZK is a promising station and will be O/S soon. Radio Inspector L. C. Quantum is on the air with call W3QJ at Washington.


EASTERN PENNSYLVANIA — SCM, Don Lusk, W3ZQF — By the time you are reading this the wx will be better and traffic should be picking up. It is hoped that this section will go through this season with a clean record insofar as off frequency and Govt. regulations are concerned. Checking up on a few stations in this section a lot will get started now and see how much tlc we can pile up. W3EU is getting all set with a TNT xmt for fall work. Hi. W3UHX is having trouble with his 251's and is shifting to 866's. W3ALK sees her hamshop at this rate will have to go. The local old timer W3GH, W3ND, W3UG and W3WZ are all showing R.C.A. Victor how to build good radios and working about 12 to 18 hours per day including Sunday. W3GS managed to handle quite a few messages considering the wx. W3CAB is playing tennis quite frequently. W3ASO calibrated his frequency meter. Better watch your frequency, fellows. W3CUD made his first report. W3FY reported too late to catch last month's report. A new man. W3BCF, makes his

O S T FOR OCTOBER, 1938
INDIANA — SCM George Graue, W9BKKJ — The various reports are more than was expected due to the change in newspapers. However, it looks like we'll have a good crop of QSOs from all the Ohio area next time. Your new SCM will be glad to work you, so whenever you hear W9BKKJ (3800 kc. cc) will appreciate getting acquainted over the air. W8RS is trying to make a crystal set, but has a serious laceration of his hand. Work W9FNX is home again and has the key oiled trying to make up for lost time. W9APF is making another attempt to have his set crystal controlled. W9WFY-W9RWH are continuing to build a new and more powerful MOPA. W9FVU received a card from the U.S.N.R. W9CIC and W9AOO are still going big on 3750 kc. W9ALB is going big on 7200 kc. with a 216A. W9FPH will be in California for six months and hopes to work his many acquaintances from there. W9HVC is with us this week and is renewing old acquaintances. W9BJZ and W9EHW have yellow tickets and will operate W9DTH of the RL. W9FHM has a new AC receiver under construction. W9FHX reports a fifty in 14 kc. The Elkllart gang have organized a club which is flourishing under the name of the Elkllart Radio Transmitting Association.


KENTUCKY — SCM, J. B. Waithen, III, W9BRA — The heat still keeps the gang away from their outfits. W9FL comes first with a fine summer total. W9BAY has sent W9GK to his other outfits. W9ALN has 1500 on 2.5 kc. even during the hot weather. W9DKR has 3000 on 2.5 kc. that he keeps interferes with his being on much. W9EYW is struggling with an AC receiver. W9FZV sold his 500-W rig and is putting in 7.5 w. CCD. W9GGR spent August in Brooklyn, N.Y., and has decided to stay. W9GDD is still rebuilding. W9ARU is touring the West. W9DUK is home after six months' rest cure, W9GGA remembered to report. While shooting blackbirds around home, W9BZB shot down his antenna. W8C would enjoy getting reports from the many new stations in the section. Don't be bashful. Now is the time to get going for the winter work. Write to W9AZY the Route Manager and get scheduled for DX and traffic.


ILLINOIS — SCM, F. J. Hindi, W9APY — Traffic and schedule seem to be picking up. Let's go, fellows, and drive traffic hard — new W9ERU for schedules as he is Route Manager of Illinois and can take care of your nice. W9GJJ is going strong. W9BNI has three schedules a day for Camp Grant A-A traffic. W9FCW will now be found on 35- and 25-meter. W9JQ and W9QO, who are home from the worst of the weather this month, W9BRR is still rebuilding. W9ARU is touring the West. W9DKR is home after six months' rest cure, W9GGA remembered to report. While shooting blackbirds around home, W9BZB shot down his antenna. W8C would enjoy getting reports from the many new stations in the section. Don't be bashful. Now is the time to get going for the winter work. Write to W9AZY the Route Manager and get scheduled for DX and traffic.


TENNESSEE — SCM, James B. Witt, W4SP - Reports are a great deal better than of late. W4SP is rebuilding and getting ready for cooler weather. We will lose W4VQ soon, as he is going away to school this fall. W4W0 is putting in Xtal. W4KFH is also putting in Xtal and bunch of electrolytic caps. W4AFM had a ham gathering this monthand is planning another. W4AOD reports FB results. He is getting things going around Bristol. He also broadcasts code practice for beginners on 7100 kc. at 8 p.m. E.S.T., Monday, Wednesday and Friday nights. W4LJ reports he is working FB. The SCM would like to hear from all ORS stations who have not sent in a report the last two months.


ARKANSAS — SCM, Henry Roos, W4AO - W4AO is in for a bang-up winter, and W9EOH spent their vacation at (now) Barker's Lake. W4EKK has a new QSL card. He visited and attended a blowout by W4K3E this month. W4AFB finds W9EH at FM and circuit. He has arranged a new broadcast sked, which will appear in the SCM. W4AD at FM and will be glad of it. W5AQA at Magnolia is getting out with a xtal-controlled transmitter. W5DBB is building a power pack to feed his 82. W5AQX has moved to Pt. Smith and will be heard from there soon. He is still operating at K F P W. W5HN is on 7000 kc. W5IQ is working on a super-select receiver. W5WCH continues to work, W51A0 to 120, W5AHJ has just returned from his vacation. Well fellows, let's hear from you all next month.


MISSISSIPPI — SCM, J. W. Gullett, W5AKP - W5AP is an operator and engineer at WGM now. He wants an ORS certificated and schedules in the 7000-kc. band. W5AKP, who is located in Jackson, is being a splendid certificate. He has a fine QSL card. W5MC. W5BRX is now located in Jackson. W5APP of Laurel is having trouble getting a push-pull transmitter going using TGTP circuit. W5BJA has moved to Denver, Colorado so we have lost a good experimenter. W5BNP is in the Philippines, China and Guam. W5R7R is using a Johannes Ando 330R receiver. He wants to work all the ORS stations. W5BNA at FM is now at FM and has applied for a fifth district license. W5AZW wants schedule on 3500-ke. band for Army-AMateur traffic. W5AN is a new station located in Jackson. Welcome to our midst, O.M. W5BNX complains that he can't get out with his transmitter at night. W5BEV says his ambition is to put out a better signal than either W5DI or W5ZK, W5AES says that he blew up all condensers, plate transformer, tubes, filament voltmeter and rectifier so his station is quiet. W5AOF says he works plenty of DX with his phone and has also worked CT1AA on 14 mc. W5AAP has plenty of trouble with B batteries and is off the air on this account. W5AKP is now using a B eliminator on his short-wave receiver instead of B batteries and says it works FB. The Jackson Amateur Radio Association is now three months old and going strong. W5ASB is the call of the club station.


