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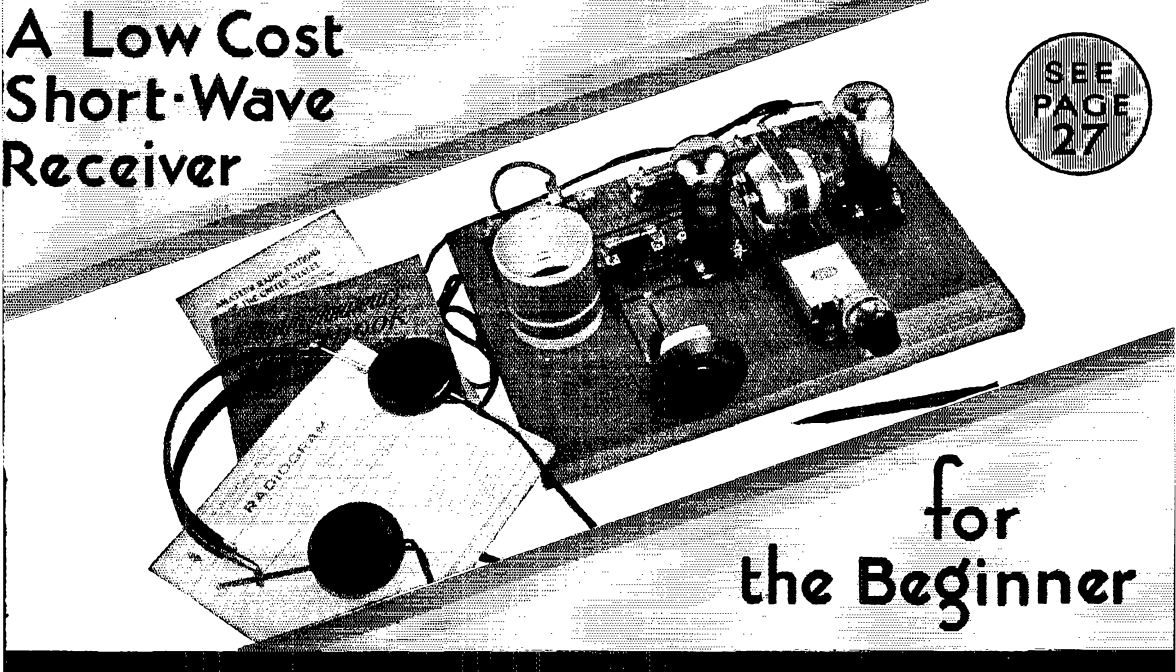

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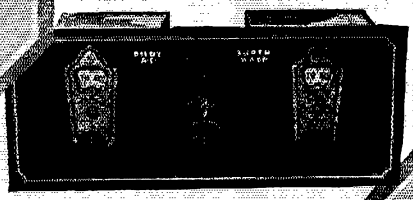
NOVEMBER, 1929 25c

PILOT A. C. SHORT WAVE RADIO



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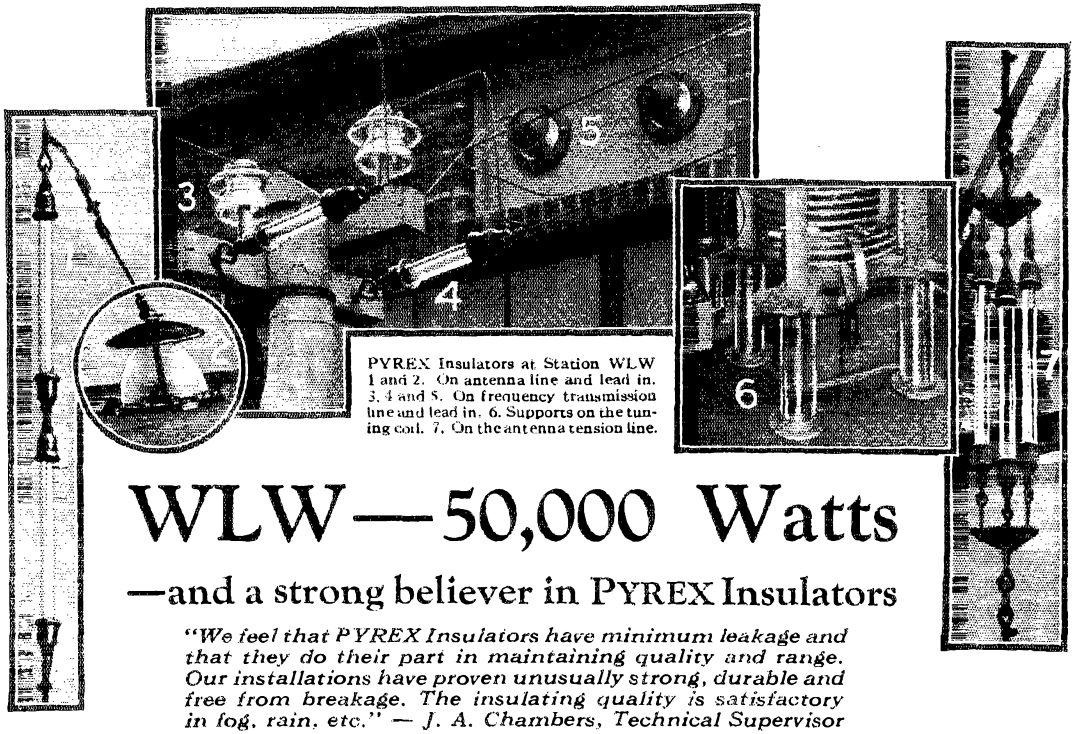

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**Acting for the summer.

QST

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The American Radio Relay League

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

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

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

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

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EDITORIALS

WE believe that readers of this magazine will be much interested in some comments made upon amateur radio by the Federal Radio Commission in its recent reply to certain appellants for "domestic" frequencies who carried their cases to the Court of Appeals of the District of Columbia. The Commission's reply is a masterly document, an able summing up of their position. In the course of that statement of facts and of the grounds for the Commission's decisions, a great fund of information on the administration of the so-called "medium high frequencies" is collected. The printed reply is a good-sized book of 178 pages, with illustrations, tables and colored charts. It should be very interesting to the student of radio regulation.

In the course of the document the Commission sets forth the historical considerations bearing upon its decisions, analyzes the applications and decisions, and then in establishing its position it cites the limitations imposed upon the Commission prior to any consideration of the merits of the applications in question. The problem is one of finding non-existent channels, the old game of "channel, who's got the channel?" First there are recited the limitations imposed by law, in the segregation of channels for other purposes; then the limitations imposed by physical and scientific factors; and then the document considers "limitations imposed by the paramount demands of other services." It is under this head that the amateur will find the paper's most interesting reading.

Considering now only the medium high frequencies, the Commission establishes that the 639 standard station bands in this range have been allocated by the North American Regional Agreement amongst the mobile services, amateurs, experimental visual broadcasting, experimental work, and the general communication services. Although none of the appellants attacked the allocation, the Commission thought it well to indicate briefly that point-to-point communication has not suffered in the distribution of station bands. To this end the needs of the other services in this range are discussed in turn, with consideration to their relative needs. Under the heading "Amateurs" the Commission has this to say:

"Amateurs are persons engaged in radio communication for personal and altruistic reasons. They are precluded by the International Convention and the General Orders and Regulations of the Commission, from gaining any financial benefit from their transmissions. Prior to February 23, 1927, they were entitled to use the entire range of frequencies from 1500 kilocycles upwards. They were the first to make practical use of short waves and demonstrated their efficacy to the world by feats of the most dramatic character. Their contributions to the science of radio communication have only too often been the demonstration of the utility of frequency ranges only to arouse the desires of commercial interests to deprive them of the use thereof.

"At the various National Radio Conferences, speaking through their authorized representatives, they offered to relinquish most of their territory for commercial development. During the breakdown of the law they policed their own frequency bands and fulfilled their pledges.

"It is only upon the North American Continent that they have been extensively encouraged, to which some are inclined to attribute much of America's leadership in radio. European governments were inclined at the Washington Conference to impose the most drastic reductions upon amateur frequency bands. In spite of the great efforts in their behalf of the North American delegates, very serious reductions were made in the width of the bands. As a result, in the range now under consideration, over 17,000 amateur stations in the United States are crowded, for domestic communication, into the bands 1712 to 2000 kilocycles and 3500 to 3996 kilocycles and they suffer an even worse congestion in their international bands. Nevertheless, through cooperative effort, they have expended large sums of money and have exerted great effort and ingenuity toward the development of new types of apparatus and circuits to enable them to survive under these circumstances.

"They communicate by radiotelegraph and radiotelephone and experiment in facsimile and television transmissions. They operate training communication nets for both the Army and the Navy. They afford communication service in times of emergency, flood, and tornado to railroads and the general public. For sixteen years they have offered a free message service to all who desired to use it as a means of providing the traffic for their tests, communications, and experiments and they have developed a world-wide relay organization for this purpose.

"In recognition of their utility and in realization that from the amateur ranks came the radio operators who gave our Army and Navy their

communications during the late war as well as most of the radio inventors, engineers, technicians, and operators, it is to be regretted that the provisions of the International Radiotelegraph Convention have afforded them so little in the way of frequency bands."

There the story is, succinctly put. In these words there is justification for the League's position that amateur radio has given all that it can be expected to give towards the progress of the rest of the world, and there is recognition of exactly that fact by the Commission itself and the clear indication of an intention to protect us in that view. K. B. W.

The President's Corner

A WORD FROM

HIRAM PERCY MAXIM

PRESIDENT OF THE AMERICAN RADIO RELAY LEAGUE AND OF THE INTERNATIONAL AMATEUR RADIO UNION

Thanks

YOU fellows certainly put one over on your president on that Birthday Relay. It took me completely by surprise, and the fact that you kept it under cover from me for over a year speaks for A.R.R.L. thoroughness. It now turns out that the Board of Directors thought my sixtieth was a year ago, and started something then, but had to call it off because I was only fifty-nine. They saved it up over a year and then put it across without my suspecting a thing. I hand it to you, gentlemen, and ask you to accept my sincere thanks. It touched me more deeply than you may believe. To have my A.R.R.L. friends give me the greatest birthday celebration of my life means a very great deal, indeed.

There were hundreds and hundreds of radiograms and a perfectly stunning barometer-thermometer-chronometer set all engraved with my name and a lovely sentiment. I cannot hope to adequately express myself to all of you individually, and so I am forced to take this method. Please realize that I appreciate your kindness.

Hiram Percy Maxim

Strays

The Eastern Great Lakes District Convention of the Institute of Radio Engineers will be held in Rochester on November 18 and 19. Three papers will be presented: "Standardization in the Radio Vacuum Tube Field," by W. C. White of the General Electric Co.; "Considerations in Screen-Grid Receiver Design," by W. A. McDonald of the Hazeltine Laboratories; and "Ultra-High Frequency Transmission and Reception," by A. H. Taylor of the U. S. Naval Research Laboratory.

Inspection trips will be made to Kodak Park, the Stromberg-Carlson Telephone Mfg. Co. and the Valley Appliance Co. Convention headquarters will be at the Sagamore Hotel at Rochester, and the Chairman of the Convention Committee is Virgin M. Graham.

A very satisfactory method of preventing interlocking between the first detector and the oscillator in superheterodyne receivers is to operate the oscillator at half the frequency of the incoming signal. Signals are as strong as when the fundamental of the oscillator circuit was used, according to J. H. Platz of W9CBK.

Amateur radio equipment, especially transmitters, seems to be following the pace set by the automobile. The 1930 equipment will soon be out!

W7ACI belongs to John Hertz.

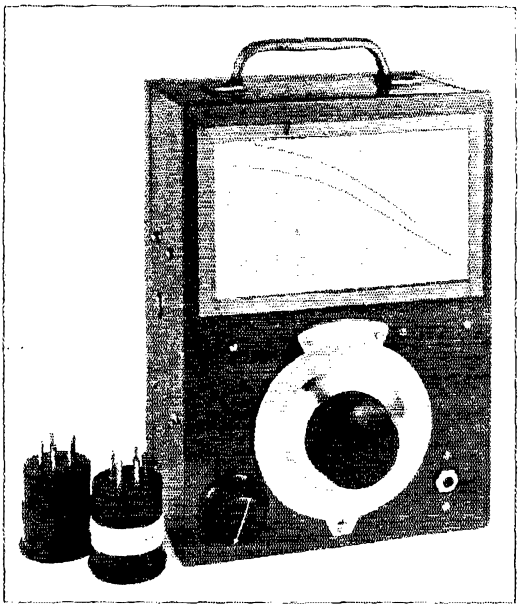
— *W9FO.*

A High-C Heterodyne Frequency Meter

The idea of presenting a constructional article on an accurate high-C frequency meter to readers of QST was born on a recent visit to W1XV, the experimental and standard frequency station at the M.I.T. Laboratory at Colonel Green's estate, Round Hill, South Dartmouth, Mass., where one similar to that described in this article is constantly used in the station. We are informed that the meter is tested frequently against the frequency standard of W1XV, and the changes in its calibration are so slight as to be negligible for amateur purposes. We are indebted to Mr. Howard A. Chinn of W1XV for the details of the original frequency meter, upon which the design of this meter is based. — EDITOR.

By B. Dudley, *Assistant Technical Editor*

THE precise determination of radio frequencies between 1500 kc. and 60,000 kc., and especially those frequencies defining the limits of the amateur bands is of utmost importance to the radio amateur. The time has long passed when amateur stations could operate outside their legal bands without causing interference to other services. A good frequency meter can be so easily constructed at moderate expense and may be so accurately and easily calibrated from the standard frequency transmissions of stations W1XV-W1AXV, W9WI-W9XL, and WWV, that there is no excuse for any amateur not owning an accurately calibrated one. The amateur who is forced to use the signal, "QRG?" not only shows that his station is not sufficiently equipped to meet modern demands but indicates what a poor operator he is every time he uses that Q signal as an interrogation. There is no reasonable alibi for any amateur not knowing the frequency to which his transmitter is tuned.



FRONT VIEW OF THE FREQUENCY METER

The rheostat knob is at the left, the tuning control in the center and the 'phone jack at the right. Above the tuning control is the celluloid window, behind which is mounted a tabulation of standard frequency calibrations. The 3500-kc. and the 1750-kc. coils may be seen at the left of the meter.

REQUIREMENTS OF A FREQUENCY METER

Let us consider for a moment some of the requirements of a good high-frequency frequency meter. First of all, it must be precisely calibrated and capable of maintaining its calibration over a long period of time with normal use (and, we might add, abuse) given it. The calibration must not be greatly affected by unavoidable variations of inter-electrode capacitance of individual tubes of the same type, of slight variations in battery voltage, or of normal room temperature changes; and of course, these unavoidable changes should be kept as small as possible. Finally, the frequency meter must be mechanically sturdy and should be provided with a geared dial or similar device to permit the accurate setting of the meter to any frequency within its range, together with a means of precisely reading and determining the setting for this frequency.

The most precise, simple, and universally applicable type of frequency meter for the amateur is the heterodyne frequency meter consisting of an oscillating vacuum tube with its associated power supply and tuning circuit. This type of meter may be used to determine the frequency of a transmitter or a receiver. It requires much less power for proper excitation than an absorption type meter and has the additional advantage of being much more easily calibrated from a standard frequency signal than the absorption type of meter.

The heterodyne frequency meter described in this article permits precise setting and cali-

bration. It makes use of a circuit which allows the accuracy of calibration to be maintained over unusually wide operating variations. This is accomplished principally by shunting the tube capacitances with fixed condensers of such size that the maximum deviation from the average values of tube capacitances which are encountered in practice cannot change the total circuit capacitance by an amount sufficient to seriously affect calibration. The mechanical construction of the meter is well adapted to the requirements of the amateur station. The meter is self-contained, portable and is built sufficiently strong to withstand normal use. These points should make this frequency meter a popular instrument around the amateur station, especially when it is known that the total expense connected with its construction need not exceed $20.00.

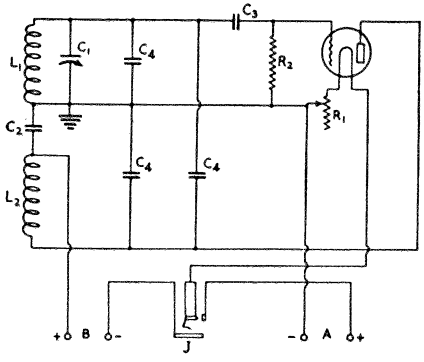


FIG. 1. — THE CIRCUIT OF THE HIGH-C HETERODYNE FREQUENCY METER

L_1 — 15 turns of No. 22 wire for the 1750-kc. band. 7 turns of No. 22 wire for the 3500-kc. band.
L_2 — Same as L_1.
R_1 — 20-ohm rheostat.
R_2 — 0.1-megohm grid-leak.
C_1 — 250-μμfd. National Equitune tuning condenser.
C_2 — 2000-μμfd. plate blocking condenser.
C_3 — 500-μμfd. grid condenser.
C_4 — 100-μμfd. tube capacitance shunt condenser.
J — Filament lighting 'phone jack.

The circuit of the frequency meter is given in Fig. 1. The circuit is a split coil, series fed Hartley. The frequency of oscillation of the circuit is determined largely by the constants of the grid circuit, $L_1C_1C_4$. Feed-back is furnished by the plate coil, L_2. The condenser C_2 is a blocking condenser to prevent short circuiting the plate battery. The filament lighting telephone jack is at ground potential with the result that the telephone cords will affect calibration less than if connected to a point of relatively high radio frequency potential. It will be noted that the rather large capacitances are effectively in shunt with the inter-electrode tube capacitances. The use of shunt condensers has several desirable effects.

ADVANTAGES OF SHUNT CONDENSERS

First of all, these condensers are probably most important in permitting the frequency meter to maintain its calibration. In the usual radio frequency oscillators, wherein no attempt has been made to shunt the tube element with fixed capacitances, a change of one tube for another is accompanied by an unavoidable change in calibration of the meter. The reason for this is that the tube constants, particularly the inter-electrode tube capacitances between tubes of the same type, differ sufficiently to make their variations quite noticeable at high frequencies. With fixed condensers in shunt with the tube capacitances, the total circuit capacitance is determined by the relatively large constant and fixed capacitance of the condensers as well as by the comparatively small tube capacitances which vary slightly with different tubes. If, now, one tube is substituted for another of the same type number, the total circuit capacitance will be affected as before, but, because the inter-electrode tube capacitance is a small percentage of the total circuit capacitance, which includes the fixed condenser shunted across the tube element, the change in frequency of the oscillator will be markedly less than when no shunt capacitances are employed.

Besides contributing to the performance of calibration, the fixed condenser in the grid circuit is beneficial in that it narrows the frequency range through which the oscillator will tune with a tuning condenser of given size. The effect of this fixed condenser, to use amateur language, is to "spread the band over the dial."