LOUISIANA — SCM, Frank Watts, Jr., W5WF - The hot down weather here in Dixie has taken its toll. A very small amount of traffic hits the docket this month. W5M1P has had a great deal of trouble getting up his new station. He was suffering from the heat and now he is going away to school. He says he will be back by the time the good old days are with us again.

Traffic: W5BRH 14, W5BJA 12.

HUDSON DIVISION

EASTERN NEW YORK — SCM, H. J. Rosenthal, W2QZ - With two large amateur clubs running full blast in this section, the coming winter promises lots of activity in spite of the falling off during the summer. The Schenectady Radio Club at Rotterdam is a center for nearly 100 members now. The Pioneer Radio Club of Westminster is making wonderful progress and is having one or two prominent speakers at each meeting. There is a quarter kw. transmitter on the air and club members are working DX. W2P and W2QZ of Schenectady are well known. W2LJ is still putting out a nice traffic total. W2ACD is now an ORS and OBS and starts out with a lot of traffic.


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Traffic: W2RSH is keeping a daily schedule with W8DSS. W2QN wants to know what could be worse than saying in his report that he is rebuilding and hasn't a single sked at present. W2JBC is doing good work in getting new hams up to their ten words per minute. W2ACV says the drought caused very poor conditions on 14 me. so he is on 7 mc. now. W2ACB got a lucky break when WSAM dropped in his shack just in time to help put up his new mast. W2BUD over on the BPL is rebuilding and hasn't a single sked at present. W2AGL is doing good work in getting some new stations. W2CFX, a prospective ORS, is still visiting conventions while the 2nd op moves traffic.

W2BJZ has been on 3500 kc. phone and is looking for U.S. contacts, W2BDU says radio room too hot for comfort. W9VFY kicked in a report of traffic handled with W9DEE off Labrador coast. W9DUD found time to ham a bit at home after pounding the links at the Army-Air Force Course. CM8ST regularly as well as the old reliable NJ2PA. Brooklyn: W2AQL leads the section with his total. W2APK has three ops on the job. W2BVEQ QSO'd 80 MB recently. W2BCC reports that he is tuning up his 10-watt outfit perking in Peru under the call of OA4 W.


MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9DFR is just back from a cruise. W9FAM is busy getting lined up for this season. W9SEX says tic very light. W9FEC will not be able to make 80-160 this season because his new transmitter all wired for all bands. and wants reports on his sigs. W9DSS is looking for a sked in any direction. W9DFR is in Natl. Guard training this month. W9BQG is still busy with farm work and wants west this kid. W9BNH reports weather conditions bad. W9DFR will be with the gang soon. W9EWH 1.

Traffic: W9DFR 8, W9FAM 6, W9BEX 5, W9EFW 2, W9BBS 2, W9EWH 3.

IOWA — SCM, H. W. Kerr, W9DZM — The "heat" has been on the JDL and even the old pro is on almost zero. However, response to cards sent to the gang indicates increased activity for the coming season. W9CQK has the list with 44 and notes his 440th QSO with VK5EG, handling tic between the Dept. of Transportation, Carleton, D.C., and YK6MO. FB, OM. W9FOZ has a new Geiger counter. W9EHEX reports tic and is tuning up an xtl MOPA.

NEW ENGLAND DIVISION

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ A bunch of new stations have started operating this month. W1BFM has 12 QSO's on all bands, and wants reports on his sigs. W1BIF has been a 210 with fine results. W1NZ of Keene reports losing 5 square inches of skin putting up his new antenna. W1HI, W1BFM is keeping skeds and is still sending in reports that the new electrolytic condensers are FB and are responsible for his d.e. note. He uses a 6 ft. antenna on 14 mc. with good results. W1BRT and W1BCP are new hams in Dover. W1AEF says his portable using 201-A worked fine at camp. W1AUX says the bands are getting hot. W1BFM is handling traffic for the Rumford Press. W1IP sent in a fine report and see he acted as relay between W1YM, Camp Devens, and W1BE, Augusta, FB. W1BM, another station in the Yankee area is interested in getting on the air. Soon. W1CCM has moved to Grafton. W1BAC has been at the CMTC at Ft. McKinley, Maine.


WASHINGTON, RHODE ISLAND — SCM, C. N. Kraus, W1BCR — W1MO reports conditions poor on 14 mc. W1BAC is still

X

QST FOR OCTOBER, 1930
busy with tennis. W1GY reports WX conditions poor. Radio Club of Rhode Island will begin new fall program September 1st. W1AWE is busy with BCL tests. Traffic: W1VWM 10, W1CPR 5, W1GJ 12.
MAINE — SCM. C. C. Brown, W1AQL — Several members of the Queen City Club recently spent a very interesting afternoon aboard the S.S. Brandonager, from Norway. Operator Joe Tillier was very much interested in the activities of the QCSC, which he says they plan to be an ORS. W1QY, operator of the old school who had a station on the air before licenses were in vogue in Norway, W1JF, formerly W1BEA, informs us that he received junior op recently. Congratulate, John. W1QY, W1CPR, W1RMF and W1QY’s wife, 73 from the gang. Louis, W1VWM sends in his first report and is high man. FB. John, W1BIBG is second and reports FB schedule with W1IP for traffic for Camp Devens. W1AHE says he has been on a vacation to Cape Cod. W1AHP is back on the air with some low power in 220 kc. FB. Ed, W1QY recently spent a very pleasant week at Pine Point, W1BLI and W1APU have applied for their Official Relay Station papers. FB. We sure need more good traffic stations. W1RHP, Radio Serg. National Guard, recently returned from a two weeks’ training at Camp Devens, Lt. Harry Crowley, W1APIH, recently qualified at the State activities shooting meet, at Auburn, and will go to Camp Perry, Ohio, in September. W1AUR reports a new station in Livermore Falls, under the call W1ALO. W1CBV is working in Oakfield prior to the opening of the college year at Maine. W1CN is spending his vacation in Vermont, and reports the Maine gang coming in FB of its high-frequency DX. W1LM, Commissioner, R. and Director Fred Best recently visited the Queen City Club Headquarters and were favorably impressed with the room which houses W1ACR. The convention at Portland was a marked success. Fred couldn’t hear a station. He is building a number out from out of state were present. Everyone reports a good time. Next year’s convention will be at Auburn.

Traffic: W1VWM 201, W1ING 98, W1AQD 23, W1API 17, W1BIBG 13, W1CMZ 10, W1GJ 5.
WESTERN MASSACHUSETTS — SCM. R. P. Peloquin, W1JW — Traffic activities have picked up considerably this month and every indication is that Western Massachusetts is ready to do the good work we are all anxious to hear about. W1BIBG wishes to thank the gang for the many letters of congratulations and he hopes to continue to enjoy the spirit of good fellowship that exist between this office and every member of the A.R.R.L. in this section. The Springfield Radio Association sent in a fine report this month, as follows: Activities at the club are on the slump this month, due to hot WX and vacations, but a few of the members show up each week. Local hams have all foresaken c.w. for phone, and there are not many standard frequencies that sound unusually good considering the power they use. Mel, Hill. W1AIF is QSA 5 R9 using a lone 210 with 135 volts on the plate. Ed, W1AID has also a 210 with only 100 volts, is using a Condenser in the TX. W1CCK is running down on 7 mc. with d.e. W1DR has improved his note to a good d.e. W1CCK is off the air until he can come on with good d.e. at 800, W1BSJ is on with a m.o.p.a. on 3.5 mc. and a Hurdly on 7 mc, as is W1BYY, who can be heard every Wednesday nite 7 to 8 p.m. and from 10:30 on. W1ATK is building a txl outfit, power unknown. W1ASY is still chirping on dry 3.5 mc. W1BSJ is off the air due to a new operator (Junior YL), and work at W1BZ-W1AHE, W1BIBG is still trying to build a good phone outfit, but is always undecided as to what to build. W1AIFU is rebuilding his Xmitter, and claims he is not on much account of the heat. W1WKP and W1AHW haven’t been heard lately. Gregory, W1CJF has moved, and has been ignored lately. How cum, Kink, the heat? W1CBV is back on with a nice txl note, W1BSJ is on with a new portable transmitter and receiver using phone and c.w. In the 3.5-mc. band, W1BIBG has had excellent reports using 220 volts on the plates. W1BSJ has been QSO Russia and several foreign countries. Springfield now boasts three portable transmitters—W1OF, W1IP and W1BSJ. The Springfield Radio Association is holding meetings every Thursday evening at the home of 76 Corliss St, cordially inviting all amateurs and others interested to attend their meetings. What are the amateurs in Holyoke and Chicopee doing? Springfield wishes to hear you on the air. C. J. Green, W1VWM, has been on vacation, but W1WKP is back from Massachusetts who are interested in Naval Reserve Commission work. Larry is working hard trying to organize his forces. Come on boys, the Navy needs you. W1BIBG wants a schedule with some live first district station for Saturday nites. W1AAWJ just got back from a sampling-fishing trip. He took along his portable W1OF, W1BIBG keeps his schedule with W1OR, key operators. FB. W1ANI is working for W.E. in Providence, so is off the air for the present. W1BVR was QRQ Brazil on 14 mc. and is keeping schedules with W1BU, W1ABG and W1ADP. W1A1SY is doing some fine traffic and DX work. He will soon be along back, and will be ordered last month. W1API reports as follows — Very quiet here at present, building a new receiver, plenty of hams on phone here, what a racket, Hi-Hi, Dog Teasner. W1V1LM has received a wife, whom he was married to some time ago. Now he is dividing his time between golf and radio. The same goes for W1AQM. Applications for ORS certificates are still in order in this section. If you are interested, communicate with the SCM. W1AVM and W1AUMI reported by phone, me on the sight of the 15th.

Traffic: W1API 6, W1BSJ 4, W1ASIY 14, W1BVR 6, W12B 21, W1JIY 10.
CONNECTICUT — Acting SCM, E. L. Battey, W1UE — In the absence of your SCM on vacation, this report is being compiled by W1UE. Traffic fell off quite a bit this month—due probably to the good weather for outdoor activities. W1MKE lends with a rather low total of 326. W1APIF reported by phone. W1AWJ has a 304-A in t.p.t. circuit with gobs of condensers and chokes in order to get a d.e. note. W1BOD has been busy with his job of playground instructor. W1AMQ reports that W1AFK has moved to Brookline. W1AJ and W1A1SY are here and may go to sea. W1ASD is helping W1BKH, a new-comer, get on the air. He will again operate his portable, W1JN, at Yale this winter. W1AMQ is on for CTNITE and worked W1VB and W1BWM. W1GJW is also about to go. W1GJS is the new station of the Twin City Radio Club, will be on soon with two 50-watters. W1AGT is a new station in West Haven. W1AV5 is at Wallingford sends in his first report, and says there are two other new hams in his horo—W1AMR and W1ANNR. Thanks, OM, and welcome to the ranks. W1CRG is building an m.o.p.a. phone outfit. W1CER is QRL YLs. Tek Tek. W1CRK has been at the shore for the summer. W1VBWU reports W1WKB. The Sixth Year that the annual airplane building. W1AXO and W1AVK have returned from an auto trip through Canada, New Hampshire and New York, during which they visited W10L, W1QK, W1OP, W1BVP, W1WKB, W1V1Y, W1W1Y, W1AWJ, W1BWM and W1QIO. W1AXO expects to start code broadcasts for beginners about October 1st. FB. OM. W1QW left his remote control switch on for 30 hours and burnt out power supply and relays. W1CTI urges every ORS to make use of W1QWQ circuit. W1BDK circuit is putting in a lot of work, and should help them by using their excellent transmissions. W1UE reports a fine vacation trip with W1THQ through Maine, New Hampshire and New York, during which W1BEQ reported a meeting of 26 hams at the Bridgeport Y.M.C.A. on the evening of August 13th. A radio club is in the making in that city, with W1AKX as the instigator of the idea. W1BM displays a couple of medals he won in a sharp-shooting contest. W1BWM is building new transmitter. W1BMW is still active in Boy Scout work. W1BV attended the Maine Convention at Portland. Remember CTNITE, fellows. It is an ideal chance to meet your fellow Connecticut hams. Plans have been concluded for a "Message Delivery Contest" between Western Massachusetts and Connecticut. Every station in this section is urged to take part and report totals monthly to SCM Eills. Full particulars on the contest are given after the New England Division reports in this issue of QST. Let’s go, gang!