CONSTRUCTION OF THE METER

The container for the frequency meter is a steel cash box made by the Art Steel Company of New York City. Probably this type of box is available at most stationery stores although if a wooden box of suitable dimensions is available to the amateur this may be used advantageously as it will not have the shielding effects of a metal box. The steel box was used in this case primarily because it was the most easily available container. A box whose outside dimensions were approximately 10" x 7" x 4" was used although a larger box to accommodate another 22½-volt "B" battery appears to be more desirable. All of the components, with the exception of the tuning dial and rheostat knob which are used in the construction of this meter, are contained inside the box and are fastened to what would be normally the bottom of the box. A wooden shelf is provided at one end of the container so that when the box is stood on end, as it is in usual operation, the batteries are supported by the shelf. The photograph shows clearly the position of the apparatus in the case.

A UX-199 tube is used as the oscillator tube

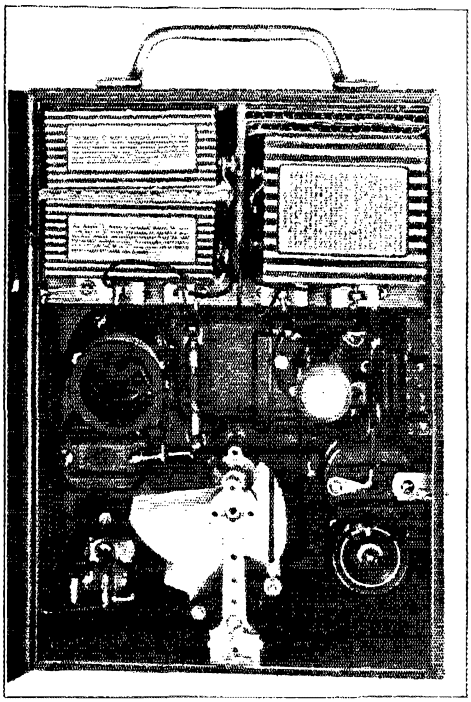
since it is more economical in power consumption than any other tube available to the American amateur. The tuning condenser is a National 350-$\mu\mu$fd. Equitune equipped with a 4" National Type N vernier dial. All fixed condensers are the Sangamo receiving condensers. The plug-in coils, two of which serve for the 1700-kc., 3500-kc., 7000-kc., and 14,000-kc. amateur bands (as well as the 28,000-kc. band if one is willing to exercise sufficient pains in operating the meter) are wound on Silver-Marshall tube base coil forms. The coils are wound in two sections, side by side, and in the same direction, with the grid and plate taps at the ends and the filament or low voltage terminals of the coils in the center. Each coil is given a coat of Duco, aeroplane "dope," or liquid cement, to prevent absorption of moisture by the insulation as well as to keep the turns firmly in position.

Except for the four battery leads, which are flexible, all connections are made with solid insulated wire, which permits the wiring to be made rigid and self-supporting. Flexible wire should not be used, as changes in the position of the various wires affect the accuracy and permanence of calibration.

A filament lighting jack is used so that when the 'phones or a short circuit plug is removed from the jack the filament circuit is broken and no unnecessary load will be imposed upon the batteries. The filament batteries used are the 4½-volt grid bias type, two of which, connected in parallel, are satisfactory for occasional frequency measurements. If it is desired to keep the frequency meter operating over extended periods of time, it will be more economical to use three of the No. 6, 1½-volt dry cells connected in series for the filament power supply. Of course, such an arrangement will necessitate the use of a larger case than the size already specified. A small 22½-volt "B" battery supplies the power to the plate although 45 volts will be generally more satisfactory. A brass drawer-handle is provided at the top of the case for conveniently carrying the meter around the station.

After the meter has been assembled and wired, the coils should be wound and tested for oscillation. Before calibrating the coils, it is a good idea to obtain an approximation of the frequency range through which the meter operates.

The frequency meter should be set up near the receiver or the antenna lead-in to obtain loose coupling with the detector circuit. A short circuit plug (preferably a plug to which a fixed resistor, the resistance of which is the same as that of the head-set used at the station, has been connected) should be inserted in the jack and the signal from the heterodyne frequency meter tuned in on the receiver. The tuning controls of the frequency meter and the receiving set should be varied simultaneously in such a manner as to obtain, and maintain, an audible frequency beat-note in the head set. The meter should be tuned first to zero and then to 100 and the corresponding dial settings of the receiver noticed. From familiarity with the receiver, the amateur can judge whether or not the frequency meter will cover the amateur band. The coils should cover the amateur band or sub-harmonic of the amateur band with some overlap on both ends of the dial of the frequency meter. That is,



REAR VIEW OF THE METER

Batteries are mounted on the shelf at the top. The plug-in coil, grid leak, and tube may be seen immediately below the shelf. One of the shunt condensers may be observed behind the lock, while the other two are mounted, one in back of the other, on brass brackets and may be seen above the rheostat.

the coils should be so constructed that the fundamental will cover one amateur band (with some overlap) while harmonics of the oscillator will cover other and higher frequency bands. If this condition does not exist, the coils will require alteration until the condition is satisfied. If the constructional details given in this article are closely followed, the coil specifications will be found to cover the amateur bands with sufficient overlap.

CALIBRATING THE METER

When it has been determined that the coils will cover the amateur frequency bands, and the operator is familiar with handling both the receiver and the frequency meter tuning simultaneously, the meter is ready for calibration

from the standard frequency transmission of W1XV-W1AXV, W9XL-W9WI or WWV, whose operating schedules appear regularly in *QST*.[1]

Suppose that we have consulted the schedule of standard frequency transmissions and have picked up one of the standard frequency signals. The exact frequency is announced during the time of transmission and this announcement should be recorded in writing. The receiver should be tuned to zero beat with the standard frequency signal after which the oscillator (or frequency meter, if you wish) should be tuned to zero beat with the receiver. The operator will then have three signals (the standard frequency signal, the signal generated by the oscillating detector tube, and that generated by the heterodyne frequency meter), all of which are in zero beat. The dial of the frequency meter should be recorded in tenths of a degree,[2] opposite the record of the frequency of the signal transmitted by the station. These operations are extremely simple, although the above explanation might not lead one to suspect this, and can be carried on by any amateur. None-the-less, it should be borne in mind that accurate calibration is being accomplished and the necessary care should be taken to make the calibration as free from the "human element" as possible. Slip-shod methods will not do in this type of work and the true amateur will pay attention to all details in connection with calibration.

After one point has been determined, the next standard frequency signal should be picked up and the process repeated until the standard frequency transmissions have ceased or until the limit of the frequency range of the meter or the receiver has been reached. When the dial settings of the heterodyne frequency meter corresponding to the standard frequencies have been determined in the manner indicated above, a calibration curve should be plotted. Coördinate or cross-section paper should be obtained, and the abscissa (the horizontal axis of the coördinates) marked in convenient units from zero to 100. The ordinate (the vertical axis of reference of the coördinate system) should be marked in convenient units to include all of the standard frequencies to which the meter was found to tune. Points are then located on the coördinate paper corresponding to the frequency and the meter dial setting and when all points have been located, a smooth curve is drawn connecting all the points. In locating the points and in drawing the curve, a ruling pen, adjusted to draw a fine hair-line should be used as this will help make the calibration more accurate and certain than a thick heavy curve. When the curve is completed, necessary pertinent data concerning the curve should be neatly printed on the graph and the calibration chart should be mounted on stiff cardboard or, better, in a chart holder or small desk pad (obtainable from your local stationer) fitted with a celluloid window. The oscillator described in this article was not only provided with a separate calibration chart, but also a celluloid window was provided at the upper part of the carrying case behind which is kept, for ready reference, a record in table form of the dial settings corresponding to standard frequencies. If so desired, the calibration curve could be mounted behind the window, although it is more desirable to possess a larger curve than that which can be mounted directly on the meter case.

The frequency meter has now been completed and is ready for use in the station. Let us see how the instrument is used.

USING THE METER

Suppose we wish to determine the frequency at which our transmitter is operating. The transmitter is put into operation and the head-set plugged into the jack in the frequency meter. The transmitter is keyed while the frequency meter dial is adjusted to zero beat with the frequency of the transmitter. Both the transmitter and the frequency meter are then tuned to exactly the same frequency and by reference to the calibration chart the frequency of the transmitter is determined.

The frequency of the transmitter may be accurately determined even if the meter is not calibrated for the particular amateur band in which the transmitter operates by making use of harmonics of the frequency meter. For example, a 7000-kc. transmitter may be adjusted to a given frequency in the amateur band by plugging in the proper coils in the transmitter after which the 3500-kc. coil should be plugged into the frequency meter which is then adjusted to one-half of the frequency on which the transmitter is to be operated. The transmitter is then tuned to zero beat with the frequency meter, and since the fundamental frequency of the transmitter beats with the second harmonic of the meter, the frequency of the transmitter will be twice that of the frequency meter. Because a high-C circuit is employed in the frequency meter, harmonics will be much weaker than the fundamental, and greater care will need be exercised when using the meter at a harmonic than when using it at its fundamental frequency.

While this method of calibrating the transmitter is the most simple, it is not the best procedure. The calibration of the meter is likely to be seriously affected by the use of a headset, since the telephone cords will serve as a rather effective "pick-up". It is therefore more desirable to insert

[1] See, "The A.R.R.L. Official Frequency System," this issue for schedules of W1AXV and W9WI, page 19, August, 1929, *QST* for schedules of WWV, and "Utilizing the Standard Frequency Transmissions," by K. V. R. Lansingh, page 36, September, 1929, *QST*.

[2] See, "Vernier Scales for Dials," by C. L. Jahs, Experimenters' Section, page 45, May, 1929, *QST*, for the method of reading vernier dials.

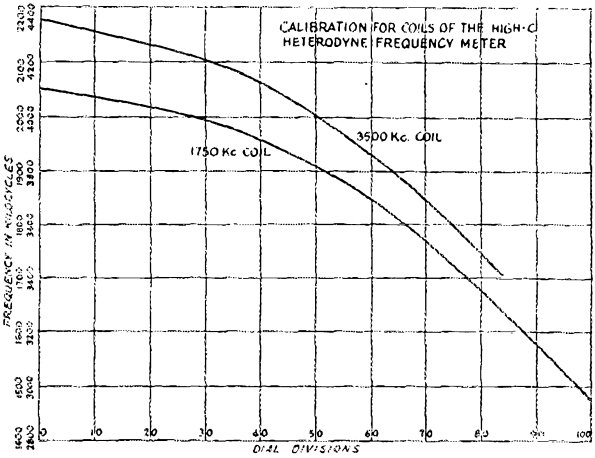
the short-circuit plug and use the frequency meter as an oscillator. To do this, the receiver should be tuned to one-half the frequency of that of the transmitter. The second harmonic of the receiver will then beat with the fundamental of the transmitter, and both the receiver and the transmitter should be adjusted to zero beat. The frequency meter is then tuned to zero beat with the receiver, and knowing the band in which the transmitter is operating, the frequency may be determined from the frequency meter calibration chart.

If the amateur insists on picking up the beat note from the frequency meter, it is suggested that the output of the frequency meter be fed into a two-stage audio amplifier so that the beat note may be heard on a loud speaker. If this method of operation is to be used much, the frequency meter had best be calibrated with the audio amplifier connected to it, and used in this manner. This procedure will minimize possible shifts in the calibration curve.

If we intend to use the frequency meter to determine the frequency of a received signal, operation is slightly different. The resistance or short-circuit plug, which is used during the reception of standard frequency signals, is inserted in the jack in the meter which, as before, is coupled to the receiver. The received signal is tuned to zero beat in the receiver and the frequency meter is tuned to zero beat with both the receiver and the incoming signal. The operation is exactly the same as that described for the reception of standard frequency signals up to this point. By reference to the calibration chart the frequency of the received signal is determined quickly and accurately. The entire operation does not take any more time than that required by the transmitting operator to send a few signals.

If it is desired to receive signals the frequency of which is known, the calibration chart is consulted and the frequency meter adjusted to the desired frequency. The receiver is then tuned to zero beat with the frequency meter, and, after turning off the meter, the receiver is ready for reception on the desired frequency. It will be observed that the calibration chart is referred to every time a frequency measurement is made and it is for this reason that quite a bit of care must be taken in receiving the standard frequency signals and in drawing the curves for the calibration chart.

Reference to the calibration curve of the frequency meter will show that the 1750-kc. amateur band extends from 26.9 to 76.4 on the vernier dial. The amateur band covers 50 dial divisions in the middle of the dial. The 3500-kc. coil is constructed so that the 3500-kc. amateur band extends from 50.0 to 79.7. This band covers approximately 30 dial divisions. If it is desired to do so, the amateur bands may be spread over a larger portion of the dial by removing some of the plates of the tuning condenser and perhaps adding another turn to the two coils. Since it is desirable that some overlap be allowed at both ends of the dial, the coils should not be constructed so as to just cover the amateur frequency bands without any overlap.



CALIBRATION CURVES FOR THE FREQUENCY METER

With the frequency meter constructed in the manner given in this article, body capacity effects are negligible. Under some conditions no body capacity effects could be noticed, and the maximum effect of body capacitance which was observed caused a change of about 200 cycles at 3500 kc. A change in the calibration of the same magnitude was observed when the filament was varied from two to four volts. Since the frequency meter cannot be read to greater accuracy than about two kilocycles of a given frequency, these changes are negligible. Opening the back of the frequency meter caused the greatest change in calibration, so that during use, the back should be closed and locked. Under these conditions, any change in calibration which does occur may be neglected for amateur purposes.

Strays

A very satisfactory choke for the keep-alive circuit in a mercury arc is the one ampere field coil taken from an old Magnavox speaker. It can easily be fitted with a level of iron and the mercury arc mounting weighted so that when no current is flowing in the keep-alive circuit, the arc will tip to the side and run the pools together. Then when current flows the current through the coil pulls the arc up in the normal position and the arc lights. Should it go out, it will re-ignite itself automatically in about three seconds.—*W9CBK.*

The Use of the Distortion Rule in Power Output Calculation

By K. S. Weaver*

IN the calculation of the performance of output tubes[1] under various conditions of load resistance, grid bias and plate voltage, one of the limiting factors which determine the circuit constants is the distortion of wave form introduced in the output stage.

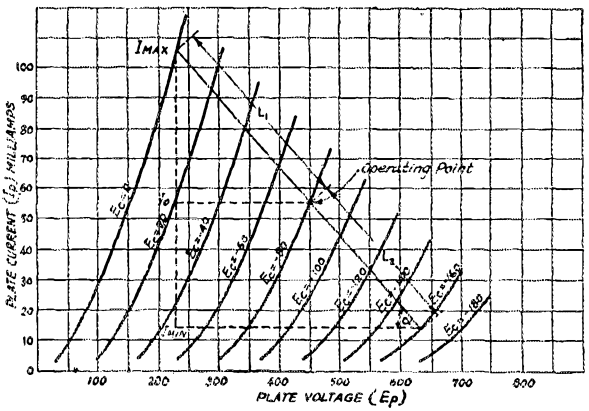


FIG. 1.— TYPICAL CHARACTERISTIC CURVES OF AN OUTPUT TYPE TUBE WITH THE LOAD CHARACTERISTIC FOR 5% DISTORTION

The distortion for the triode is generally calculated by the following formula, which gives the ratio of the amplitude of the second harmonic to that of the fundamental:

$$\text{Distortion} = \frac{\frac{I_{max}+I_{min}}{2} - I_o}{I_{max} - I_{min}} \qquad (1)$$

where:

Distortion = Percentage distortion expressed as a decimal.

I_{max} = Plate current at intersection of load line and zero grid voltage curve.

I_{min} = Plate current at intersection of load line and grid voltage curve for twice the operating grid bias.

I_o = Plate current at operating point.

In Fig. 1 is shown a family of characteristic curves such as is generally used in the study of the operating characteristics of output tubes. The points used in Equation (1) are indicated along the load line, the slope of which gives the load resistance. The load resistance and grid bias are generally so chosen that the distortion as calculated by the above formula does not exceed 5%.

Referring to Fig. 1, it is evident that the following relations hold:

$I_{max} - I_o = L_1 \sin \alpha$, $I_o - I_{min} = L_2 \sin \alpha$, $I_{max} - I_{min} = (L_1 + L_2) \sin \alpha$.

By a simple rearrangement of (1) and substitution of the above identities, we may write for the distortion in terms of the intercepts, L_1 and L_2, of the load line:

$$\text{Distortion} = \frac{L_1 - L_2}{2(L_1 + L_2)} \qquad (2)$$

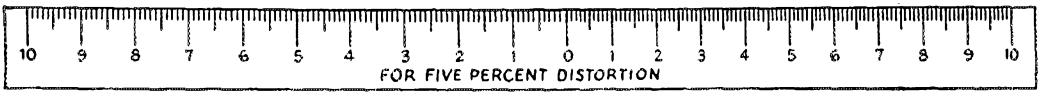


FIG. 2.— THE 5% DISTORTION RULE

The divisions to the left of the zero point are 11/9 those to the right of zero. In use, the rule is placed with its zero on the operating point and then swung until its reading at the point where it intercepts the zero grid voltage line is the same as that at which it intercepts the line representing twice the grid voltage at the operating point. A line drawn through these two intercepts and the operating point is then the load line for 5% distortion. In making up such a rule, its total length must be sufficient to span the distance between the maximum and minimum plate current points. An over all length of 9¼" will be found generally satisfactory.

from which:

$$\frac{L_1}{L_2} = \frac{2\,\text{Distortion} + 1}{1 - 2\,\text{Distortion}}, \qquad (3)$$

Suppose the distortion to be 5% (0.05):

$$\frac{L_1}{L_2} = \frac{2(0.05)+1}{1-2(0.05)}$$

$$= \frac{1.1}{.9} = \frac{11}{9}.$$

* Westinghouse Lamp Co., Bloomfield, N. J.

[1] "Development of New Power Amplifier Tube," by C. R. Hanna, L. Sutherlinand C. B. Upp, *Proceedings of the I.R.E.*, April, 1928.

"Output tubes" are those used as linear output power amplifiers in audio systems, such as the UX-250, UX-842, UV-845, etc. — EDITOR.

The value of L_1/L_2 for 5% distortion is 11/9, and it is seen that the ratio L_1/L_2 is constant for a given value of distortion.

A special rule (Fig. 2) of very simple design has been constructed which reduces to a minimum the tedium of this part of the calculation, the load line corresponding to exactly 5% distortion being determined directly without cutting and trying. The rule is used to determine the load line for which L_1/L_2 has this ratio and is divided from a center zero with the left-hand divisions 11/9 as long as those to the right. In use the zero of the rule is placed at the operating point corresponding to the values of plate voltage and plate current, so that the reading of the rule at one extreme of the assumed grid swing is the same as that at the other extreme of the grid swing. The position of the rule when so adjusted corresponds to the load line giving 5% distortion

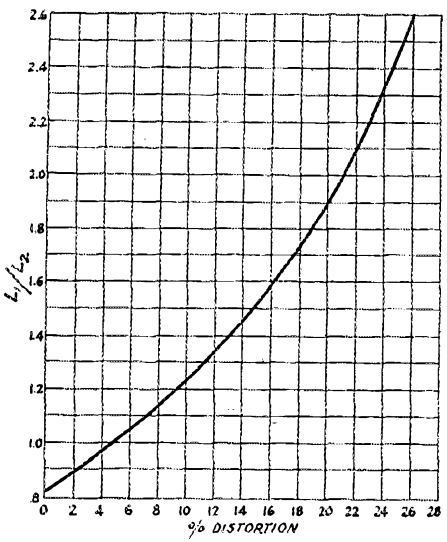


FIG. 3.—PER CENT DISTORTION PLOTTED AGAINST THE RATIO OF L_1 TO L_2

Used in conjunction with the distortion rule, this curve permits the determination of the percentage of distortion for any position of the load characteristic.

In positions of the rule other than that giving the same readings at each end, the distortion may be determined by reference to Fig. 3, in which the distortion is plotted against the ratio of the reading at the left to that at the right. The relation between this ratio and distortion is determined by the use of Equation (2).

If we write R_1 and 9/11 R_2 for L_1 and L_2 respectively, we have:

$$\text{Distortion} = \frac{R_1 - 9/11 R_2}{2(R_1 + 9/11 R_2)}$$

from which

$$\frac{R_1}{R_2} = \frac{9/11 + 18/11 \text{ Distortion}}{1 - 2 \text{ Distortion}}.$$

This is the equation represented by Fig. 3.

For more detailed information on output calculation see footnote 2.

[2] "Design of Non-distortion Power Amplifiers," by E. W. Kellogg, *Proceedings*, A.I.E.E., February, 1925. "Output Characteristics of Amplifier Tubes," by J. C. Warner and A. V. Loughren, *Proceedings*, I.R.E., December, 1926.

Information on output calculations is also contained in the article on the UV-845 in this issue of *QST* as well as in the article on the UX-842 in the July, 1929, issue of *QST*. — EDITOR.

The Northwestern Division Convention

THE Rose City Radio Club as sponsors of the Northwestern Division Convention held in Portland, Oregon, August 30th and 31st, should get a medal for staging one of the best affairs ever held in the division.

With the very largest attendance on record, the Committee in charge saw to it that the program was carried out to the letter, and there was not an idle moment. It was great fun when fifteen automobiles crowded with "hams" and led by a motorcycle "cop" with W7SI in the side car acting guide toured the whole city visiting stations. Of interest was the club's own station aboard the battleship "Oregon"; it is installed in the old wireless room of the ship. Moreover, Portland seems to have more first class amateur stations in operation than is usually found, and this must account for the enthusiasm of the club members who made every one feel at home.

Meetings were held in the Georgian Room of the Hotel Heathman with H. K. Lawson, W7QR, as chairman. Dr. Louis K. Poyntz, a well known lecturer spoke on the "Electron" and possibly some who heard him may discover uses for the higher frequencies about which so little is known. Mr. McMillan of the Western Electric Co. gave an interesting talk on measuring instruments. It is now customary to have Navy or Army representatives at all conventions, and Lt. N. H. Randall, U.S.N.R., spoke for the Naval Reserve.

After the meetings Friday and Saturday evening, the real "boiled owls" scattered at the different stations and it is understood that DX records were broken. Saturday morning saw the full attendance registered with delegates from every city within the Division, and a continuation of stunts and contests which included a Tug-of-War (c.w. versus i.c.w. — the c.w. won), swimming races and fancy diving at the Natatorium. Among old timers present who had attended a convention 10 years ago were John Waskey, I. V. Iversen, Geo. Sturley and Walt.

(Continued on page 18)

Ham's Hour

A Bed-Time Story With a Tragic Ending

By Uncle Jimmy *and* The Pied Piper

BUT sure, U.J. —"

"Who's a jay?"

"*You* misunderstand, U.J."

"I am *not* a jay!"

"Those're your initials, you big lid."

"Oh, all right, P.P. Now, what were you about to say?"

"Surely you didn't come up here unprepared?"

"No, it's like this: I came prepared to pull off an off-bee bed-time story; had you starring all through it, but I've decided not to tell it. I've been playing with a new click-filter and I believe the little hams will be more interested in hearing about that."

"Has it had a thorough tryout?"

"Oh, yes! John is using it right along. You know John; he's our S.C.M. — that big six-foot-three baby you met at the convention. And that reminds me of the favor I wanted to ask of you.

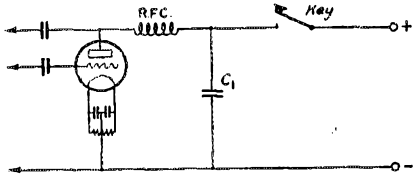


FIG. 1

You remember that dirty crack I made about John at the banquet? Well, John told me later that he figured I owed him a public apology."

"Ever apologize?"

"Nope, not yet, but I will at the next convention. I'll tell him I'm sorry — sorry that conventions come but once a year. He won't mind. I wish they were all as good-natured as John! . . . But you can see the point. There's no telling what I'll say when I go to make a speech off-hand. Now if you could just help me out a bit on this thump-filter talk — kinda' prompt me — "

"Sure thing! Tell you what we'll do; we'll put it all in verse. You supply the vocabulary and ideas and I'll put the ryhme and rhythm into your head as you go."

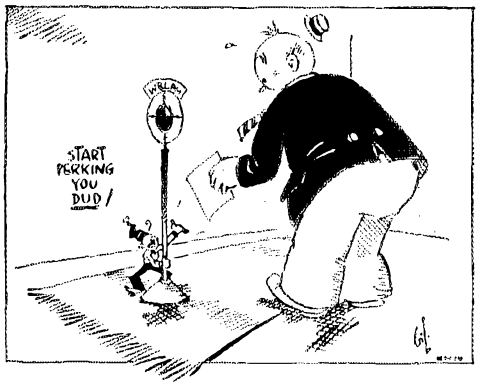
"But, P.P., I never made up a rhyme in my life. Folks don't fall for that stuff, anyway; they say editors won't even read it."

"Sure, they read it — more's the pity, poor devils — but they don't print it. Why? 'Cause it's rubber-stamp stuff. Now you take a poem that's really got somethin' in it — "

"But Piper, for the love o' dee-ex — "

"Hush! We're on the air. Do your stuff. . . . Start perking, you dud!"

"There was a ham in our town
And he was wondrous wise;
He put a filter on his key
To still the neighbors' cries.



"Perhaps he was a Scotchman,
For it is nice to tell;
He fixed it so that would work
To help the note as well.

"No scheme was ever perfect;
The thing has faults, it's true;
But then, we must be practical.
I think you'll like it too.

"The wise man found that break-in
Was not what it should be.
'But *should* it be?' he asked himself,
And judged it thoughtfully.

"'It's just a nuisance nowadays
In all the QRM.
I'll listen to the monitor —
Improve my fist again.'

"The key was in the positive,
Which has a dang'rous name.
He put a relay there instead
And made it safe and sane.

"And now I'll show you how it works —
Upon the the'ry dwell.
We'll go into it step by step
To understand it well.

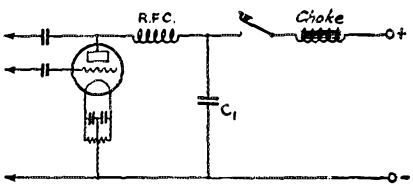
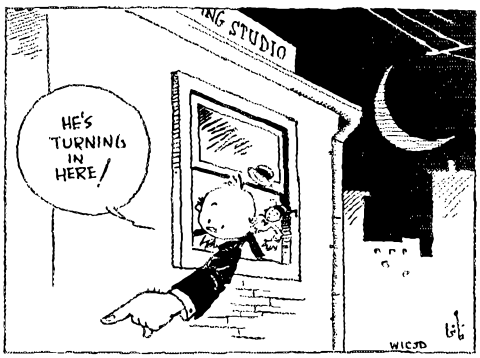


FIG. 2

"When first the contacts open,
We ought to have in store
A little bit of energy
To oscillate some more.

"In Figure 1 we see that
When contacts open, why,
Until its energy is gone,
C_1's the pow'r supply.

"But if too small capacity
We should chance to use,
C_1 is certain, all too soon,
Its energy to lose.



"Be sure to make it large enough
To stop the naughty click,
But not too large, for then a tail
On ev'ry dash will stick.

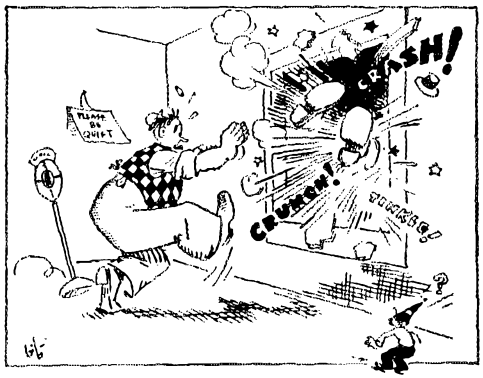
"And now we needs must figure out
A way to *close* the key,
To gently charge C_1 again
And do it gradually.

"Inductance seems to be the thing
That we will want to use
To charge it gently right at first
And yet no voltage lose.

"We show the scheme in Figure 2,
But when we try it out,
An arc is in the argument
That must be put to rout.

"The arc is caused by voltage that
The choke too-quickly builds.
Resistance shown in Figure 3
This voltage eas'ly kills.

"How much resistance shall we use?
Ah, that, of course, my friends,
On choke reactance — ampere-turns
And rate of change — depends.



"We'll use resistance high enough
To stop the neighbors' kicks —
Just low enough to kill the arc
And yet avoid the clicks.

"Our filter's done, and, what is more,
It helps the note as well;
It aids the reg'lar filter's work —
The filter in the dell."

"Hold on, U.J., you big slice of confused frequencies! Whoever heard of a filter in the dell?"

"That's where it is; I put it there, didn't I? Besides, you deactivated 199, *you* were supposed to furnish the rhyme."

"Yeah, but I'm hampered by that ex-soldier vocabulary of yours. I looked through it to find a word to rhyme with 'well' and all I saw was a cuss-word. You're a fine example for little hams!"

"Oh look, Piper, look! Isn't that John running across the street? Great heavens, P.P., he's pursued by BCLs! He's turning in here. Listen."

"Wheeze, puff, whoosh, puff — saved! They'll never think — puff — to look for *me* — whoof — in a broadcast station. James! You here? Good! Fate is kind; I shall throw you to the BCLs!"

"No, no, John, you're crazy! Why —?"

"You know why, you — you inventor of thump-filters!"

Crash! Tinkle! Crunch! A ghastly silence!

(Twenty-four hours later we tune in again. The announcer's calm voice is heard.)

"The station management wishes to express its regret concerning the unfortunate interruption of last night's programme.

"It seems that an unidentified piano-mover, fleeing from a mob, rushed into the studio, seized our Uncle Jimmy and threw him bodily through

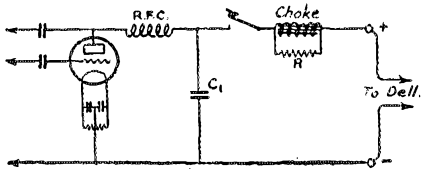


FIG. 3. — A GOOD THUMP-FILTER BUT, LIKE ALL SUCH FILTERS, EFFECTIVE ONLY IF VALUES ARE SELECTED SUITABLE FOR THE SET WITH WHICH IT IS USED

C_1 — Likely 1 to 3 μfd. Proper value depends upon impedance of tube circuit. (The greater the plate current, the more capacity is needed.)

Choke — 1 henry, up. Should be large when C_1 is small.

R — This resistance must be at least as great as that of the tube circuit (divide number of plate volts by amount of plate current in amperes to find this value); higher resistance is preferable if it can be used without causing an arc. R may be eliminated in very low-powered sets. If arc is present when using lowest specified value of R, size of choke must be reduced.

the window to the mob below. Uncle Jimmy was painfully bruised and bitten before the mob discovered its mistake and dispersed. None was identified.

"During the struggle in the studio, the mike was overturned and crushed beneath the foot of Uncle Jimmy's assailant. The police have examined the footprint and are searching for a man who, they say, resembles William Howard Taft.

"Uncle Jimmy's condition is not much improved today, but he seems to know more. He has given me a somewhat cryptic message to deliver for the benefit of any little hams who may be listening in. I quote:

"'It is my belief today, as it has been in the past, that thump-filters are destined to play an extremely useful part in the promotion of world peace. I must add, however, that I am also convinced that the only safe way to deal with BCLs is to shoot upon sight!'"

The Northwestern Division Convention

(Continued from page 15)

Emerick. A number of distinctive "lids" were in evidence and Gunston, W7GP, was the winner, — how that man can think up original things!

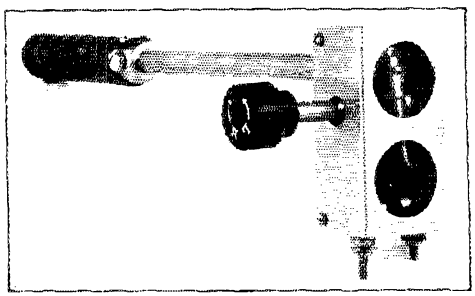
Music was furnished by the "Oscillating Five" and they were good too. Director Weingarten, acted as Toastmaster, and did a fine job of it. The main speaker at the Banquet was Treasurer Hebert, of A.R.R.L. Headquarters who told of the battles the League has had to fight for amateur radio during the past 15 years and made a strong plea for continued loyalty. After listening to remarks made by a great many representative hams from every part of the division, the grand award of prizes took place much to the delight of all, because there seemed to be no end of trophies which had been donated by the manufacturers. Our thanks to them; and, three cheers to W7QR; W7AKK; W7PP; W7AP; W7SI and W7UN, for the success of the convention.

The Spokane delegation obtained the convention for 1930, — CU then.

—*A. A. H.*

A Thermo-Regulator for Quartz Crystals

ALTHOUGH not new in the sense that it has been made but for a short time, the DeKhotinsky bimetallic thermo-regulator shown here has recently been found applicable to temperature control of piezo-electric quartz plates in amateur crystal-controlled transmitters. The sensitive element of this regulator is made



from a strip of high thermostatic metal. It can be set to any desired temperature from that of the surrounding atmosphere to 260° C. A change of temperature of ¼° C. is sufficient to produce convenient opening and closing of the contacts. The regulator can be used without a relay, since heavy contacts, capable of breaking a current of 3 amperes are provided. A condenser of approximately .03 μfd. capacitance is supplied which should be connected across the contact points whether the instrument is used for controlling alternating or direct current.

The temperature control unit is reasonably

(Continued on page 80)

The Hiram Percy Maxim Sixtieth Birthday Relay

By E. L. Battey, Asst. to the Communications Manager

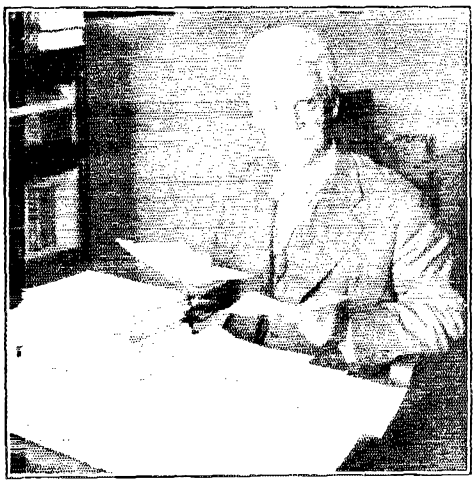
IN recognition and honor of President Maxim's 60th birthday which fell on September 2 it was deemed suitable to hold a relay to afford all amateurs the opportunity of expressing their esteem and personal good wishes to him by amateur radio. The relay was open to every amateur in the world and was a secret from Mr. Maxim up to the time the messages were delivered to him.

The delivery of approximately 700 messages of congratulations and good wishes came to our President as a complete surprise and he, to use his own words, was literally "bowled over" by such substantial evidences of kindly feeling. He calls the relay one of the outstanding events in his life and a splendid example of the good old A.R.R.L. spirit that has stood amateur radio in such good stead all through the years.

"So many dots and dashes that if layed end to end they would reach from Hartford, Connecticut to Louisville, Kentucky," is how Chief Operator Parmenter of W1MK summed up the Hiram Percy Maxim Sixtieth Birthday Relay. Those who took part will readily grasp the significance of his words as the ether offered any number of HPM messages from start to finish of the relay.

Inasmuch as the whole affair had to be kept a secret from President Maxim the relay could not be announced through *QST*. Just before the relay announcements were mailed to the A.R.R.L. Official Relay Stations, Affiliated Clubs, Section Communications Managers and Route Managers throughout the United States and Canada. The more active and enthusiastic of those receiving the announcement immediately hopped to it and scouted up messages from all their amateur friends. Mr. Maxwell, W4SI, Atlanta, Georgia, deserves special mention for this sort of work as he called all the amateurs in Atlanta on the telephone to inform them of the relay and ask them to get on the air and send their HPM message. This effort made Atlanta exceptionally well represented in the delivered traffic. Other stations told every fellow worker about the event and thereby prepared him for the start. A broadcast was sent daily for about ten days before the relay by the Official Broadcasting Stations giving news of the affair. A few amateurs known to be keeping foreign schedules were requested to pass the word along to their contacts so that foreign countries would also have a chance to participate. A surprising number of messages were received from outlying points in view of the fact that no special advance publicity was attempted in foreign localities. All details were kept secret until just before the relay to avoid the possibility of the news getting to President Maxim.

The relay was held from 6 p.m. E. S. T., Saturday, August 31 to 6 p.m. E. S. T., Monday, September 2. W1MK was on the air continuously during this period with the result that the three operators, "RP," "FH," and "EV," heaved a sigh of relief when Monday night rolled around. Regular shifts were kept of eight- to nine-hour duration on 3575 and 7150 kc. It was a lively week-end at W1MK! The second station worked after the official start at 6 p.m. Saturday had ten messages and from then on it was copy, copy, copy! No sooner would one station be cleared then another would open up with a frantic call to W1MK and five to ten more messages would be chalked down. By Monday they were coming through in bunches of 20, 25 and one station even had *40*. Stations stood by for hours awaiting their chance to unload their traffic. Of course there were the dead hours of the early morning during which activity died down to practically zero but as a whole the tubes were kept quite comfortably warm. A total of 356 messages was received at W1MK and all three



MR. MAXIM EXAMINING MESSAGES RECEIVED FROM ALL OVER THE WORLD

Some bunch!

operators noticed hardly two messages with the same wording. There were any manner of thoughts expressed and one or two humorously worded messages were received. The texts of a few representative messages are given herewith so that the nature of the relay traffic may be better ascertained.

"Heartiest birthday greetings and congratulations on your many years of inspiring leadership in amateur radio."

"Birthday greetings to our League President from a new ham."

"Best wishes and congratulations from an old timer of the W1AW days."

"The members of the local club congratulate you on your birthday. Regards."

"Congratulations on your birthday from a YL operator."

"Birthday congratulations to the 'ham what am.' May all things good be yours. Very 73."

"Blessed with three score years and the enthusiasm of youth. What a man!"

"Thanks very for demonstration of how short waves shorten years. Hope you stay on that job until the rest of us catch up."