Traffic: W1MPI 529, W1AFB 77, W1ATW 57, W1AMQ 23, W1AMQ 18, W1CTI 15, W1BUZ 3, W1HJQ 15, W1AIS 4, W1LSX 1.
EASTERN MASSACHUSETTS — SCM. Miles W. Weeks, W1VW — W1ABG and W1CCCP are now ORS. W1CRA celebrates his return after his summer absence by inviting the list of traffic handlers and making the SCM available for expeditions. W1CMZ has been handed over to his trainee, and the arrival of a second junior op. Congrats and hope you will be fully recovered by next month, OM. W1BZQ is rebuilding his receiver for me. W1AGS and W1ACA report that they have been on vacation, W1AVM is building the new station set. W1QCM is getting ready for the traffic contest. W1BCF has moved to Detroit. W1IG is operating G19 with the First Corps Cadets and expects to operate at W1KN.
this fall. W1LQ has returned from a vacation trip through New Hampshire, Vermont, Maine and Canada with W1UE. W1BXR continues his consistent work on 3750 kc. W1WW is just completing his new outfit. Our DXer, WA1ZQ, reports his Xtal is getting out even better than his former RAC note. W1KJW is spotting skeds with W0QAE and W3CNO as usual. W1WV visited W1CCZ, W1CMZ and W1AXY while on vacation. W1BWP is RM2C on the U.S.S. Eagle No. 19 until October. W1ABG is arranging plenty of skeds, and the traffic is doing better and better to their laurels. WA1FP starts reporting. W1ADK is about ready for his ORS appointment. The E.M.A.R.A. will have a booth at the Boston Radio Show, September 29-October 4, and will be on the air from its home over W1CAL's call. The committee in charge will be W1AW, W1BXR, W1JY, W1BU, W1KY, W1KH and W1WV. It is expected the usual large amount of traffic will be handled. Listen for W1AC on the 7000-ke. band during the day and on 3800 kc. at night. Beginning October 15th and lasting for twelve months, there will be a "Message Delivery Contest" between Connecticut and Eastern Massachusetts. Full details of this contest are to be found in this issue after the New England Division reports. All stations in this section, whether ORS or not, are urged to report their traffic to the SCM for this contest. If all hands show the necessary cooperation it is expected that Eastern Massachusetts will be a consistent Division traffic leader. WA2CA 176, W1CMZ 146, W1BXR 83, W1KH 56, W1AS 50, W1AC 48, W1BQZ 42, W1ABG 39, W1WY 31, W1CCP 29, W1AT 25, W1AWE 19, W1CQN 11, W1AFP 6, W1ADK 2.

EASTERN MASSACHUSETTS-CONNECTICUT MESSAGE DELIVERY CONTEST

The SCMs of Connecticut and Eastern Massachusetts have recently planned a contest for a Message Delivery Contest between their respective sections. The following rules have been drawn up as satisfactory to both sections. Every contestant is urged to read them carefully. DURATION — From midnight, October 15, 1930, to midnight, October 15, 1931.

1. For the station making the greatest number of bona-fide message deliveries during the twelve months: A Telephone Electric Clock.

2. For the station making the greatest number of bona-fide message deliveries during the same period: One year's membership to the A.R.R.L. Or, if already a member, renewal of one year's present membership. This includes the subscription to QST.


CONDITIONS

1. No station shall be eligible for more than one monthly prize.

2. In case of a tie, the total amount of traffic handled shall determine the winner.

3. The usual copies of all messages handled must be kept on file subject to inspection by the SCM.

4. Formal entry not required. Any station eligible need only report its monthly traffic to the SCM in the usual way, except that reports received by the SCM later than the 19th of each month will not be counted for the monthly or annual total.

5. Any unfair practices such as the use of rubber stamps or exchanges of messages between two stations while QSL cards or messages are addressed to each other, solely to pad delivery totals, shall result in disqualification of the stations involved.

6. Participating stations must conform strictly to the Rules and Regulations of the Communications Department of the A.R.R.L.

NORTHERN DIVISION

MONTANA — SCM, O. W. Viera, W7AT — It is with deep regret that we must record the passing of Mrs. C. F. Wilson (W7AAW) of Bozeman on July 17th. We extend our heartfelt sympathy to Mr. Wilson, W7AMK, a new station in Havre, reported on time. Why can't the ORS of this section do the same? We must have more reports from now on, gang, or our section will lose its place in this department.

Traffic: W7AMW 29.

IDAHO — SCM, James L. Young, W7ACN (Reported by Oscar E. Johnson, W7AKZ) — W7AIW is having very good luck with his 3.500 kc. and finds some traffic up there. W7AHI is on the air with a 210. W7ACD is thinking of putting up a 3500 kc. transmitter and better look to their laurels. W7AJP is interested in the lessons get in touch with him. W7CG is at Cambridge, Idaho, using his portable, W7AHI. W7AIS is working now and then with a 210. W7AKZ is busy on 7 and 14. W7AIW is going to have a new 210-watt rig and will be on the air from there under W1KH's call. The A-A, net and asks all interested to communicate with him. W7AJQ is working on 14 mc. W7UM has moved to Kent, Wash. W7ATQ is burning up the ether on 3.5 mc. W7ABP has a new 15-watt rig and will have a 60-foot mast. W7AKZ has a 60-watt on 7 mc. now and is planning a xtal job. W7AT is fighting his Menny with a bit of luck. W7AFL is building at Sandpoint and will be on soon. W7AIW has moved to Colfax, Wash. and promises to call in later.

Traffic: W7AD 12, W7ALW 8, W7AIZ 4, W7AJQ 4.

WASHINGTON — SCM, Eugene. Piety, W7ACN — W7ZZX reports for the first time and wants an ORS. W7RBO comes back and lends the section. W7TX is busy with Alaskan skeds. W7AJT keeps the Capitol City on the map. W7AAX handled a message in Polish and got a good relay out of it. W7ACE is rebuilding a station. W7AS has been handling a trick at the Naval Reserve control station in Seattle. W7ACY visited the SCM and brought his traffic along. W7VCY is very busy but finds time to make a few QSOs. W7AIW gets his total from the Alaskans. W7OFQ says the QSLs are coming in and the usual copy of all skeds handled must be kept in the SCM office. If you want to keep busy, W7AJT asks you to shift for more traffic. W7AEQ 50, W7AVZ 48, W7BSW 45, W7ABP 39. W7AKZ is thinking of putting up a 210. W7AJQ is thinking of continuing his work on 17. W7AHL is building a 210. W7ACD is thinking of putting on a new 210-watt rig and will have a 60-foot mast. W7AKZ has a 60-watt on 7 mc. now and is planning a xtal job. W7AT is fighting his Menny with a bit of luck. W7AFL is building at Sandpoint and will be on soon. W7AIW has moved to Colfax, Wash. and promises to call in later.