"We hope to see you a centenarian still at the head of our League. 73."

"You are doing very well for a young fellow. Am nearly sixty myself."

Two message deliveries were made to President Maxim, the first delivery including over three quarters of the messages received being made on the evening of his birthday. Mr. Maxim was justly pleased by the various greetings. The longest message was one of nearly 100 words, and there were several such missives in the bunch.

Twenty-four Connecticut stations besides W1MK were organized before the relay to get the traffic into Hartford and their schedules for operation were sent with the announcement to the field organization so that there would be definite channels through which to route the messages. These stations did well but, unfortunately, all of them did not send in a full account of their work so the totals given in this article do not really give full credit for the work done on the part of all stations.

It was announced at the start of the relay that a letter of commendation from Mr. Maxim would be presented to the Connecticut station handling the largest amount of HPM traffic. This did not include W1MK of course. W1AOX, with a total of 151, is the leading Connecticut station and accordingly wins that letter. Dwyer (W1AOX) maintained ten or twelve special schedules to collect HPM traffic and it is to this fact that he attributes his high total. This represents untiring effort and we must felicitate him on his good total. W1AFB is second high with 97 — many relayed from W1AOX, all delivered. The work of many of the remaining Connecticut stations represents many hours of operation and the sum total of messages delivered to Mr. Maxim would not be so large were it not for those stations. The totals for the active Connecticut stations reporting are as follows. Delivered traffic is intended except where totals are specified in detail.

W1MK 356; W1AOX 151 (1 orig. 150 rel.); W1AFB 97; W1AJB 41; W1AMQ 34; W1ADW 29 (3 orig. 12 del. 14 rel.); W1SZ 29; W1AMG 20; W1UE 18; W1CTI 17 (1 orig. 2 del. 14 rel.); W1BDI 14; W1NE 12; W1RP 12; W1BOD 10; W1AKU 5; W1CJD 3; W1BM 2; W1VP 1; W1AVT 1.

Out-of-Connecticut activity was very keen. Unfortunately the large number of participating stations makes it impractical to show the totals for each station in detail. In addition to a letter of commendation to the Connecticut station handling the most traffic, letters were offered to the ten stations outside of Connecticut handling the greatest volume of messages. As was the case in Connecticut the outside men did not all send in accounts of their work. Letter awards were made after carefully checking and balancing the logs received. W8CHC leads the out-of-Connecticut group with a score of 134! Scott (W8CHC) was on the air consistently and worked hard to build up that total. W1BOB is next in line with 83, W2AVR a hair behind that with 82. W8BGY turned in a total of 75, W8CUG and W8AVB following with 48 and 46 respectively. The awards could be made only in accordance with the message files and logs received and it is regretted that every amateur did not report his part in the relay. The ten leaders and winners of letters from Mr. Maxim are listed in the order of their accomplishments and are W8CHC, W1BOB, W2AVR, W8BGY, W8CUG, W8AVB, W4SI, W9ERU, W9AFN and W9ADS. These amateurs have made history for their stations and congratulations are in order!

The HPM birthday greetings came in from many different points throughout the United States and the world. Messages were received from 41 states and the District of Columbia, *every* state except Arizona, Louisiana, Montana, Nevada, New Mexico, South Dakota and Washington being represented. In practically every case the number of messages received from each state was proportional to the number of amateurs in the state. Greetings came in from each Canadian district except the first. Amateurs in Cuba, Hawaii, Porto Rico, the Philippines, Australia, Chile, China, Brazil, Colombia and England each sent their message of greeting. One Australian amateur (VK5HG) obtained the special permission of his radio supervisor to send the official message from the Wireless Institute of Australia. Another Australian expressed his good wishes but could not put it in the form of a message. Likewise a British amateur extended congratulations and best wishes from all British hams but because of existing laws could not send

a message. In the case of each foreign message received the sender had heard of the relay by amateur radio. Congratulatory messages came from thirty-nine radio clubs in divers sections of the United States. This is approximately fifty per cent of the active amateur radio organizations in the country. A leading radio association in China sent its greetings in addition to the good representation from Australia and other points.

The relay recounted above opened the 1929–1930 radio season. Most of the traffic came through on 3500 or 7000 kc. although a number of stations working on 14,000 kc. took an active part. No work on the other bands was reported. Amateurs showed much enthusiasm and the results of the relay are gratifying, especially when we consider the comparatively small amount of advance publicity possible, the usual smaller amount of general activity in August, and the fact that the relay was held on Labor Day and the preceding week-end when many people go away or are still on vacation. We feel justified in writing the Hiram Percy Maxim Sixtieth Birthday Relay into the "Book of Successes" of Amateur Radio.

The Midwest Division Convention

JOHN H. AMIS, W9CET, S.C.M. for Kansas, is the choice of the Sunflower state for Midwest division director — that was the overwhelming and unanimous declaration of the third annual Kansas convention, at Topeka, September 13 and 14.

Nomination of Amis and the rush to sign his petition followed quickly upon the announcement at the closing banquet by Quinby, W9DXY, present director, that he would not run for re-election. "Port," retiring, was given a ringing ovation.

Excellent weather, a peppy crowd, and a program of stunts, contests, excellent talks and food combined to make the convention "best ever," and the vote to return to Topeka in 1930 was unanimous.

Hebert, representing A.R.R.L. Headquarters; "Port" Quinby, of St. Louis, Mo., Midwest director; Lt. Comdr. R. H. G. Mathews, of Chicago, commander of the ninth district USNR, volunteer communications reserve; and three S.C.M.'s, Kerr, of W9DZW, Little Sioux, Ia., Laisure, W9RR, of Kansas City, Mo., and Amis, W9CET, of Topeka, were principal speakers.

Two messages — one of coöperation to preserve the spirit and status of amateur radio, the other urging that competition for traffic leadership be kept on a friendly basis and above the rubber stamp level — were brought by Hebert.

Eighteen temporary tickets became "amateur firsts" under supervision of W. J. McDonnell, federal examiner from Kansas City, Mo., and 21 enlistments in the naval reserve put a Topeka unit well "on the way."

Visits to WIBW, Capper Publications' 2500-

(*Continued on page 80*)

Finding the Expeditions

Expedition Station	*Frequency (kc.)*	*Call Signal*	*Remarks*
Yacht *Carnegie*, Dept. of Research in Terrestrial Magnetism, Carnegie Institute of Washington.	*6045*	WSBS	In second year of three-year cruise. Sailed from Honolulu Sept. 19 for Apia, Lyttelton, So. Georgia, St. Helena, Cape Town, etc. Operator, Stuart L. Seaton of W3BWL.
Base Station, All-American Lyric Malaysian Expedition, Poerock, Tjahoe, Borneo.	7330	PMZ	In the jungle conducting radio and other research work. Traffic should be filed with W1MK or W6AKW to be sent to PMZ direct or via K1AF or K1CY. Operator, Harry W. Wells, ex3ZD.
Yacht *Ripple*.	*8290* 5525	KFLF	Sailing north from Gloucester, Mass., to Halifax, N. S., calling at ports en route. Operator, J. R. Foran, QSL to Box 188, Bradenton, Fla.
Oxford University Exploration Expedition, in British Guiana from July until December.	7000 *14,000*	VP5OUX	50-watt base station and 10-watt portable station with survey party. QSL via A. C. Edwards, G6XJ, c/o Stratton & Co., Ltd., "Eddystone" Radio, Balmoral Works, Bromsgrove St., Birmingham, England.
Base, Byrd Antarctic Expedition, Lat. 78.34 S, Long. 163.30 W.	*8810* *6580* 13,180	WFA	WFA calls CQ after regular schedules, also at 0400, 0700 and 1000 GCT daily, choice of frequency depending on season and conditions. Operators, Berkner, Hanson (MP), Peterson (Pete) and Mason (MN).
S.S. *Eleanor Boling* of Byrd Expedition.	8830 7310	WFAT	In port at Dunedin, N. Z.
S.S. *Lake Ormoc*, Ford Motor Company.	8560	KVUA	Bases at rubber plantation at Santa Ream, Brazil.
Italian Arctic Expedition.	14,500	LDIV	Worked by W8VS, Sept. 8, when at Nova Zembla (an island north of Russia).
Cableship *Dellwood*.	8600	WUAJ	On world cruise in mid-Atlantic QRD London when worked by W6CUH, 500-cycle note.

Marine Radio of To-day

By C. H. Hess*

THE commercial operator, through the medium of *QST*, is able to keep up with the newest developments in amateur radio but, on the other hand, the amateur knows very little about the commercial end. By "commercial radio" let it be explained that "marine radio" is meant, the branch upon which the writer can speak from several years' experience.

In the minds of many operators in the amateur field, the spark transmitter is generally considered as one of the relics of the dark age, ranking with the coherer and kindred pieces of apparatus in antiquity. However, a good 50% of the ships sailing the seven seas are still spark equipped and, although the numbers are gradually dwindling, it is safe to assume that a goodly proportion will be in operation until the spark really does pass into history in 1940.

This is not as bad as it sounds, for a "500-cycle" spark transmitter in the hands of a skilled operator is capable of some very pretty work. The rub comes in the fact that sometimes the operator is not successful in finding the right "combination" and the note goes flop, greatly broadening the wave and reducing the range. It is, however, not unusual for a good spark to work 2000 miles in good radio weather, in the wee sma' hours, when local interference lets up.

Marine radio is not primarily concerned with DX work. It is an advantage for a ship to work DX, but not a necessity, for marine radio is primarily for use in case of emergency. In such instances, help summoned from a distance of 2000 miles would be worthless. Except in the case of the large passenger vessels, traffic to and from the cargo ships, which form the bulk of ocean tonnage, is limited to docking messages, notifying the agents of arrival, supplies required and other details.

Many spark transmitters have been converted for A.C.C.W. transmission, with wonderful success. It is through these modernized sets that the bulk of the traffic to and from coast stations is handled, the coast stations preferring to give their traffic for spark equipped vessels to tube equipped ships for relay, and spark stations finding it easier to clear their traffic through the same routing. One often hears an ambitious operator with a tube set work all day "gathering in" traffic and TRs and then shooting the whole bunch on through to the nearest coast station after dark, receiving, in return, traffic for the ships whom he is QSO, then turning around to deliver the same. Some very neat work is done in this manner and one hears many exceptionally good "fists" at work.

Relaying plays a very important part in marine radio. It has been developed until it has become very much of a fine art. Considering the bulk of traffic handled, there are very few mistakes, even though such traffic might pass through a dozen hands. For each message delivered, the station doing the relaying notifies the station of origin of its delivery with a service message.

Many large steamship companies have established nightly schedules between their ships, and have been assigned a general call. Much good work is done on these schedules. Position reports are exchanged and passed along to the ship nearest a coastal station.

This may seem "small pickin's" to the amateur who is accustomed to easy international contact, but conditions are very different on ship waves, especially in the matter of QRM. It takes quite a bit of concentration, not to say skill, to copy a ship even 1000 miles away on 750 meters, with another vessel, right abeam, booming forth with a spark set on 600 meters. Spark sets usually employ, in addition to the 600-meter calling wave, 660, 706 and 800 meters. Tube sets use 640 or 660, 706, 750 and 800 meters. The 800-meter wave is, of course, for radio compass work only.

Passenger ships, having a lot of "paid" or personal traffic, transmit on the higher waves of from 1800 to 2400 meters, leaving the 600- and 700-meter bands free for ships not so equipped. Many of the foreign passenger ships, while still keeping their spark sets on 600 meters, are fitted out with a modern tube or arc sets for long wave work. In the marine field the arc has proven itself very efficient on the high waves but is not much good on 600, due to the mush accompanying the chopper modulation. Quite a few of the Shipping Board freighters are equipped with spark on low waves and arc for high waves. This is generally considered to be a good combination.

All of the coast stations are now tube equipped. No traffic is transmitted on 600 meters, the coast stations shifting to a higher wave after communication has been established. This is an innovation of the past few years and has done much to alleviate the terrific QRM racket on 600.

Recently, a few of the larger ships have been

(Continued on page 78)

* W3BLI, 7344 Summers Road, Philadelphia, Pa.

Building Shields

By H. D. Pendleton*

THE procuring of shielding cans or boxes of the proper sizes and types often proves a serious stumbling block in the construction of the amateur receiver or transmitter and the construction of shields such as would be most desirable is usually side-stepped because of the generally prevalent idea that it is necessary to have at hand a variety of elaborate and costly shop equipment to do a good job. Fortunately this is not altogether true, and good workmanlike copper or aluminum shields of sturdy construction and good appearance can be formed easily with the aid of two blocks of wood and two steady hands.

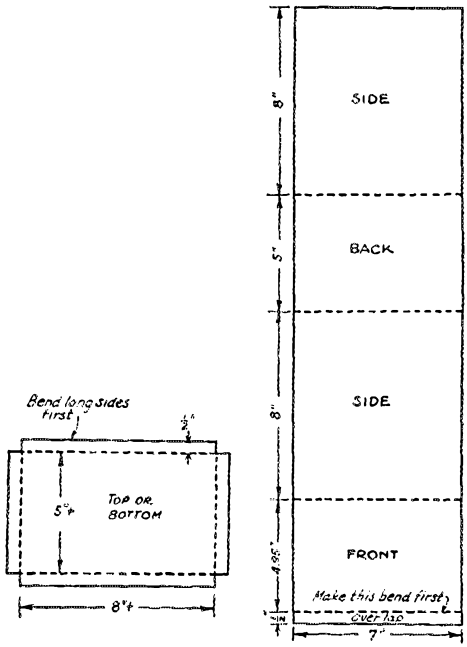
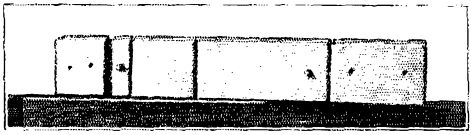


FIG. 1.— TYPICAL LAYOUT FOR BENDING

The scribed lines are dotted. Note that the front of the can is narrower than the back by the thickness of the material. 16 gauge sheet (0.05-inch thickness) is assumed. The body of the shield should be used as a template when scribing the lines on the top and bottom pieces.

The cans considered are of the "three piece" type. The top and bottom are identical and have a ½-inch lip all around which fits over the sides. The sides are in one piece, a ½-inch overlap being provided at one corner for the soldered, riveted or bolted joint. The first step is to obtain the aluminum or copper sheet from which the shields are to be made; a local hardware or tin shop which stocks aluminum and copper sheet, or is willing to order it, can usually be found. The thickness of the stock will depend on the size of the contemplated shield, degree of mechanical strength and rigidity required, and the individual taste. Thicknesses up to 16 gauge are quite workable and this weight of material should be sufficiently thick for all ordinary purposes. When the sheet is purchased it is advisable to have the pieces cut at the shop to the exact size desired. This can be done rapidly and accurately on the foot-power shears found in almost every such establishment.



THE TWO BLOCKS USED IN FORMING THE CORNERS

With the material cut to size, the lines along which the bends are to be made should be marked using a square and scribe or knife point. These lines should be carefully and accurately placed. In fact, it is a good plan first to make a model of the box from heavy paper or cardboard. A possible error in planning is then made clear before any valuable sheet has been spoiled. In marking off the overlap which is to be used in making the joint of the sides, allowance should be made for the thickness of the sheet, which is added to that particular side. Otherwise the corners will not come out square. When the lines for the bends have been laid out, the actual forming is next in order.

Two pieces of wood are used in this process, the sheet being clamped between them and the bending done as shown in the photograph. The heavier piece is what might be termed the base block, the bending always being done away from it, the lower front corner of the top block serving as the one on which the angle is formed. The lower block is of soft wood while the top block should be of some hard wood such as maple. A piece ¾" or more in thickness will do very well. Slots having a width a little greater than the thickness of the sheet are cut across this block at right angles. The spacing between these slots is such that the edges of the top and bottom pieces already

(Continued on page 76)

*R.F.D. No. 1, Waterford, Conn. Photographs by W1AOZ.

The UV-845

A Low Impedance Linear Power Amplifier and Modulator Tube of the 50-Watt Type

This is the second of a series of articles on special-purpose tubes which, although available for amateur and experimental use, are not so well known to either the amateur or engineer. The series will be continued in succeeding issues of QST. — EDITOR.

By James J. Lamb, *Technical Editor*

THE UV-845 is another member of the 50-watt type tube group of which the UV-203-A and UV-211 are the better known, and has as its special purpose utility as an audio frequency power output amplifier and modulator. While it may be used as an oscillator or radio-frequency power amplifier, it has no advantage over the other 50-watt type tubes in such service and has a serious handicap in its extremely low plate impedance. It is therefore not recommended for radio-frequency operation. As an audio-frequency

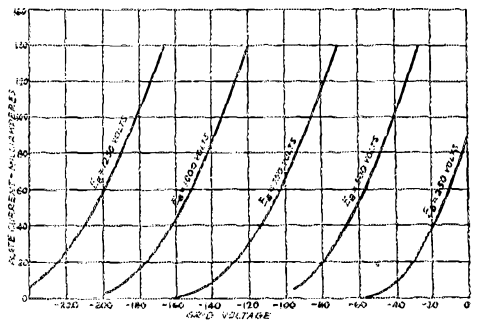


FIG. 1.— THE PLATE-CURRENT GRID-VOLTAGE CURVES FOR THE UV-845 AT VARIOUS VALUES OF PLATE VOLTAGE

power amplifier or modulator, however, it has considerably greater capability than even the UV-211, and it is for this type of service that the tube is intended.

In general appearance and base arrangement the UV-845 resembles the UV-203-A and UV-211. Its filament characteristics are identical with those of the other 50-watt type tubes. Comparative ratings of the UV-845 and UV-211 are given below.

The average grid-voltage plate-current curves for the UV-845 are shown in Fig. 1. In utilizing the plate impedance and mutual conductance curves of Fig. 2 the plate current for given values of plate grid voltage is obtained from Fig. 1. Since these curves of plate impedance and mutual conductance are for small values of input voltage only, some variation from these values

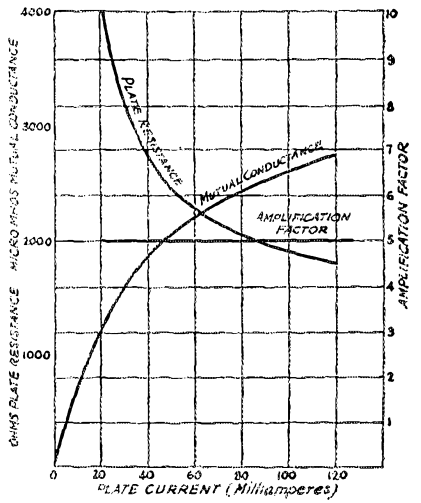


FIG. 2.— PLATE RESISTANCE, MUTUAL CONDUCTANCE AND AMPLIFICATION FACTOR OF THE UV-845 PLOTTED AGAINST PLATE CURRENT

will be found in amplifiers where input voltages are greater than a few volts.

LINEAR AMPLIFIER

When the UV-845 is used as an output linear amplifier in audio systems, it is capable of delivering a maximum of 20 watts of undistorted power under optimum conditions. Although a power output of such magnitude is not often required in any but commercial amplifier systems, the characteristics of the tube when so used are nevertheless interesting to the amateur. The curves of Fig. 3 give the *undistorted* power output, proper grid bias and load resistance for given values of plate voltage. The power output and load resistance are obtained by drawing in the load characteristic for various circuit conditions on the plate-current plate-voltage

curves of Fig. 4 and substituting in the equations for power output and load resistance as described on pages 28 and 29 of July, 1929, *QST*. From Fig. 3 it is seen that with normal plate voltage of 1000 and negative grid bias of 145

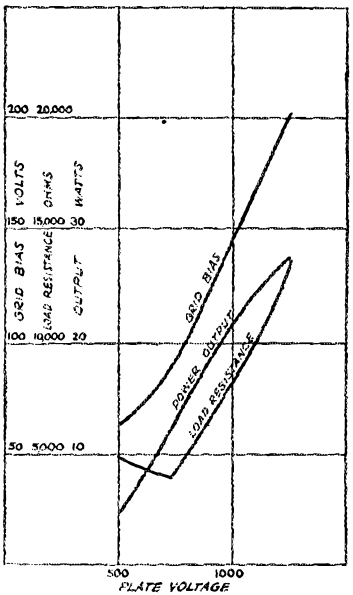


FIG. 3. — POWER OUTPUT, GRID BIAS AND LOAD RESISTANCE PLOTTED AGAINST PLATE VOLTAGE FOR OPTIMUM CIRCUIT CONDITIONS AND UNDISTORTED OUTPUT

volts, the power output, undistorted is 21.5 watts and the load resistance 8150 ohms. These curves are for undistorted output and of course do not hold where distortion is permitted.[1]

[1] A method for locating the load line corresponding to exactly 5% distortion by means of a simple rule will be found in the article, "The Use of the Distortion Rule in Power Output Calculation," in this issue. Since 5% is considered the maximum permissible distortion in practice, the application of this rule in locating the load line greatly simplifies the operation of determining the power output and load resistance as well as calculations for modulator characteristics. The "cut and try" method of locating the load line for various degrees of distortion is given on page 28, July, 1929, *QST*.

At plate voltages below 375 volts the output is not limited by the plate dissipation as with the higher values of plate voltage and the maximum power output is obtained when the load resistance is twice the plate resistance for the particular value of plate current being used.

MODULATOR

The UV-845 has its greatest appeal to the amateur in its capacity as a modulator in the constant current system. It is admirably suited to such use in conjunction with a UV-203-A or UV-211 as the oscillator or Class C modulated radio-frequency power amplifier. With 75 milliamperes at 1000 volts plate input to one of the latter tubes used as a Class C radio-frequency power amplifier, a single UV-845 is capable of modulating better than 60% when the same plate voltage is applied to both modulator and r.f. tube and considerably more when the system using a higher plate voltage on the modulator than on the r.f. amplifier is employed.

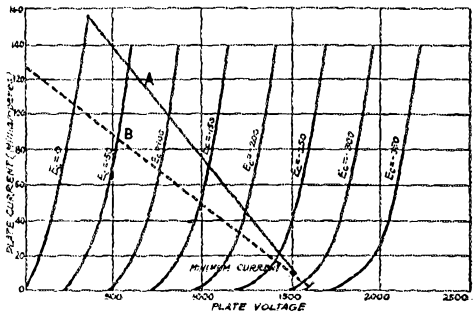


FIG. 4. — PLATE-VOLTAGE PLATE-CURRENT CURVES ON WHICH ARE PLOTTED THE LOAD LINES

"A" is the load line for the UV-845 as a linear amplifier with maximum conditions for obtaining maximum undistorted output. "B" is the load characteristic for the tube used as a modulator with a low value of oscillator or Class C amplifier plate current.

	Amplifier or Modulator *UV-845*	*UV-211*
Filament volts	10	10
Filament amperes	3.25	3.25
Plate voltage	1000 (normal) 1250 (maximum)	1000 (normal) 1250 (maximum)
Negative grid bias (volts)	150	55*
Safe plate dissipation (watts)	75	75
Amplification constant (μ)	5	12
Plate resistance (ohms)	2100	3400*
Maximum undistorted output as amplifier (watts)	30	10
Oscillator or Class C amplifier input watts for each tube used as modulator (Mod. factor 0.6)	120	45

* When the UV-211 is used as a modulator the negative grid bias should be increased to 70 volts with the normal plate voltage of 1000. Under these operating conditions the plate resistance is approximately 5500 ohms.

As explained in the article on the UX-842 (page 29, July, 1929, *QST*) the load characteristic for the tube when used as a modulator may be plotted on the plate-voltage plate-current characteristics as shown at B in Fig. 4. The load line is extended to the vertical axis and the value of current at this intersection is the sum of the modulator and oscillator plate currents. For the line shown at B, the d.c. modulator plate current chosen is 50 milliamperes, the plate voltage is 1000 and the *minimum* current is 4 milliamperes. These points fix the operating point and a line is drawn through it and through the intersection of the intersection of the curve for twice the grid bias of the operating point with the minimum current line. The point at which this line intersects the zero plate voltage line (vertical axis) is the sum of the oscillator (or modulated amplifier) and modulator plate currents or 127 ma. The difference between this current and the

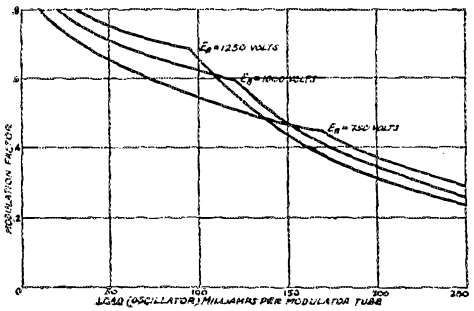


FIG. 5.—CURVES SHOWING THE PERCENTAGE OF DISTORTIONLESS MODULATION OBTAINABLE, AT DIFFERENT VALUES OF OSCILLATOR OR CLASS C AMPLIFIER PLATE CURRENT FOR THREE VALUES OF PLATE VOLTAGE

modulator plate current chosen, 50 ma., is the oscillator or amplifier plate current, 77 ma. in this case. The modulation factor is then:

$$M = \frac{E_{max} - E_{min}}{2E_o}$$

where: M = Modulation factor.
E_o = Voltage of operating point.
E_{max} = Voltage at minimum current point.
E_{min} = Voltage at intersection of load line and zero bias line.

$$M = \frac{1600 - 280}{2(1000)} = .66$$ (Percentage of modulation is this value × 100 or 66%.)

The grid bias is seen to be 155 volts and the peak grid swing the same value.

In following the above method it will be seen that the maximum safe plate dissipation of the modulator (75 watts) can be exceeded with high values of oscillator current. It is therefore best to fix the operating point at the safe value of modulator plate current, 75 milliamperes at 1000 volts. A straight line drawn through this point and the sum of a chosen value of oscillator current plus the fixed modulator current on the vertical axis is the load characteristic for the value of oscillator current chosen.

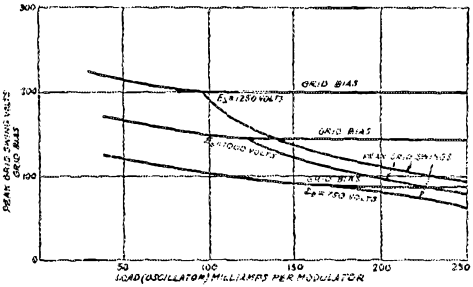


FIG. 6.—PEAK GRID SWING AND GRID BIAS VOLTAGES PLOTTED AGAINST OSCILLATOR OR CLASS C AMPLIFIER PLATE CURRENT FOR THREE VALUES OF PLATE VOLTAGE

Grid bias and grid swing are coincident to the left of the junction points.

Fig. 5 shows the percentage of distortionless modulation obtainable at different values of oscillator current per modulator tube for three different values of plate voltage. From these same curves the number of modulator tubes required to give a desired percentage of modulation with a given value of oscillator or r.f. amplifier plate current can be determined. The same d.c. plate voltage on modulator and modulated tubes is assumed. Irrespective of the number of modulator tubes employed, however, the modulation factor of 1.0 (100%) cannot be obtained unless the d.c. plate voltage of the modulator is higher than that of the oscillator or modulated r.f. amplifier.[1] Fig. 6 shows the peak grid swing and grid bias voltages for the values of plate voltage and oscillator plate current of Fig. 5. In determining these curves the oscillator plate circuit is considered a resistance load in parallel with the plate resistance of the modulator tube, both being supplied from the same source of power through a modulation choke of infinite impedance.

Due to the comparatively low plate impedance of this tube, every precaution should be taken to guard against loss of grid bias, since the excessive plate current drawn under this condition would almost instantaneously wreck the tube. When two or more tubes are operated in parallel or push-pull, a non-inductive resistor should

(Continued on page 60)

[1] When a higher plate voltage is applied to the modulator than to the oscillator or Class C amplifier, 100% modulation *can be obtained with proper circuit conditions*. Transmitters employing this system of modulation have been described in the April and September, 1929, issues of *QST*.

A Simple 1750- and 3500-Kc. Receiver

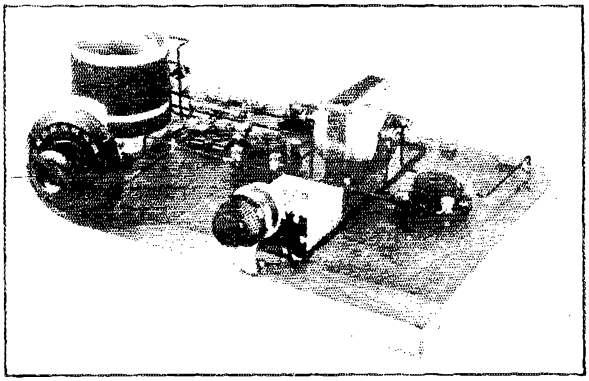
By **B. Dudley,** *Assistant Technical Editor*

EVERY autumn, interest in radio communication takes on increased activity. With the summer vacation a thing of the past and the long winter nights yet to come, it is little wonder that radio is chosen to help pass the time away when summer activities are no longer possible. To many (probably most) people the term radio is connected only with radiophone broadcasting. There are, nevertheless, other phases of radio communication which are even more interesting and instructive than broadcasting to the individual persuing them.

Of these, amateur radio is undoubtedly the most interesting, instructive and attractive.

Amateur radio is primarily a pleasant hobby, and as such it is interesting, instructive, and permits a healthy recreation and relief from the regular day's worries. There are several very attractive phases of amateur radio communication, all of which are appealing. For instance, the owner of even a relatively inexpensive and low-power amateur station can frequently talk directly with amateurs in other parts of this continent, or even of other continents. Fancy talking with fellows like yourself in England, France or Australia! For those interested in handling messages, the 3500-kc. (80-meter) and 7000-kc. (40-meter) amateur bands are of most service, while the student and the experimentally inclined person can learn a good deal — and at the same time have a good time by building experimental transmitters and receivers to operate on the various frequency bands assigned amateurs. Any one of these activities alone is worth following, and the all around amateur may wish to be actively engaged in all of these branches of radio communication sooner or later.

Broadcasting stations operate in the one band of frequencies between 500 kc. (600 meters) and 1500 kc. (200 meters). Compared to this, amateurs operate in five bands of frequencies between 1715 kc. and 60,000 kc. The 56,000- to 60,000-kc. (5-meter) amateur band is used only for experimental purposes, as is also the 28,000- to 30,000-kc. (10-meter) band, since these two bands have not as yet proved suitable for reliable communication. The 14,000- to 14,400-kc. (20-meter) amateur band is well suited to long distance transmission and reception and many distant daylight records have been made in this band, even with low power equipment. The 7000- to 7300-kc. band and the 3500- to 4000-kc. bands are at the present time the most popular. The 7000-kc. band is well suited to long distance work, and is used by a good portion of the radio amateurs. The 3500-kc. band is more suitable for domestic communication and is used for "rag chewing," traffic, and also for radio telephone communication. It is probably the best band in which to operate after one is well acquainted with amateur procedure, practice and operation. The 1700-kc. band is useful primarily for local reception and transmission. It is not so extensively used as the last three mentioned bands but because of the lack of interference, and the "volunteer stations" transmitting code practice in this band, it is an excellent one for the beginner to use.



COMPLETED RECEIVER

The dial to the left is the tuning control and the knob at the right controls regeneration.

Contrary to the impression the uninitiated might get, it is not difficult to break into amateur radio. The rules of the game are few, and the apparatus essential to start is simple and inexpensive.

In all classes of amateur radio work, a knowledge of the International Morse Code is essential. One cannot converse with amateurs in other communities unless the code is thoroughly known, for all amateurs use the same code and transmit and receive at speeds of from eight to twenty words per minute. One of the best methods of breaking into the amateur work, then, is to become fully acquainted with the code. This may be done by practicing on a buzzer set with another person, although there is a more interesting and equally effective method. The Communications Department of the A.R.R.L. has enlisted the aid

of a number of amateur "volunteer stations" to send code lessons at frequent intervals. The list of these stations appears in the Communications Section which is a part of the member copies but not a part of the news-stand copies of *QST*. If your copy of *QST* does not contain the report of the Communications Section, you can obtain a

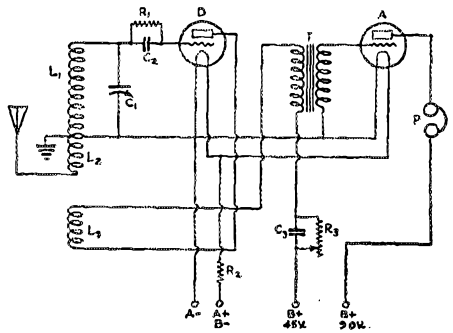


FIG. 1. — THE SCHEMATIC WIRING DIAGRAM OF THE RECEIVER

L_1 — 42 turns, tapped at the 15th turn, of No. 22 d.c.c. wire on cardboard tube 2¾" in diameter.
L_2 — 8 turns of No. 22 d.c.c. wire on cardboard tube 2¾" in diameter.
L_3 — 15 turns of No. 22 d.c.c. wire on cardboard tube 2¾" in diam. These coils are described in the text.
C_1 — 100-μμfd. tuning condenser.
C_2 — 250-μμfd. grid condenser with clips.
C_3 — 1-μfd. fixed condenser.
R_1 — 2-megohm grid leak.
R_2 — ½-ampere filament resistor.
R_3 — Clarostat universal resistor.
T — Audio transformer — ratio unimportant.
P — Telephone headset.
D — Detector tube (UX-199 or UX-201-A).
V — Amplifier tube (UX-199 or UX-201-A).

list of the "volunteer stations" by addressing a request to the Communications Department, American Radio Relay League, 1711 Park St., Hartford, Conn.

These "volunteer stations" operate in the 1750-kc. amateur band and a simple receiver for picking up these stations, as well as other amateur stations operating in the 1750-kc. and 3500-kc. bands, is described in this article. The 1750-kc. amateur band is excellent for local communication and the 3500-kc. band will offer opportunities to listen-in to the more distant communications of amateurs in all parts of the country after the code is mastered.

A receiver for the man who is not thoroughly familiar with all the intricacies of radio should be simple and inexpensive, and these two ideas were kept uppermost in mind in constructing the receiver described here. It would, indeed, be difficult to make a much more simple or less expensive satisfactory receiver than the one described. The circuit, although simple, is effective, and is similar to that used by most radio amateurs. A single stage of audio frequency amplification is used so that the received signals will be sufficiently loud to copy on a headset without undue ear-strain. The bread-board layout makes the receiver as simple to construct as possible without detracting from its utility. The parts used, although of good quality, are so chosen that the cost of the entire receiver need not exceed $15.00 including the tubes and "B" batteries, but not including a filament battery, 'phones, antenna or ground. If all of the items have to be purchased the complete receiver should not cost more than $25.00.

In constructing the receiver it is best to have all the parts on hand so that one will not have to take a trip to the local radio store to purchase an additional item or two before the receiver can be completed. While the components used in the construction of this receiver may be plainly seen in the cut, and the exact size and position of the parts in the schematic wiring diagram is indicated by the cut-label, a list of parts is also included here for those who may desire to make use of it. The parts required will be:

1 wooden baseboard, 10" x 14" x ¾".
1 cardboard tube, 2¾" in diameter and 3" long.
1 100-μμfd. 23 plate midget tuning condenser with dial.
1 250-μμfd. fixed condenser with grid leak clips.
1 2-megohm grid leak.
1 audio frequency transformer (ratio not critical).
2 vacuum tube sockets (UX type).
1 ½-ampere automatic filament control resistor.
1 Clarostat variable high resistance regeneration control.
8 Fahnestock clips.
1 1-μfd. fixed condenser.

About 10 feet of hook-up wire and about 60 feet of No. 22 d.c.c. wire.
Brass mounting screws.

In addition to the parts actually required for the set the following are necessary and will usually be found among the equipment of those who have been previously interested in radio:

2 UX-201-A or UX-199 tubes.
2 45-volt "B" batteries or "B" substitute.
1 radio telephone headset (2000 to 3000 ohms).
1 6-volt storage "A" battery, or 3 No. 6 dry cells if UX-199 tubes are used.
Antenna and ground.

With all of the parts given in the first list before you, the receiver layout should be planned. Perhaps you have your own ideas about the layout of a receiver which you would like to follow, but the layout used closely follows the plan of the apparatus in the schematic wiring diagram and it would be well for the novice to follow the general plan given here. With the parts correctly arranged, all

but the coil should be screwed to the base-board.

The coil should be the next item to which attention is directed. The coil of this receiver was wound on a card-board tube 2¾" in diameter and 3" long. The exact size of the cardboard tube is not critical and tubes of other diameter or length may be used. If a tube of larger diameter than 2¾" is used, fewer turns will be required than those specified and, conversely, more turns will be needed if the diameter is less than 2¾".

The tickler coil is wound first. This coil consists of 15 turns of No. 22 d.c.c. wire wound at one end of the tube. After this coil is finished a space of ¼" is left after which the antenna and tapped grid coil, which are made in one continuous winding, are wound in the same direction as the tickler or plate coil. The antenna coil consists of 8 turns. At the eighth turn the insulation is scraped off and the bare wire is twisted into a loop. The ground is later connected to this tap. The grid coil is made by continuing the winding. A tap, similar to the one already made, is taken after the additional 15 turns have been wound, and the winding continues until the 42nd turn. We now have a tickler coil of 15 turns, and an antenna and grid coil of 50 turns tapped at the eighth and twenty-third turns. The details of the coil construction are shown in the sketch. The coil is the only part of the receiver which must be home-constructed.

When the coil has been completed it should be mounted on the baseboard. This may be done by cutting a piece of wood to fit snugly on the inside of the coil, and screwing this piece of wood to the baseboard. The coil is then fitted over this piece and, if necessary, may be glued in place.