OREGON — SCM, W. S. Claypool, W7UN — W7ALM is still building. W7AT is fighting his Meany with a new rig and will have a new xmitter there. The president of the E.C.A.R.A., W7DCP, has been the SCM's traffic leader.

Junior College, W6AME sent in an interesting letter on amateur activity in Modesto. W6QA is busy grading papers for his students. W6GCI reports activity on the increase. The SCM is Commanding Officer of the U. S. N. R. and any amateurs in Santa Clara, Santa Cruz, Monterey, San Benito and San Luis Obispo counties interested in the Reserves should get in touch with W6NX.


SACRAMENTO — SCM, L. A. Walworth, K6CIB — Our gang is happy over getting second place for the consecutive months in traffic totals. Our June total was 2665 and we almost prided that Los Angeles would fall down so we could get first place. Everett Trout, W6FJ of Los Angeles has been a real friend to HK1U in sending us material for our convention preparations. K6EWE's gang got too ambitious and was sent to the Army Hospital to take three months of rest cure. K6AIA wrote he is bringing Mrs. AJA to the convention for a nice Super Wasp now and will soon catch him up on the 852 in TPT circuit as per June QST.

On July 10th Hawaiian Hams met at 31 strong and organized a temporary club. On July 24th the second meeting occurred, at which the temporary officers became permanent for one year, and articles of affiliation with A.R.R.L. were filled out. Convention committees reported all details completed except sale of tickets and publicity. J. H. Roser, W6DMK, and Glen Mack, W6BEC, both of Los Angeles, were present and told us how they got started back in June from Honolulu, Hawaii. Roser was on the yacht Idalgos and Mack on the yacht Contender. K6DYC and K6DQQ will be sworn in as A.R.R.L. at the convention. K6EVE, K6CDD and K6DDF made a trip to the west coast for the Conv., 1st class. Ex U. S. Navy 6 CBC of 1922, King spark days, Mr. J. Henry Hind, Manager of Hawaiian Plantation on the Big Island is soon to return to us as a new K6. Thanks to K6AIA, Route Manager of Hilo, for much increased interest on the Big Island.

Late news (added by Headquarters) — We have just heard of the success of the Hawaiian Section Convention, which was instigated and planned by SCM Walworth. His efforts to get the convention over were particularly fine and every K6 owes him his hearty thanks. K6, K6CIB! Portable K6EIG was installed at convention headquarters and very successful communication was maintained from the convention.


SAN FRANCISCO — SCM, C. Bane, W6WB — Activity this month seems to have been slightly on the uphill side. Several of the boys announce that they have finished radiation therapy. The equipment is the bigger and better things this winter. W6FRK lends the parade with a total far below his normal output, due probably to his installing 3000-ke. phone. W6OFR is continuing to hold his regular Army-Amateur schedule. W6CRR got quite a good QRM on 3- and 7-mc. bands. He was in nightly communication with W6DDB while the latter was up in Alaska. W6DDB returned home just about long enough to say hello and took off again for Alaska. W6EKG reports as usual, W6DFB deserted his radio to go deer hunting. W6HPY says that traffic is scarce on 7 mc. band. We are glad to announce that the former well known ACW has now moved to the States and plans on settling in San Francisco. We will sign W6HN. W6HECC is half of the time away from the ham bands. W6HEX is a good friend W6DZZ. W6HP has returned from the Army Reserve camp, W6AMF now proudly sports the new call W6DK. W6HPB also proudly signs W6MU. W6BW sends in one of his very rare reports and says things rather deadly on 7 mc. W6FJY says his new transmitter fails to perk. W6CKC is looking around for a power supply to conform to the new rules and will be on as soon as he finds one. At the last minute W6LEF of Hong Kong is now the proud parent of a little daughter. Congrats, OB! W6JN just got back on and wants to handle lots of traffic. Look him up, men. W6ERK requests anyone desiring schedules to get in touch with him. Your SCM will be very happy if anyone in the section having a QRM sked get along, but we don't want to go on too much about it.


QST FOR OCTOBER, 1930

EAST BAY — SCM, J. Walter Frates, W6CZK — W6ALX is top man in traffic again this month. W6HDR has the job of trying to persuade his QRA to put his power up. W6EKC is also doing a steady job. This band is as usual. In spite of the fact that he has been traveling between Oakland and Medford, Oregon, keeping an eye on both branches of his insurance business, W6EJ has managed to keep his sked in shape and handle the traffic which they entail. W6AQO is back among the traffic men again with a sizeable total. W6ZX has finally gotten back on the air with a pair of 210 tubes working into a voltage fed Hertz, and has made his bow among the traffic handlers. One of his first requests on the air was to help an East Bay man, who had been robbed in Honolulu, get some assistance from his home. W6AQ, the CRM, announces that he has a bunch of nice new cards of wording to the ORS and that there are things doing in the wind. The DX season is approached with enthusiasm and the section will have to take its old place at the top of the traffic column. W6CUM has been kept on the move, commuting 45 miles every day to his new job in San Jose. W6CQ is now proudly wearing the laurels of a married man. W6QG has been building a DX on a 210 tube with which he son, W6CEF, built as a portable, W6HP, now on KDUX, radiated from HU that he had been in a hospital at Seattle for an operation. W6BO also reported from Cristo­ bal, Panama, with the Army where he is starting out on a four months' voyage to South America as operator on the S.S. Coronado, W6CUM—W6EDS discloses that QRM has been crippling him considerably. W6AKB of Alameda has moved his QRA, joining the OW, and is a steady DXer now on the air. W6CQI is also increasing his DX traffic, occupying his time getting a good crystal for his transmitter, and in assisting W6IT, W6AQ, W6AKB and W6AO in reorganizing the Oakland Radio Club. Two events have made a place so the DX season is in full swing. Ex U. S. Navy 6 CBC of 1932, King spark days, Mr. J. Henry Hind, Manager of Hawaiian Plantation on the Big Island is soon to return to us as a new K6. Thanks to K6AIA, Route Manager of Hilo, for much increased interest on the Big Island.