With all the parts mounted, the set is ready to be wired. Stiff, No. 14 insulated wire makes a very neat conductor for this purpose and may be obtained in two-foot lengths from your local radio store. All connections should be made by bending loops in the wire and fastening these in the binding posts, or should be soldered. Care should be taken to connect the audio frequency transformer and tuning coil as shown.

Either UX-199 or UX-201-A tubes may be used with this receiver. In the receiver constructed for this article, UX-201-A tubes were used, and the filament resistor, R_2, was therefore of the ½-ampere type. If UX-199 tubes are used, the ½-ampere filament resistor will not be satisfactory, and in this case an automatic filament resistor suitable for use with two UX-199 tubes with the storage battery available for lighting the filaments should be used.

When the receiver is wired and the batteries, 'phones, antenna and ground correctly connected, the receiver is ready to be tested. The circuit should be tested for oscillation by touching the grid of the detector with the finger. If a click is heard when the grid is touched, and again when the finger is removed from the grid terminal of the detector tube socket, the circuit will be oscillating. If the circuit does not oscillate, and changing the resistance of the regeneration control, R_2, or increasing the plate voltage of the detector does not make the tube oscillate, the tickler may either be connected incorrectly or may not have sufficient number of turns. The circuit should be checked to see that the tickler is connected as indicated in the diagram of the coil connections. If the circuit still does not oscillate, more turns will be required on the tickler coil only. The circuit should oscillate when used for the 3500-kc. band (with the clip of the flexible lead connected to the 3500-kc. tap) as well as when used for 1750-kc. reception, in which case the clip on the flexible lead should be fastened to the cardboard tube to get it out of the way. If too

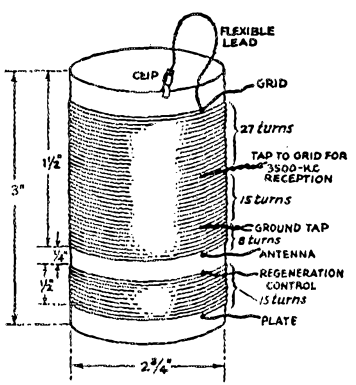


FIG. 2. — DETAILS OF COIL CONSTRUCTION

As shown, the coil is suitable for 1750-kc. reception. For 3500-kc. reception the clip should be fastened onto the 3500-kc. tap, thus shorting out the top 27 turns of the coil.

many turns have been wound on the tickler, an audio howl will be heard when the regeneration control is adjusted to minimum resistance. The tickler should be made so that the circuit oscillates with the regeneration control adjusted for nearly minimum resistance at the 1750-kc. band and at about maximum resistance for the 3500-kc. band. By following this procedure it will usually be possible to make one tickler suffice for both the 1750-kc. as well as the 3500-kc. band. If the directions given are followed and if UX-201-A tubes are used, there should be no reason for having to deviate from the specifications given for the tickler.

With the circuit oscillating, the receiver is ready to receive the continuous wave "volunteer stations." For 1750-kc. reception, the flexible lead should be fastened to the edge of the cardboard tube, but should be connected to the tap for reception of the 3500-kc. stations.

The antenna and ground system suitable for use with this receiver will not differ from that suitable for broadcast reception. The antenna

(Continued on page 76)

Operating Characteristics of Vacuum Tube Oscillators

By H. A. Robinson*

THE average amateur radio operator when adjusting his transmitter twiddles with the controls until he succeeds in obtaining a fair amount of antenna current on the proper frequency, let us hope, and lets it go at that. Perhaps he observes the changing indications of the plate milliammeter and perhaps still other characteristics of his oscillating transmitter have caused him to wonder as to the causes and relations existing between these varied effects.

It is the purpose of this article to bring to the attention of the average amateur, in terms which are within his grasp, the fundamental relations existing in a self-excited vacuum-tube oscillating circuit and to illustrate their application in adjusting a typical high-frequency transmitter.

The oscillating circuit employed in the tests about to be described is the familiar tuned-grid tuned-plate arrangement shown in Fig. 1. This circuit is best adapted to illustrate the fundamental relations of triode oscillators and because of the ease and flexibility of control is especially suited for these tests. Furthermore this circuit

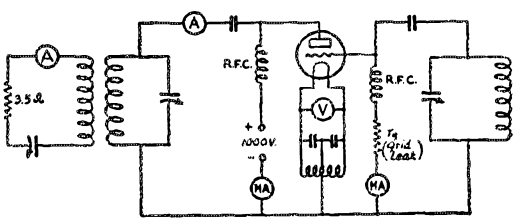


FIG. 1

arrangement is extremely popular in present-day high-frequency transmitter design and is used in a large percentage of amateur stations. The relations to be developed and the results obtained, however, are equally applicable to other types of oscillating circuits.

Let us consider a vacuum tube oscillator like that of Fig. 1 or a similar arrangement in which the high voltage d.c. supply is shunt fed to the plate through the radio-frequency choke coil as indicated, grid bias being obtained by the use of a grid leak, r_g, connected in a similar parallel arrangement. The meters in the grid and plate circuits are milliammeters indicating grid and plate currents respectively.

* W3LW, Silver Lake Farm, Willow Grove, Penn.

The diagrams of Figs. 2, 3 and 4 serve to illustrate graphically the mathematical relations existing in the grid and plate circuits.[1] The plate current curves in these figures are typical characteristics in which the plate currents are plotted as ordinates against the electrode voltages as abscissas. The grid current curves represent the grid currents as ordinates against the grid voltages as abscissas.

When there is no excitation on the grid there is no grid current flowing and hence the grid bias is zero. This condition, which corresponds to the triode in a non-oscillating state, is represented in Fig. 2. The operating point S is determined by

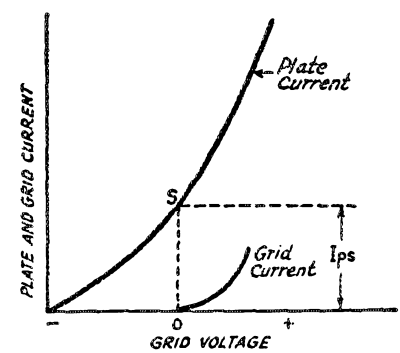


FIG. 2

the steady electrode voltages and in this case, since the grid voltage is zero the plate voltage is the only controlling factor. Thus the d.c. plate current corresponding to these conditions is equal to the ordinate i_{ps}. This is the plate current flowing before the tube starts to oscillate.

When the grid is excited, either by energy supplied by a separate oscillator or by energy fed back from the plate circuit through the grid-to-plate capacity, the initial conditions are illustrated by the curves of Fig. 3. Here the operating point "S" is again determined by the d.c. plate voltage (assuming grid current has not yet begun to flow). The excitation voltage impressed

[1] Mathematical analysis, supplementary to the graphical analysis contained in this article, will be found in the following references: Pages 42-46 and Chapters VII and VIII, "Thermionic Vacuum Tubes," by H. J. Van Der Bijl. "The Tuned-Grid, Tuned-Plate, Self-Oscillating Vacuum-Tube Circuit," by J. Warren Wright, Proceedings of the Institute of Radio Engineers, August, 1928. — EDITOR.

on the grid produces a corresponding variation in the plate current about the steady value I_{p_s}. However, because of the curvature of the plate current characteristic, the resulting alternating component of the plate current is not sinusoidal but is somewhat distorted and can be resolved into a component of fundamental frequency and an added increment of d.c. plate current, indicated by $\triangle i_{p_s}$. Further analysis of the resulting alternating plate current will reveal a double frequency component but that, together with terms of higher frequency, will be neglected in this discussion.

Coming now to the effect of the impressed grid excitation voltage on the grid current, it will be noted that grid current flows each time the grid voltage swings through the positive portion

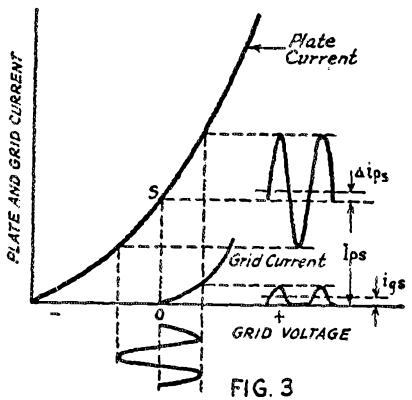


FIG. 3

of the cycle. This results in the pulsating grid current shown in the figure. This pulsating current is composed of a direct-current component representing the average value of the resultant over a complete cycle and alternating components of fundamental and higher frequencies. It is this direct current component represented by i_{g_s} in the figure which, flowing through the grid leak resistance, r_g, produces the negative grid bias, E_c.

It should be noted, however, that the conditions represented by the diagram of Fig. 3 hold only for the instant when the grid excitation voltage is first impressed. As soon as grid current flows there is a corresponding drop through the grid leak and the resulting grid bias E_c, shifts the operating point by an amount which depends on the average value of the grid current, i_g, and the resistance of the grid leak r_g.

The diagram of Fig. 4 shows the conditions existing during the period of sustained oscillation. Here the grid current flows only during a fraction of the positive half cycle of grid voltage swing but the resulting average value of grid current, indicated by i_g, flowing through the grid leak, r_g, produces an effective negative grid bias, E_c, which shifts the operating point to a value as indicated at "A," determined by the steady electrode voltages. The resulting alternating plate current produced can again be resolved into an additional d.c. increment, $\triangle i_p$, and an alternating component of fundamental frequency (the useful component). The plate milliammeter, however, reads the sum of the d.c. components $(I_p + \triangle i_p)$ and this value will be less than the d.c. plate current flowing when there was no impressed excitation voltage because of the shift in the operating point resulting from the grid bias. This accounts for the decided drop in plate current which occurs when a triode with grid leak bias starts to oscillate. The converse of this statement is also true as many operators have learned by bitter experience.

It will be noted that the conditions existing when a vacuum tube is producing sustained oscillations are dependent, to a considerable degree, on the magnitude of the excitation voltage impressed on the grid. This voltage, of course, depends upon the feed-back from the plate circuit. In the tuned-grid tuned-plate circuit the grid excitation is practically controlled by the adjustment of the grid tuning condenser (other factors being constant) and the effect of increased excitation on the grid, plate and output currents as well as on the efficiency of the oscillator arrangement of Fig. 1 is shown by the curves of Fig. 5.

A phantom antenna with a resistance of approximately 3.5 ohms was used with very loose inductive coupling to the plate of the oscillator. The latter employed a UV-204-A with a plate voltage of 1,000 and a 10,000-ohm grid leak. The grid and plate blocking condensers were quite small (36 $\mu\mu$fd.) and changes of grid excitation produced but slight changes in the frequency of

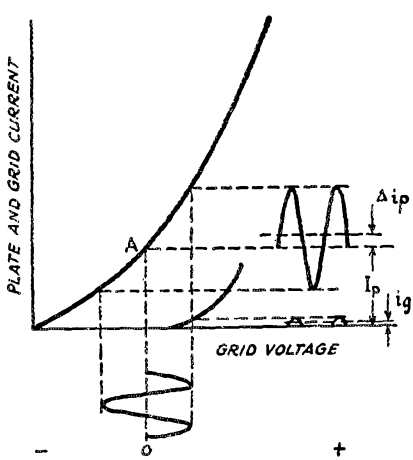


FIG. 4

oscillation. Adjustments were made, however, to compensate for this effect and the frequency of oscillation was maintained constant throughout

the test. Since the load resistance was constant, for constant frequency, the square of the load current was taken as a measure of the output. Furthermore, since the plate voltage was maintained constant at 1,000 volts the average value of the plate current, as indicated by the plate milliammeter, gives a measure of the input. The ratio of these gives a measure of the relative efficiency of the arrangement. Currents of frequencies higher than the fundamental will be discriminated against by the reactance of the plate and load circuit for these frequencies. Their effect though measurable at high values of excitation will be neglected in this discussion.

Considering the curves of Fig. 5, when the excitation is less than a value corresponding to the grid tuning condenser setting on the left (82 degrees) the tube does not oscillate and the plate current is constant at a relatively high value (112 ma.). This corresponds to the conditions of Fig. 2 where the grid bias is zero; i.e., no grid current. Under these conditions the total input is dissipated in heating the plate and the efficiency is zero since there is no output.

When the grid excitation is increased to such a value that oscillations are set up, grid current flows and the average value as indicated on the d.c. grid milliammeter, produces a drop in potential across the grid leak, biasing the grid negatively and producing a shift in the operating point (Figs. 3 and 4). The average value of the d.c. plate current may increase or decrease depending on the magnitude of the excitation voltage. This follows from the fact, pointed out above, that the shift in operating point due to the negative grid bias decreases the d.c. plate current over its value when the tube is not oscillating but the added d.c. increment due to the grid voltage is included in the reading of the plate milliammeter which records the sum of $I_p + \triangle i_p$. When the excitation is just sufficient to sustain oscillation this increment is small and the resulting d.c. plate current is considerably less than its value when the tube is not oscillating. However, as the excitation voltage increases this d.c. increment increases rapidly, since this component is dependent on the square of the excitation voltage. The

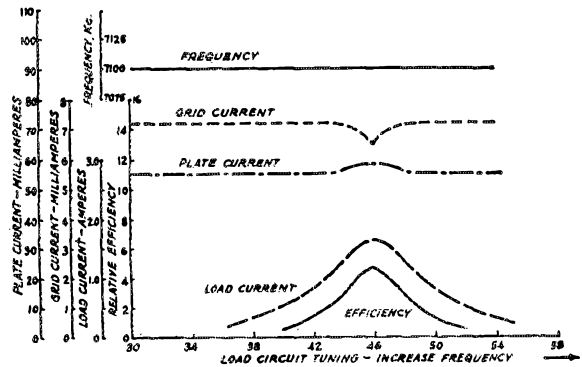


FIG. 6

d.c. (average value) grid current also increases because of the increasing negative bias and shifts the operating point to positions of greater curvature. This reduces the d.c. component of the plate current but the sum $I_p + \triangle i_p$, as read on the plate milliammeter, actually increases with increasing values of excitation voltage. The grid and plate current curves of Fig. 5 show these effects very clearly. The d.c. plate current drops with the start of oscillations and the accompanying flow of grid current. As the excitation increases the plate current passes through a minimum value and then increases, slowly at first and then more rapidly. The grid current continues to increase fairly uniformly with increasing excitation until the impedance of the grid parallel tuned circuit passes through a maximum at resonance, after which the excitation voltage decreases as do also the grid and plate currents.

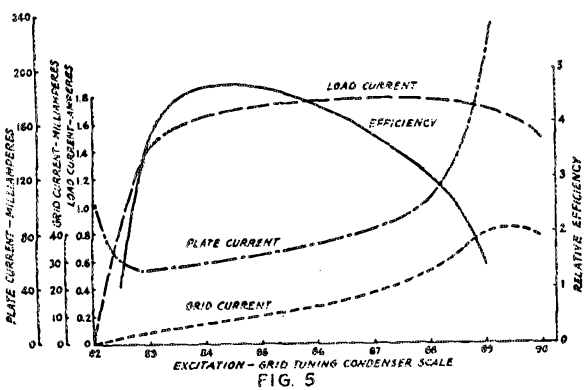


FIG. 5

Since the useful alternating component of the plate current is directly proportional to the excitation voltage, it might be thought that the output current would continually increase with increasing excitation. However, the value of the tube plate resistance (or plate impedance) depends on the slope of the plate current characteristic at the operating point. This plate resistance increases as the operating point is shifted by the negative bias produced by the average value of the grid current and hence the load current actually falls off when the grid excitation is carried to excessive values. This effect is shown by the curve of Fig. 5. The efficiency curve shows a decided peak and would indicate

that the grid excitation should be adjusted to a value just beyond the point of minimum d.c. plate current to secure the maximum efficiency. It is here that the plate of the tube is the coolest

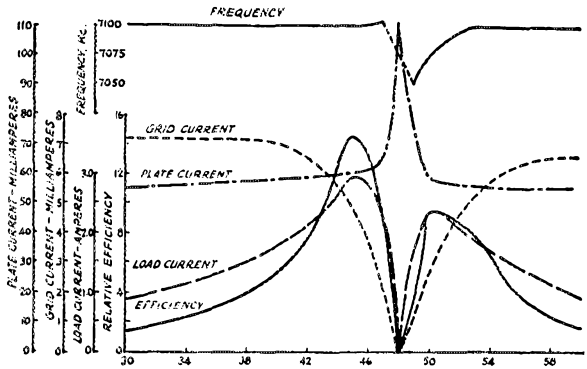


FIG 7

for a given output. The necessity for the careful adjustment of the grid excitation is quite evident from the rapidity with which the efficiency falls off on either side of the optimum value. This point cannot be over-emphasized in the adjustment of amateur transmitters for maximum efficiency. Incidentally, the note as heard in the monitor is clearer and steadier at this point since the double frequency components are relatively small at this value of grid excitation.

The curves of Figs. 6 and 7 show the variation of oscillator characteristics with tuning of the coupled load circuit, corresponding to the antenna circuit. These tests were made on the same oscillator arrangement, the grid excitation being adjusted for maximum efficiency and then all controls set during the run. Fig. 6 shows the variation of grid, plate and load currents and efficiency with tuning of the coupled circuit. Coupling was 8½ inches between centers of the plate and load circuit inductances.[1] No change in the frequency of oscillation could be detected when the circuits passed through resonance. The efficiency curve reaches its maximum at resonance and indicates that the correct adjustment for very loosely coupled circuits is that where the plate current is a maximum or grid current a minimum.

For the curves of Fig. 7 the spacing between the coils was reduced to 3½ inches between centers, all other adjustments remaining the same. Because of the increased capacitive effect produced by the closer coupling, the coupled circuit becomes resonant at a slightly lower value of series capacity (higher frequency).[2] This is shown by the shifting to the right of the resonant point. Upon increasing the resonant frequency of the coupled circuit the load current passes through a maximum and then falls off rapidly while the plate current continues to increase. At resonance the tube stops oscillating and the efficiency falls to zero. After passing through the point where the coupled circuit is resonant to the frequency of oscillation the load current reaches another but smaller peak and then again decreases slowly. The considerable shift in frequency of oscillation is shown by the frequency curve. This shift in frequency of oscillation is due to the effect of the reactance transferred from the load circuit to the plate circuit for such large values of coupling. In this case the point of maximum efficiency is secured when the load or antenna circuit is tuned to a frequency slightly lower than the resonant frequency. At this point the generated frequency is fairly stable.

It is hoped that this paper will be of help to other amateur operators in better understanding the characteristics of their vacuum tube transmitter and in securing improved operation and increased efficiency.

[1] This figure of coil spacing is given for comparative purposes only. Whether coupling is actually "tight" or "loose" depends on various additional factors. — *Editor.*

[2] This effect may operate in either direction depending upon the particular coupling conditions involved, i.e., whether the mutual inductance is progressing positively or negatively. — *Editor.*

Strays

Everyone concerned will be benefited if those who write to the Technical Information Service will give us plenty of details, so we have at least a guessing chance of analyzing troubles. The "my-set-doesn't-work-what's-the-matter-with-it?" type of letter wastes our time as well as the time of the author of such a meaningless letter.