SACRAMENTO VALLEY — SCM, Everett Davies. W6DON W6GOU reports the 1 kw, newly furn, W6BBW, W6BD, W6JY, which has evaporated, is back on the air. W6GOU is new and active additions to the Capital city gang, W6YBR and his brother, W6CQN, who have been working during the summer vacation. W6ELC has a new a/c. gear but reports that light interference bad. W6KJC and W6BYB lack AFRs for WAC. W6EFM kicks off with a 210 on 7 mc. Quite a large percentage of the gang are using a/c. trans. W6DON is putting up a new lattice-type 30-ft. mast. W6DFY, W6AXM and W6DMI have been attending the N. G. encouragement. W6DIW is on our old farewell band where he was employed as chef. W6AXM uses a 250-watter in tptc ckt. W6EFU has quit ham radio. The S.V.A.R.C. reports that plans for the Pacific Division Convention at Sacramento in October are progressing nicely. W6LX uses a pair of Type '10 tubes in tptc with 1000 volts on their plates on the 7- and 14-mc. bands. W6EFO using a tidy is heard again on 7 mc. W6CEN is now on with a new 75 watt outfit.


LOS ANGELES — SCM, B. E. Sandham. W6EIQ — W6QP runs away from the fellows again with a total of 1177, which is real work — try it. Four make the list, as follows: W6QP, W6HER, W6CUIH and W6EQF. The section's total in June is 1716 which is good considering that vacation season is at hand. The ARRL now meets at the Old Fellows Temple and a large attendance is anticipated with fall in the

XIII
Shack. W6CRF is installing a crystal in his 3500-kc. phone. He would like to contact amateurs on Tuesdays and Thursdays. Anyone wishing dope on the Naval Reserves Radio Association held its first meeting August 19th since its last. W6BAM 7, W6EOS 6, W6ACJ 4, W6AEP 3.

L. Estatio~. Plans were made to resume work on the Club W6DNL sent in his first report with good total. Vi6ASM 7, W6UI 6, W6BUZ 5, W6ID 5, W6AM 5, W6HT 2, W6DZI 1, W6ABR 5.

TPTG to Hartley. W6EQD is rebuilding. W6CXW has xtal i.o rebuilding at new QRA. The Long Beach Club is sponsoring a Rpell at sea. W6UJ will be on regularly soon.

BOCA RATON -- SCM, L. Cavenee, W4EG has all the necessary parts for his xtal-controlled 50-watter. W40C has completed a push-pull transmitter for the 14,000-kc. band. FQPM and his OW recently paid W4OC a delightful visit. W4MI, W4AGO, and W4EAG are trying to do A-A work on 7000 kc., while W4CC, W4JR, W4ERL, and W4AOA have the same thing on 3500 kc. W4U1 and W4YI are just getting on the air in Raleigh. W4AA's report for July was ten days late to get into the right month's report. He had a nice total of 71, however. W6DNL also late; total 9, DXW 6 — and W7 —.

Traffic: W4ZZ 82, W4TN 11, W4DW 8. VIRGINIA — Acting SCM, Ted P. Mathewson, W3FJ — J. F. Wohlford of W3CA was reelected our SCM. Now, let's give him our support by reporting regularly. We want to keep Virginia on top of the Division. The SCM welcomes Capt. Baldwin and W3CAM to Virginia. His first report is surely appreciated. His QSLs are coming out in Virginia. Dot Gray ex-W3CKL is now W2CKO in Schenectady, N. Y., and has his xtal rig on 7000 kc. W3AMB now has a 90-watter and an ORS certificate. W3FB is busy with convention plans. W3GS is getting out fine on 7000 kc. W2ZA is still hitting the high spots with his phone. W3RDZ works 3.5-mc. crystal-controlled when shack is cool enough. W3FF will be on the air soon. W3WO is back with us again. W3AAJ is on consistently despite his convention activities. W3AYV is heard on phone. FR, W3EG is working for the power company now and should be able to swipe some good juice. Hi. W3BB is still tinkering when the weather permits. W3FJ spent two weeks at Virginia Beach with National Guard.

K4DK has dismantled pending locating suitable quarters for his station. K4AAaN lost his tennis championship as well as his appetite, he said. W4MM reports.

ALABAMA—SCM, Robert Troy, Jr., W4AHP—W4AAQ leads the station in traffic. He is taking a position with WSFA in Montgomery. We are sorry to say that W4AFN, former SCM, died recently. W4VMA operated on a commercial ticket. FB, GM, W4AQM is coming back after the summer slump. W4AX has been on Naval Reserve cruise to Havana. W4AGI is having fine time on vacation in North Carolina. W4DX and W4A4A are finishing up two of the first and the second annual certificated amateur radio operators, the second last 5DI, who is with RCA, visited Selma. W4TG1 will be going strong as soon as cool weather comes. W4AJR is happy. He has his longed-for bug. W4EJ had a bad accident recently. We wish him a speedy recovery. W4AXP has been vacuuming. W4AKM is busy with summer school. W4AHF is rebuilding and will have a much better outfit on soon. W4GI is putting in crystal control. W4ZX, in Montgomery, is coming along fine. W4C8Q operates occasionally on 10-meter band of the Florida Panhandle, Fla., is visiting in Montgomery. W4VC, since the first of the year, has shot a plate transformer, blown one rectobulb, blown three 210's, blown a 2-mlh filter condenser and broke the glass of an 856. Some one beat that bad luck! The W4AM twins are becoming expert crystal grinders.

W4DRD, a new ham, is getting on fine.


FLORIDA—SCM, Harvey Chafin, W4AII—W4PAW—W4AGI reports that his station is supplementing with a new transmitter the second highest station this month. W4AG reports. W4JO is on the air on Thursdays for U.S.N.R. drill. W4QH is experimenting with push-pull transmitters and filters. W4AF7 reports that his station in Panama City, W4PK, has come over to Tampa with W4TB and visited some of the Tampa gang. W4TK says they are organizing a ham club in Jacksonville, Fla. W4ZI is busy with summer school.

W4ASRM has been appointed an ORS. We find W4YEY back on the air this month after a long absence. W4VU is home now. W4AV is a new station at Nichols. W4MM has started to look for his station, his CH4S, and has begun to wonder if W4HFL already has QRM and general slumps cut W4ALH's traffic total this month. W4NFE at St. Augustine is operating for the National Guards for the past two or three months. W4TB and W4IVY have been working on plans for a transmitter for the Tampa unit of the National Guard. This station has ordered the components for two on 7000-kc. and one on 1750-kc. band. W4AKA came over to Tampa with W4TB and visited some of the Tampa gang. W4TK says they are organizing a ham club in Jacksonville, Fla. W4ZI is busy with summer school.