"Radio broadcasting has been responsible for the loss of some homing pigeons and has delayed others from returning to their base, according to Godfrey Timmermans of Roxbury, a trainer of racing pigeons.

"He rarely lost a bird until the advent of radio broadcasting on large scale, he says. Radio waves cause some of the birds to lose their bearings and fail to return, while others when they fly into the waves have to circle for some time to get their bearings."

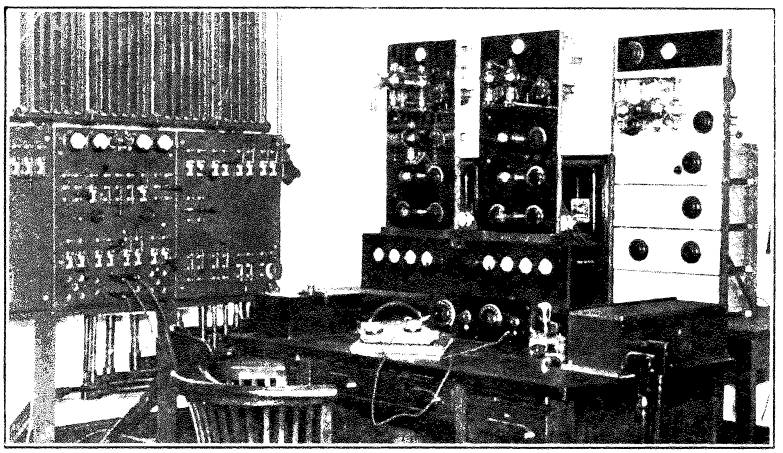
— From the *New York Times*, via W2EF.

GDM of W2JR had an Elkon trickle charger that wasn't doing anything as well as a 50-ohm Bunnell relay. Both were pressed into service and the relay follows a bug beautifully without chattering.

W8CAU

In March, 1929, QST we detailed the opening of a station description contest. The seventh published entry in this issue describes a popular eighth district station. The many ideas presented in this description should prove of interest to amateurs.
—EDITOR.

W8CAU is the amateur radio station of the Electrical Engineering Department of the University of Cincinnati. For experimental work the call W8YX is used. When Swift Hall, the electrical engineering building, was completed the latter part of 1926, two eighty-foot steel towers one hundred and twenty feet apart, as well as a radio room were built on the roof. In the new radio room, looking down on a quadrangle of which Swift Hall forms one side, and the chemistry building the other side, W8CAU was launched on a new start. The photograph of the electrical engineering building shows the towers which provide the excellent antenna systems for this amateur and experimental station, while Fig. 1 gives a good idea of the various antennas used.



A GENERAL VIEW OF W8CAU

The power panels are at the extreme left, the operating table with receiver and heterodyne frequency meter in the center, and the three transmitters behind the operating table.

All of the antennas are single wire. The 3510-kc antenna is such that it must be worked on the second harmonic. The 7240-kc. antenna is a semi-vertical wire, operating on its second harmonic. Each transmitter has its own antenna system permanently connected. Several receiving antennas are also used, but these are not shown in Fig. 1.

One of the photographs gives an ensemble view of the radio room facing the power panels, transmitters, and control desk. A casual glance at this picture indicates that the station is not only flexible and convenient to operate, but is unusually complete as well. The slate switchboards at the left control the various power supply units and connect these units with any of the three transmitters which may be seen behind the control desk. A heterodyne frequency meter, the traffic receiver, and switching panel may be seen on the operating desk.

The most interesting pieces of equipment one gets at a casual glance of the station are the three transmitters which are shown more in detail in another photograph. A close examination shows that all three transmitters are built up in the rack and unit system similar to that used by the A. T. & T. Co. The arrangement of transmitters in units makes a very satisfactory layout and economizes floor or table space. The 7240-kc. transmitter is the one at the extreme left. It was the first transmitter built at W8CAU and was completed in November 1926. It has been in use ever since with no radical changes being made upon it. The DeForest H tubes, for which the set was originally designed, "went west" at the rate of eight tubes in six months, so that in May, 1927, replacements were made with UX-852 tubes. The other transmitters have been the subject of experimental work with incidental changes, but the 7240-kc. transmitter is the "old reliable" of the station.

The 7240-kc. transmitter is built up on formica panels 18 inches wide and from 7 inches to 9 inches high, as required. The transmitter consists of five units; the UX-210 crystal controlled oscillator at the bottom using an 1810-kc. crystal

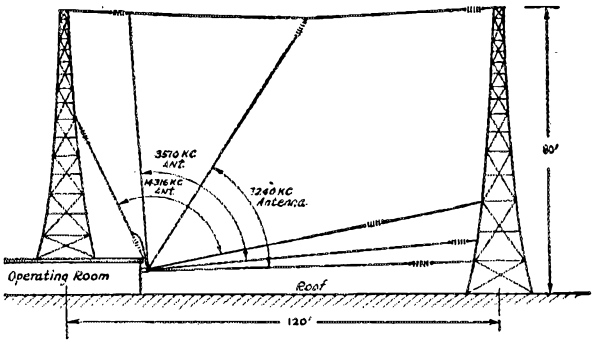
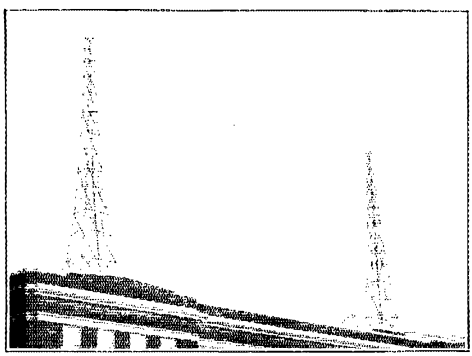


FIG. 1.—ANTENNA SYSTEMS AT W8CAU
Each transmitter has its own antenna and counterpoise.

and feeding 3620-kc. voltage to the first amplifier which uses a UX-210 tube operating on 3620-kc., an intermediate amplifier using one UX-852 tube, the final amplifier, using four UX-852 tubes, and the antenna panel with coil, condenser and meter. The units are assembled, one above the other, on a wooden frame.

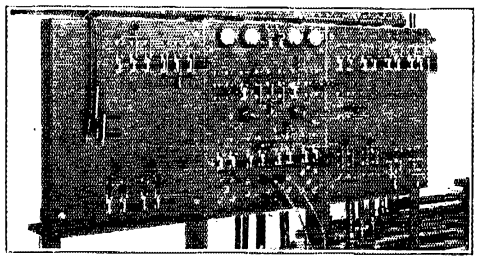
Among the features worth noticing on this transmitter is the crystal oscillator circuit shown in Fig. 2. It is a combined oscillator and frequency doubler, one tank circuit being tuned to 1810-kc. and the other tank circuit in the output circuit to 3620-kc. The second harmonic voltage obtained directly in this manner is about 70% of the fundamental voltage. The method of obtaining C bias



THE TOWERS OF W8CAU ON SWIFT HALL, ELECTRICAL ENGINEERING DEPARTMENT OF THE UNIVERSITY OF CINCINNATI

by resistors in the negative plate lead has the disadvantage of reducing the available plate voltage, but overweighing this is the fact that the bias is automatic so that the tubes do not become hot through the loss of bias. The 2000-$\mu\mu$fd. by-pass condensers shown in the schematic diagram of Fig. 2 are of real use in confining radio frequency to the desired path. This greatly aids to keep the frequency and power output of the transmitter constant. It is not necessary that all local oscillations in the amplifier be eliminated provided that the strength of local oscillations is reduced to a point where they can be pulled into synchronism by the incoming crystal-controlled energy. Determination of this condition of course necessitates the use of a monitor, but no effort has been made to neutralize the single UX-852 intermediate amplifier.

In the final amplifier, neutralization as shown in the schematic wiring diagram was used. The type of neutralization used allowed some adjustment of the output impedance into which the amplifier worked, since the tap could be moved up along the coil as desired. Its chief advantage was that the standard type of coil construction could be used and the coil could be mounted directly



POWER CONTROL BOARD

to the tuning condenser which gives a low resistance tank circuit. The neutralizing system used does not permit the rotor of the tuning condenser to be grounded. A symmetrical arrangement of tubes is used wherever tubes are used in parallel, and with such an arrangement no difficulty has been experienced with unequal division of load.

Fig. 2 shows that the UX-210 frequency doubler has its filament fed from the 10-volt bus through appropriate resistors. This was done so that its plate current would be broken on keying, since the keying relay is in the 10-volt center tap. When the key is up there is no appreciable energy being put out on 7240 kc. and break-in operation is possible. The transmitter may be keyed from several positions, or may even be controlled by a remote radio-controlled receiver in a manner to be later described. The remote control relay, keying relay, and the delay time relay function when the transmitter is remotely controlled.

The 14,316-kc. transmitter has not had as consistent use as has the 7240-kc. set. Its construc-

tional and electrical features are similar to the 7240-kc. transmitter, except that the third, instead of the second harmonic is used in the oscillator and frequency multiplier circuit. The crystal ulating systems with which experiments were conducted were made in the low-power portion of the transmitter, amplifiers being used to increase the power output to the desired level.

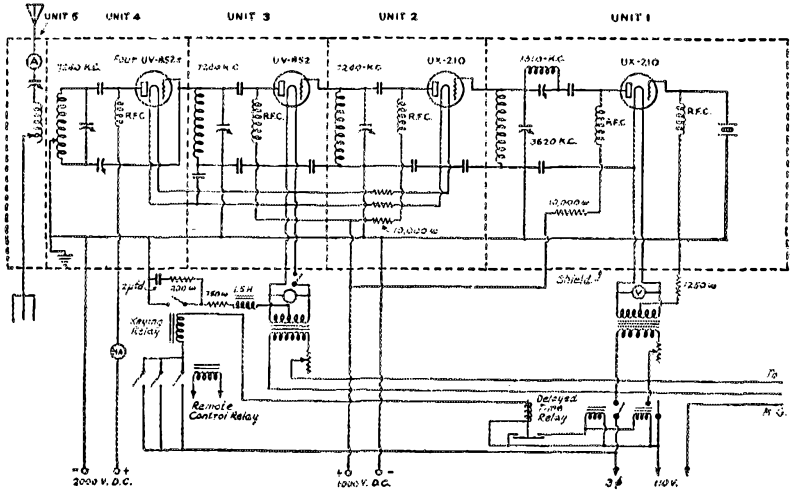


FIG 2. — THE 7240-KC. TRANSMITTER AT W8CAU

The transmitter is built up in five units. The oscillator, which uses an 1810-kc. crystal has two tuned plate circuits; an 1810-kc. circuit and a 3620-kc. frequency doubler circuit. The amplifier of Unit 2, which uses a UX-210 tube operates at 7240-kc. as do also the UX-852 amplifier of Unit 3 and the amplifier of Unit 4. The final amplifier uses four UX-852 tubes in parallel. This transmitter may be controlled from several points in the room, or may be controlled from the remote control receiver of Fig. 4.

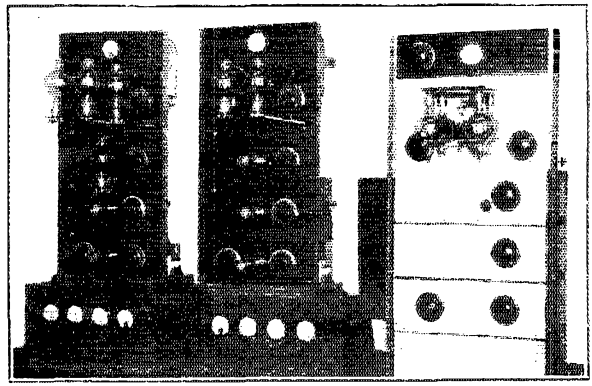
has a fundamental frequency of 2386 kc. and the output of the third harmonic is fed into a 7158 kc. amplifier. The output of the succeeding frequency doubler as well as that of the output amplifier is 14,316 kc. The output amplifier uses two UX-852 tubes in parallel.

These two transmitters stand on a wooden base box approximately 50 inches, by 12 inches by 12 inches. The box opens to the rear and contains two filament transformers feeding the 7.5-volt and the 10-volt filament busses, the filament rheostats in the transformer primaries, and the resistors for C bias and for plate voltage reduction. On the front of the base box are filament voltmeters reading voltages of the 7.5-volt and the 10-volt busses, rheostat handles, and plate milliammeters on the crystal oscillator, intermediate amplifiers, and power amplifiers of each transmitter.

THE 3510-KC. TRANSMITTER

The 3510-kc. telegraph and telephone transmitter is shown in detail in another photograph, and schematically in Fig. 3. This transmitter was constructed for thesis work on duplex radiophone communication. The mod-

The crystal temperature controlled oscillator unit uses a UX-112 A tube with 129 volts on its plate. The subsequent radio frequency units use a UX-201-A tube, which sometimes is modulated,



THE TRANSMITTERS AT THE UNIVERSITY OF CINCINNATI

The 7240-kc. transmitter is at the left, the 14,316-kc. outfit in the center, and the 3510-kc. phone transmitter at the right.

a UX-210 amplifier which may be modulated, an amplifier using one UX-852 tube, and the final amplifier using four UX-852 tubes.

Because it was important that all amplifiers act as true cascade amplifiers and that the antenna current be substantially proportional to the plate voltage of the modulated amplifier, shielded construction was used throughout, as compared to the simpler panel construction used in the two inside the front angle and go down to the bottom power unit. The other units are, from bottom, upward; the UX-112-A crystal controlled oscillator, the radio frequency amplifier using a UX-201-A tube in which modulation takes place, a UX-210 amplifier unit, a power amplifier panel with four

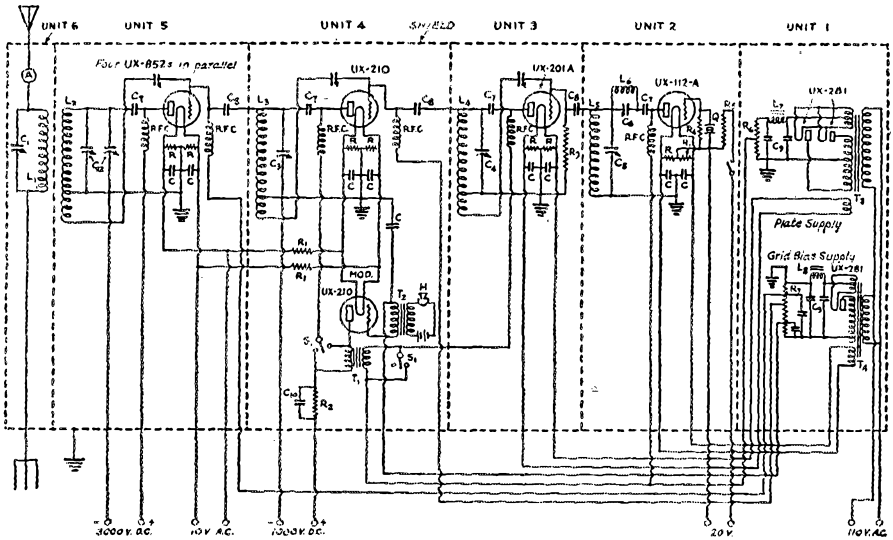


FIG. 3. — THE EXPERIMENTAL 3510-KC. TRANSMITTER

An unusually interesting 'phone and telegraph transmitter is employed at W8CAU. Heising modulation may be employed by throwing the switch S_1 (shown in two separate sections) to the right. Throwing these switches to the left permits series voltage system of modulation to be used. The parts used in this transmitter are listed below:

L_1 — *11 turns of 5/16 inch 4 inches in diameter.*
L_2 — *Same as L_1.*
L_3 — *7 spaced turns No. 14 dcc 3 inches in diameter.*
L_4 — *Same as L_3.*
L_5 — *Same as L_3.*
L_6 — *11 turns spaced No. 14 dcc 3 inches in diameter.*
L_7 — *Choke coil.*
L_8 — *Choke coil.*
C — *2000-μμfd. condenser.*
C_1 — *450-μμfd. 3,000-volt condenser.*
C_2 — *150-μμfd. 6,000-volt condenser.*
C_3 — *500-μμfd. receiving condenser.*
C_4 — *Same as C_3.*
C_5 — *Same as C_3.*
C_6 — *1,000-μμfd. receiving condenser.*
C_7 — *500-μμfd. grid condensers.*
C_8 — *500-μμfd. plate blocking condenser.*
C_9 — *750-volt, 1-μfd. condenser.*
C_{10} — *2-μd., 1000-volt condenser.*
R — *50-ohm center tapped resistors.*
R_1 — *Resistors to drop voltage from 10 to 7.5 for 210 tubes.*
R_2 — *5,000 ohms.*
R_3 — *.05 megohm grid leak.*
R_4 — *3 megohm grid leak.*
R_5 — *Heater resistor for heating crystal.*
R_6 — *B eliminator resistor.*
R_7 — *B eliminator resistor.*
S_1 — *Modulation change-over switch.*
T_1 — *Modulation transformer for series plate modulation.*
T_2 — *Microphone transformer.*
T_3 — *Plate supply transformer.*
T_4 — *Grid bias supply transformer.*

higher frequency transmitters already described. There is no tendency whatever for self-oscillation or feed-back, and neutralization adjustments can be made complete. The boxes are soldered together and are made of 16-guage galvanized iron. They are 7 inches by 9 inches by 20 inches overall and are suspended in an angle and strap iron frame. The front panels carry a sub-panel, and all apparatus is mounted on these. Removing the front panel brings all parts into access. The operating voltages come in at the lower corners of the panels in shielded braid. The braids are tucked UV-852 tubes, and an antenna panel. The radio frequency connections between units are made through studs on which spring clips make contact when the front panel is put in place. Tuning and neutralizing is done by a vacuum-tube voltmeter arrangement which can be put on the r.f. leads between units.

Referring to Fig. 3, it may be seen that when the switch S_1 is thrown to the right, the modulator tube, Mod., uses the Heising or constant current modulation system for modulating the UX-210 amplifier in Unit 4. When this switch is

thrown to the left, series modulation is affected by varying the plate voltage applied to the plate of the UX-201-A tube in Unit 3. In this last modulating system, a UX-210 is fed with speech voltages from a desk stand microphone and a microphone transformer. From the 210, by means of an output transformer, are taken the speech voltages which are injected into the plate circuit of the UX-201-A first radio frequency amplifier.

gency purposes and the transmitter is built and adjusted so that it can run continuously for hours without harm.