W4SK has added a new xtal to his equipment. Bill Dade, W4DC, is a new ham up in Orlando. He got his start from W4BAF, W4QF is trying out the new chemical rectifier distributor. W4QF, W4AJR took the examination in Tampa and now has an amateur first grade ticket. FB, OB, W4ZV is playing football now. W4AKH is back in Jax after spending some time up in North Carolina, where he visited W4VPW and W4AKH has been rooming with W4VPW at 7627 Kingsland Ave. or 14,000 kc. is dead as far as we know. W4UJ's new QTA is 405 Cedar Street, So. Jax. W4ALF of Unit 3, Section 3, U.S.N.R., wants to route a chain of schedules to California. Come on, fellows, let's give them some real skeds. The SCM was very glad to meet W4AGR in person this month. W4AHF reports that he has three crystals.

The W4LM twins are becoming expert crystal grinders. W4AF7 is busy with summer school. W4AHF is rebuilding and will have a much better outfit on soon. W4GI is putting in crystal control. W4ZX, in Montgomery, is coming along fine. W4C8Q operates occasionally on 10-meter band of the Florida Panhandle, Fla., is visiting in Montgomery. W4VC, since the first of the year, has shot a plate transformer, blown one rectobulb, blown three 210's, blown a 2-mfd. filter condenser and broke the glass of an 856. Some one beat that bad luck! The W4AM twins are becoming expert crystal grinders.

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Florida—SCM, Harvey Chafin, W4AII—W4PAW—W4AGI reports that his station is supplementing with a new transmitter the second highest station this month. W4AG reports. W4JO is on the air on Thursdays for U.S.N.R. drill. W4QH is experimenting with push-pull transmitters and filters. W4AF7 reports that his station in Panama City, W4PK, has come over to Tampa with W4TB and visited some of the Tampa gang. W4TK says they are organizing a ham club in Jacksonville, Fla. W4ZI is busy with summer school.

W4ASRM has been appointed an ORS. We find W4YEY back on the air this month after a long absence. W4VU is home now. W4AV is a new station at Nichols. W4MM has started to look for his station, his CH4S, and has begun to wonder if W4HFL already has QRM and general slumps cut W4ALH's traffic total this month. W4NFE at St. Augustine is operating for the National Guards for the past two or three months. W4TB and W4IVY have been working on plans for a transmitter for the Tampa unit of the National Guard. This station has ordered the components for two on 7000-kc. and one on 1750-kc. band. W4AKA came over to Tampa with W4TB and visited some of the Tampa gang. W4TK says they are organizing a ham club in Jacksonville, Fla. W4ZI is busy with summer school.

W4SK has added a new xtal to his equipment. Bill Dade, W4DC, is a new ham up in Orlando. He got his start from W4BAF, W4QF is trying out the new chemical rectifier distributor. W4QF, W4AJR took the examination in Tampa and now has an amateur first grade ticket. FB, OB, W4ZV is playing football now. W4AKH is back in Jax after spending some time up in North Carolina, where he visited W4VPW and W4AKH has been rooming with W4VPW at 7627 Kingsland Ave. or 14,000 kc. is dead as far as we know. W4UJ's new QTA is 405 Cedar Street, So. Jax. W4ALF of Unit 3, Section 3, U.S.N.R., wants to route a chain of schedules to California. Come on, fellows, let's give them some real skeds. The SCM was very glad to meet W4AGR in person this month. W4AHF reports that he has three crystals.
CANADA

This report goes forward to Headquarters minus several reports. It is too bad that your SCM cannot spare the time to forward the reports that you ORS have sent to him. If you are in a division whose reports do not appear in this issue, it is up to you to write your SCM and demand a prompt and promptforward this monthly report to me in time to go to Headquarters.

With the exception of the Quebec Division, reports have fallen off, and those reporting show a marked decrease in the amount of traffic handled. This is natural during the summer months, and the usual slump is always expected. However, next month marks the beginning of the fall season and all SCMs reporting are confident that with the number of new stations and the old standbys, the winter season of 1939-31 will be a record-breaker as far as traffic goes, so dust off her, gang, and let's all get off to a good start.

A message has been received from VSAG stating that Hong Kong amateurs are anxious to QSO Canadian on 14,000 kc. A Canadian has not been QSOed by a "VS" station in two years. Let's go, gang, and show them it can be done.

CAnadian General MANager
Alex Reid, VE2BE

QUEBEC DIVISION

QUEBEC -- SCM, Alphry Miles, VE2AC -- Outstanding work this month and high honors go to VE2CA and his XYL for emergency traffic handled between VE2RF and VE2CA. Details about a lady's illness was relayed from VE3RF via VE2CA to relatives in Montreal, saving folks in Montreal from worry and an unnecessary trip to Toronto. The lucky boy this month is Tommy, at VE2BG, who had the visit of Disley and Atkins, radio operators of the dirigible R-100. Disley is a member of the R.S.G.B. Tommy had the much envied privilege of visiting the radio shack on control car of R-100. VE2BB has a new short-wave(A.C.) short-wave receiver built by VE2AP. He had two visitors this month -- VE3JL and W2CDQ. Two professors in physics and chemistry at the Laval University visited the shack at VE2AC, in view of installing short-wave apparatus in the laboratory of the University. W2BNX stopped at VE2CA for a rag-chew. Earle is coaling a new ham, VE2CL. General reception conditions were poor all month. Little DX was worked. A fair amount of traffic was handled. VE2AC has sked with WNDH, VE2BB reports VE2AP is sick. Hope you recover promptly. John, VE2AC heard Yacht Mopelia, DAIY. Traffic: VE2AC 00, VE2BB 3, VE2BG 5, VE2CA 21, VE2BE 22.

ONTARIO DIVISION

ONTARIO -- Acting SCM, C. D. Lloyd, VE3CB -- VE3FC, our genial SCM, is spending a well-earned holiday at Sturgeon Point, Ont. A pleasant vacation to you, OM! VE3GM has returned from Boston, having kept in touch with his home via short wave phone. VE3AL has returned from vacation and is doing his daily dozen again on the 3000-ke, band. VE3HE is hitting the high spots on 14 mc. VE3BT is still experimenting with a new to-the-minute phone outfit, crystal-controlled. VE3DW is working hard at both farming and ham radio. Mrs. VE3DW is also hearing pounds the bush. VE4AD got his outfit in working order after transporting it to Millford Bay, Muskegon. Owing to poor antenna location results have not been so good, so he moved in with VE3CR at Beaumaris, and finds conditions much better. VE3KR has put up a new 7-mc. Zepp and is preparing to do a Steve Brody to the 14-mc. band. VE3FT reports excellent conditions up to August lst and piled up a good traffic total. VE3HA writes from the great Northland that northern lights worked everything at night. VE3BC is debating whether to go in for ham radio or YL's when he joins his trip with the Forestry Branch this fall. VE3P is collecting meters, etc., in preparation to going on the air this fall at Grand Valley, Ont. Welcome back, OM. VE3CR is rebuilding, using HI C circuit, after "re-doing the works" early in the month. VE3DB is doing the odd job at the key. Northern District -- SCM, G. V. Lawrence, VE3ET -- VE3HD made his first DX contact when he snagged DAIY. VE3BD says conditions are still bad up his way. VE3DS is getting the parts together for an RAC power supply, and hopes his B Battas VE3BS says that all his spare time is taken up by canoe and other summer camp activities. VE3FQ wrote VE3ET a nice new letter for his first report. Jack Dordal will send a report. R.C. Cranor on the air. VE3DR is having a tough time getting two 55as to perk properly in a T-P-T push-pull. VE3HA keeps sked with VE3BC.


VANALTA DIVISION

VANALTA -- SCM, J. K. Cavaleky, VE3AL -- The Vancouver gang got summer fever with Glenda and Bob Vons on a tour of duty in B.C. VE4RB is out to get new B's for power. VE3GR has managed one or two local QSO's at last. VE3AV, our new XTL, is getting out in fine style. VE4FC is on moving duty. VE3AK has a little QRM from Moose Jaw at last -- "Hello! Gaud, don't think the hot weather has got us down: we still have a little water left in the old swimming hole and able to come up without mud on our heels." Boys, let's congratulate VE4EF. The OW and OM are having a domestic condition as to who is to own the gift edge for their certificate of proficiency. Congrats, Mrs. Sparks. You will be replacing that ticket with a Comm'n yet. Another old timer came to life last Sunday when Dave Meck, VE4ET, put on a junk box with an armful of antiques Saturday night and was pumping out a D.C. sign with his 1010 Sunday afternoon. FB, Dave, VE4TH is too busy chasing that white pill and finds the links to find time to do anything. VE4HL has been fighting a battle to keep up his skeds. VE4HH has been putting in so much time on his air motor cutting props for it that his yard looks like a airplane factory. If any of the hams hear VE4JS, please QSO (if necessary) by mail.

Traffic: VE4IB 11, VE4GR 2.

BRI TISH COLUMBIA -- SCM, J. K. Cavaleky, VE3AL -- The Vancouver gang got summer fever with Glenda and Bob Vons on a tour of duty in B.C. VE4RB is out to get new B's for power. VE3GR has managed one or two local QSO's at last. VE3AV, our new XTL, is getting out in fine style. VE4FC is on moving duty. VE3AK has a little QRM from Moose Jaw at last -- "Hello! Gaud, don't think the hot weather has got us down: we still have a little water left in the old swimming hole and able to come up without mud on our heels." Boys, let's congratulate VE4EF. The OW and OM are having a domestic condition as to who is to own the gift edge for their certificate of proficiency. Congrats, Mrs. Sparks. You will be replacing that ticket with a Comm'n yet. Another old timer came to life last Sunday when Dave Meck, VE4ET, put on a junk box with an armful of antiques Saturday night and was pumping out a D.C. sign with his 1010 Sunday afternoon. FB, Dave, VE4TH is too busy chasing that white pill and finds the links to find time to do anything. VE4HL has been fighting a battle to keep up his skeds. VE4HH has been putting in so much time on his air motor cutting props for it that his yard looks like a airplane factory. If any of the hams hear VE4JS, please QSO (if necessary) by mail.

Traffic: VE4IB 11, VE4GR 2.

Newfoundland -- Acting SCM, E. V. Jerrett, VO5Z -- Although operating activities were practically at a standstill during the summer we are glad to note many of the boys preparing for an interesting fall and winter by the addition of much new equipment. VO8WG spent a pleasant holiday home from the North and reports a useful fair up to August 1st and piled up a good traffic total. VE3HA writes from the great Northland that northern lights worked everything at night. VE3BC is debating whether to go in for ham radio or YL's when he joins his trip with the Forestry Branch this fall. VE3P is collecting meters, etc., in preparation to going on the air this fall at Grand Valley, Ont. Welcome back, OM. VE3CR is rebuilding, using HI C circuit, after "re-doing the works" early in the month. VE3DB is doing the odd job at the key. Northern District -- SCM, G. V. Lawrence, VE3ET -- VE3HD made his first DX contact when he snagged DAIY. VE3BD says conditions are still bad up his way. VE3DS is getting the parts together for an RAC power supply, and hopes his B Battas VE3BS says that all his spare time is taken up by canoe and other summer camp activities. VE3FQ wrote VE3ET a nice new letter for his first report. Jack Dordal will send a report. R.C. Cranor on the air. VE3DR is having a tough time getting two 55as to perk properly in a T-P-T push-pull. VE3HA keeps sked with VE3BC.


PRAIRIE DIVISION

ASKATCHEWAN -- SCM, W. J. Pickering, VE4FC -- Conditions are at last improving and it looks as though this section is going to be more active than ever this winter. VE4PB wants to hear the gang Sunday mornings. VE4PK is rebuilding, VE4HP and VE4HD have to get new B's for power. VE4GR has managed one or two local QSO's at last. VE4AV, our new XTL, is getting out in fine style. VE4FC is on moving duty. VE3AK has a little QRM from Moose Jaw at last -- "Hello! Gaud, don't think the hot weather has got us down: we still have a little water left in the old swimming hole and able to come up without mud on our heels." Boys, let's congratulate VE4EF. The OW and OM are having a domestic condition as to who is to own the gift edge for their certificate of proficiency. Congrats, Mrs. Sparks. You will be replacing that ticket with a Comm'n yet. Another old timer came to life last Sunday when Dave Meck, VE4ET, put on a junk box with an armful of antiques Saturday night and was pumping out a D.C. sign with his 1010 Sunday afternoon. FB, Dave, VE4TH is too busy chasing that white pill and finds the links to find time to do anything. VE4HL has been fighting a battle to keep up his skeds. VE4HH has been putting in so much time on his air motor cutting props for it that his yard looks like a airplane factory. If any of the hams hear VE4JS, please QSO (if necessary) by mail.

Traffic: VE4IB 11, VE4GR 2.


MARI T I ME DIVISION