REMOTE CONTROL SYSTEM

In the remote control set-up a receiver operates continuously. The receiver consists of an oscillating detector and two-stage audio amplifier. The filament of the detector tube is heated

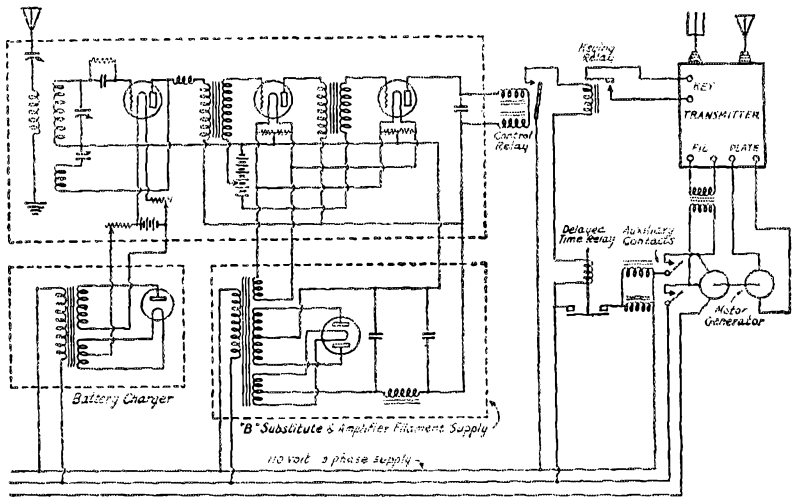


FIG. 4.— THE AUTOMATIC REMOTE CONTROL SYSTEM

The receiver tuned to 2000-kc. is kept operating continuously. When a 2000-kc. signal is received, the transmitter is automatically put into operation.

Distortionless modulation is easily attained, for the output voltage of the microphone transformer works the UX-210 modulator to rating, and the UX-210 is capable of completely modulating the UX-201-A tube.

It is interesting to note that a so-called linear amplifier is not necessary for a radio frequency stage which passes on modulated radio frequency. Because of this the r.f. stage can be biased to, or even past plate current cut-off, and may then be used with high efficiency. Any distortion which occurs gives rise to harmonics of the carrier and sidebands — not of the audio frequencies. The selectivity of the tuned circuits in the transmitter and the antenna is so high that harmonics of the carrier and sidebands are not passed through to any appreciable extent. With the radio frequency stages biased near cut-off the relation between plate voltage in the modulating stage and output can still be linear.

Reliability is a point that must be given attention at W8CAU for there is in use a remote control-by-radio system which makes it essential that the equipment operate satisfactorily time after time when no operator is in the station. Protection of the equipment is had by appropriate fusing. This protection is only for emer-

by a storage battery floated across a battery charger, as shown in Fig. 4 while alternating current is used to heat the filaments of the amplifier tubes, which are Western Electric telephone repeater tubes. Because alternating current is used for the filament supply of the amplifiers some hum may be heard when a headset is plugged in the final amplifier but this does not affect operation. A B-battery substitute furnishes the plate voltage for all three tubes.

The second amplifier is biased almost to cut-off, and the receiver is tuned to 2000 kc. When a sufficiently strong 2000-kc. signal is received, a beat note is set up in the detector circuit and this is amplified by the audio amplifiers. Since the final amplifier is biased almost to cut-off, its plate current increases when its grid receives excitation from the preceding amplifier. The increased plate current flowing through the control relay closes the contacts of this relay which, in turn, close the contacts on the time delay and keying relays. The time delay is so constructed that at least three seconds are required before it will operate. Therefore the signal operating the receiver has to be received for at least this length of time before the time delay relay closes the power circuits and puts

(Continued on page 84)

Cascading Rectifiers

By J. M. Grigg*

BARRING commutator devices, all the known means of converting an alternating current into a unidirectional current depend for sensitivity upon the square law. That is to say, registration is proportional to energy content or squares of impressed potentials. In turn this implies that sensitivity falls away in inverse squares, e.g., $\frac{1}{4}$, $\frac{1}{9}$, $\frac{1}{16}$, etc., with cessation of activity at low potentials. That no complete rectifier has ever been devised — the tendency of an alternating current to persist as such — classes the square law of response as axiomatic, along with the other axioms of electrophysics.

It may be shown, however, that if a given oscillator potential is passed through a series of rectifying devices, each one in square law and contributing to the energy content, an infinite

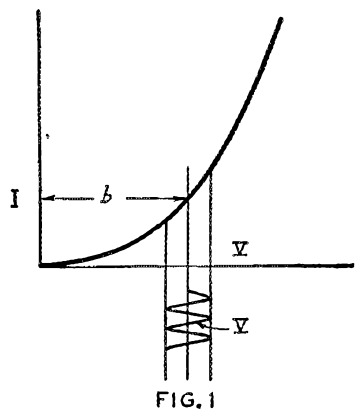


FIG. 1

number of such devices would result in complete rectification. From this it may at once be inferred that cascading rectifiers, even in few numbers, results in more complete rectification. To demonstrate the practicability of such an arrangement, however, it must be shown that the output is greater than that of a corresponding series of amplifiers.

To get at the matter quantitatively consider the curve, Fig. 1, corresponding with the plate current of a vacuum tube, the equation for which may be given as

$$I = K(b+\mu V)^2. \tag{1}$$

The change in plate current for a change in grid potential of amplitude V in the positive direction is

$$K[(b+\mu V)^2 - b^2] \tag{2}$$

and in the negative direction it is

$$K[b^2 - (b+\mu V)^2]. \tag{3}$$

Subtracting one from the other leaves $2K\mu^2V^2$, which is the value of the rectified current. At the same time the plate circuit carries an oscillating current whose amplitude is $2Kb\mu V$.

Let it now be assumed that the unidirectional component is suppressed and that the oscillating component alone is impressed upon the grid of a succeeding rectifier. Multiplying the last expression by the voltage factor and substituting again in the equations for plate current change, the result after subtraction is

$$(4b^2K^2R^2\mu^2)\ 2K\mu^2V^2 \tag{4}$$

the factor in parentheses being the gain of the amplifier.

In the other case, if one half the direct current had been added to the positive lobe of the oscillating component and the other half subtracted from the negative, the two lobes, in amplitude and sign, respectively would be

$$(2bK\mu V + K\mu^2V^2) \text{ and}$$
$$-(2bK\mu V - K\mu^2V^2).$$

Suppose also the physical nature of the first plate circuit is such that this lop-sided potential may be impressed directly upon the grid of a succeeding rectifier. Multiplying by the voltage factor and substituting again in equations for plate current change, there results for one lobe

$$K[\{b+\mu R(2bK\mu V + K\mu^2V^2)\}^2 - b^2] \tag{5}$$

and for the other

$$K[b^2 - \{b-\mu R(2bK\mu V - K\mu^2V^2)\}^2]. \tag{6}$$

Expand and subtract, retaining only terms which contain V, and the remainder is

$$(4b^2K^2\mu^2R^2 + bK\mu R + K^2\mu^4R^2V^2)\ 2K\mu^2V^2 \tag{7}$$

an expression representing the difference between the positive and negative fluctuations of plate current, namely, what is direct current, the quantity in parentheses being the factor of increase for the first rectifier, and greater than the corresponding amplifier factor by the terms

$$\ldots\ bK\mu R + K^2\mu^4R^2V^2.$$

Thus is indicated a substantial output gain over the use of the first tube as an amplifier, and this contention has been amply borne out in experiment.

(Continued on page 88)

* 5951 S. Tripp Ave., Chicago, Ill.

Official Frequency System

THE Official Frequency Station Committee, a part of the Experimenters' Section of the A.R.R.L., has arranged the services described below for the benefit of the members of the League and others who may wish to use them.

1. Standard Frequency Transmissions are sent by the Standard Frequency Stations (known as O.F.S.-S.F.) on definite schedules with a high degree of accuracy. All the principal amateur bands are covered, several points being given in each so that frequency meters may be accurately calibrated. These transmissions are based on piezo-electric frequency standards that are regularly checked by one or more of the leading scientific laboratories of the country.

2. Official Frequency Transmissions are sent by Official Frequency Stations (known as O.F.S.) at a somewhat lesser degree of accuracy. These stations do not transmit on regular schedules but announce their frequency at the end of at least every other transmission during their regular amateur operation. Such stations will measure the frequency of your transmission upon request.

Practical suggestions are always welcome and should be sent to the proper member of the Committee which is composed of the following: Don C. Wallace, W6AM, Chairman in charge of O.F.S., Room 410, 209 Pine Ave., Long Beach, Calif.; Prof. C. M. Jansky, Jr., care of University of Minnesota, Minneapolis, Minn.; and Killian V. R. Lansingh, W6QX, in charge of O.F.S.-S.F., Box 666, Hollywood, Calif.

STANDARD FREQUENCY SCHEDULES

Friday Evening Schedules				*Friday and Sunday Afternoon Schedules*			
Time (p.m.)	Frequency, kc. A	B	AB	Time (p.m.)	Frequency, kc. BB	C	CD
8:00	3500	7000	7000	4:00	7000	14,000	28,000
8:12	3550	7100	7100	4:12	7100	14,100	29,000
8:24	3600	7200	7200	4:24	7200	14,200	30,000
8:36	3700	7300	7300	4:36	7300	14,300	14,000
8:48	3800	....	3500	4:48	....	14,400	14,200
9:00	3900	....	3650	5:00	....	.....	14,400
9:12	4000	....	3850				
9:24	....	....	4000				

The time is the local standard time at the transmitting station. 8:00 P.M. at W1XV-W1AXV is 0100 G.C.T. and 8:00 P.M. at W9XL-W9WI is 0200 G.C.T. Similarly, 4:00 P.M. at W1XV-W1AXV is 2100 G.C.T. and 4:00 P.M. at W9XL W9WI is 2200 G.C.T. Due to the new regulations of the Federal Radio Commission concerning experimental licensed stations, the Standard Frequency Stations will in all probability use the amateur calls W1AXV and W9WI for these schedules.

DATES OF TRANSMISSION

Date	*Schedule*	*Station*
Nov. 1, Friday	A	W1AXV (W1XV)
" 3, Sunday	CD	W9WI (W9XL)
" 8, Friday	BB	W1AXV
" 8, Friday	AB	W9WI
" 15, Friday	B	W1AXV
" 22, Friday	AB	W9WI
" 24, Sunday	C	W1AXV
Dec. 6, Friday	A	W1AXV
" 8, Sunday	CD	W9WI
" 13, Friday	BB	W1AXV
" 13, Friday	AB	W9WI
" 20, Friday	B	W1AXV
" 27, Friday	AB	W9WI
" 29, Sunday	C	W1AXV

Schedule "BB" sent at 2100 G.C.T. on one Friday of each month is transmitted at that hour for the particular benefit of European stations. If sufficient reports on its reception are not received, it will be discontinued.

THE STATIONS

W1XV-W1AXV: Massachusetts Institute of Technology, Communications Department Experiment Station, Round Hill, Dartmouth, Mass., H. A. Chinn in charge. Uses Eastern Standard Time and characteristic letter "G."

W9XL-W9WI: Gold Medal Station, R. F. D. No. 3, Anoka, Minn., H. S. McCartney in charge, assisted by Lyall K. Smith, Ivan H. Anderson and George Collier. Uses Central Standard Time and characteristic letter "D."

DIVISION OF TIME

A total of 12 minutes is allotted to each transmission divided as follows:

4 minutes — QST QST QST de (call letters).

3 minutes — Characteristic letter ("G" or "D") sent very slowly and broken by call letters each half minute.

1 minute — Statement of frequency in kilocycles to nearest integral figure.

4 minutes — Time allowed to change to next frequency.

ACCURACY

The transmissions of both stations will be within 1/10 of 1% of the frequencies herein announced, which is considerably better than the accuracy to which the average good amateur frequency meter can be calibrated and maintained constant. During each transmission by W1XV-W1AXV the integral frequency nearest its exact frequency within 1/100 of 1% will be announced for the benefit of those able to use such accuracy, but for all general amateur purposes the frequency of transmission of both sta-

(*Continued on page 74*)

Experimenters' Section

NEW CRYSTAL FRAGMENTS

By Maxwell Howden, VK3BQ

FROM what we hear in Australia, crystal control is not so popular in the U. S. A. as it is here, and I put this down partly to the lack of dope on simple crystal-controlled outfits. Perhaps this is due to the fact that the appearance of the diagrams which are usually published is enough to make the average ham with empty pockets pass right over them.

Most of you will have noticed that a large percentage of the active VK stations now use crystal control. In very few cases do the transmitters consist of more than a 201-A as crystal oscillator followed by a single 210 or two of the latter in parallel used as the frequency doubling power amplifier. On the 3500-kc. band the crystal oscillator is often used alone; 20 to 30 watts is the usual input to these simple but effective 3500-kc. transmitters. With this power we have no trouble at all in working all states (Australian) and ZL, and that is all we use this band for. Now Australia is approximately the same size as the U. S. A., so apart from the real QRM that you, in your numbers, must create for each other, you should be able to do as well. Another difference in the respective conditions is probably that over there you buy your crystal already ground, whereas we have to grind our own. We are rather fortunate in having a certain amount of native quartz crystals in Australia and, in a relatively small community like ours, the hams have a good chance of getting their hands on most of it. The best of our crystals come from the Mt. Lofty Ranges in South Australia, although we do not get as many as we should like from there. So much for the conditions, and let's get on with the dope.

Going back to the early days of crystal control, you will remember that slabs cut out in the correct plane from the crystal had three electrical axes. The one we use mostly is that which is perpendicular to the ground faces of the slab and causes oscillation at approximately 104.7 meters per millimeter thickness. The other two axes are at an angle of approximately 60 degrees to this short one and will cause oscillation at about 150 meters per millimeter thickness. It is with one of these latter axes that I have been experimenting for the most part during the last few months.

In a great many cases when one is grinding, say, an 80-meter crystal from a slab which has not been cut very accurately, one gets it down to about 86 meters and finds that no oscillation can be obtained on the 104-meter peak, but that very active oscillations are produced on about 130 meters as the result of a higher peak. This has occurred several times, and I have then continued to grind the slab down so as to get the higher peak on the 80-meter band, only to find that the lower one has appeared again lower down and that the upper one has died out. After thinking this over, I realized that as the slab approached the 80-meter band in the first place, the accuracy was increasing to near perfection, and it must have been this which caused the lower peak to lose its kick. Therefore, I one day purposely ground down the corners slightly when this oscillation stopped, and found that it immediately started again. We now have the first piece of new knowledge which may prove useful.

Very accurate grinding accentuates the higher peak and a slight convexing of one or both faces

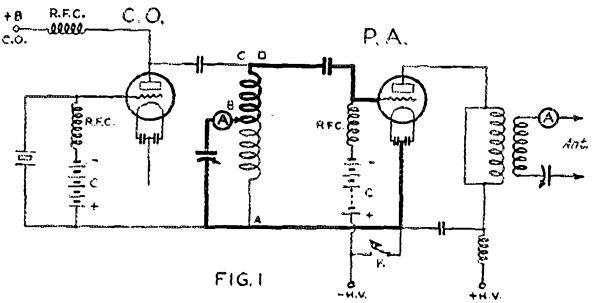


FIG. 1

emphasizes the lower one. But remember that unless the symmetry about the center is maintained, all oscillations will cease. Another point, while we are on this subject: When the faces of the slab are slightly convex, maximum power will be obtained with very light pressure on the crystal: but when they are slightly concave, great pressure can be applied without altering the operation.

After finding the foregoing, I continued testing with different shaped faces, and found that with one or both faces curved one way only (that is, with the ends ground down about 1/10,000th of an inch thiner than the center) the third harmonic of the higher (150-meter) peak is so greatly emphasized that the crystal will oscillate at this wavelength with no additional regeneration, and will handle the same power at the same voltage as a thinner slab working at this wavelength on one of its normal peaks. As far as I know, this is something quite new. It means that instead of the lowest wavelength per millimeter thickness being 104.7 meters, it is now about 50 meters. (The general conception of this type of operation is

that the crystal is operating at the third harmonic of its natural frequency. — *Editor.*) Since discovering this, I have ground five other slabs in the same manner, and all have performed in a somewhat similar manner. The first three were about 0.75 millimeters thick and oscillated on their lower normal peak in the 75–85-meter bands. Reducing the thickness of the ends or sides produced oscillation in or about the 41–42.8-meter band. The other two were 0.64 and 0.48 millimeters thick and oscillated at 33 and 27 meters respectively.

Going back to the first three slabs, the first one was only curved on one face, and it handled 25 watts at a plate voltage of 400 on the crystal oscillator without any trouble. The second one was curved in the same direction on both faces, and it gave slightly greater output, but at 400 volts it "punctured" on one face to a depth of one third the thickness in one spot and would no longer oscillate at 42 meters. However, the oscillation on the normal peaks was not affected in any way. The third one I ground with the curve at right angles on one face to what it was on the other. This crystal gave even greater output, but at 400 volts it gave just one mighty kick, and upon examination proved to have punctured to a depth of one third the thickness in different places on both sides, and had also split right through at an angle in the center for a length of about ¼". From this I should think that more interesting facts concerning the harmonic oscillation of crystals could be brought to light by someone who had better than the standard micrometer reading to 1/10,000th inch in the way of measuring equipment.

As yet, I have not been able to sufficiently emphasize the third harmonic of the 104.7-meter peak to produce oscillations when the crystal is cut at right angles to one of the electrical axes, but I think that if it were cut at only a slight angle to the normal, such oscillations could be produced. As a guess, I should say that this oscillation might be at something better than 40 meters per millimeter thickness.

Some may be interested in knowing that the third crystal, which punctured on both sides and split right through as well, was so curved on both sides that the corners were 4/10,000th-inch thinner than the center.

Regarding the splitting of crystals subjected to too much power, which is often miscalled puncturing but is very different from it, I have always found that it is due to the slab trying to oscillate at two different frequencies at the same time. In most cases, it occurs when the crystal starts oscillation on the lower (wavelength) peak while the power input is sufficient to make the slab oscillate weakly at an upper peak. Suppose, for instance, that the crystal is one millimeter thick and is oscillating at 150 meters. If the tank condenser of the plate circuit is then rotated so as to reduce the capacity, the crystal will continue to oscillate long after the point of resonance is passed, and when the power input is sufficient to prolong this higher oscillation until the lower peak is reached, something has got to give, and it is almost always the crystal. Although I have not yet tried to see if any considerable power increase is permissible with an aerial coupled to the plate tank of the crystal oscillator, I think that it is possible. Just as with the case of a self-excited (self-controlled. — *Editor*) set, the power input will increase when a tuned antenna is coupled to the plate circuit with an accompanying reduction in plate dissipation and grid excitation — and lessened strain on the crystal. In any event, it is safe to say that a crystal will handle more power with safety at its highest peak than it will at either its lower normal peak or its harmonics.

The only occasions when I have noticed puncturing is when the top plate of the holder is either rough or smaller than the crystal. In either of these cases, the puncture occurs at a sharp corner and it is possible to see the r.f. sparking through it. This puncturing does not seem to affect the oscillations to the extent that splitting does. In most cases, when a crystal splits, it ceases to oscillate at the peak producing that oscillation, but will work as usual on the other peaks.

So much for the actual crystal oscillation which, by the way, was in all cases produced in the standard C.O. circuit with no regeneration other than the natural feed-back in the tube. Now a few words concerning frequency doubling. Fig. 1 gives the standard circuit, but with the difference that the active grid circuit of the power amplifier is drawn in heavy lines. The point of maximum pickup from the C.O. to the P.A. grid is at tap "D" on the C.O. plate coil, right at tap "C." No diagram I have ever seen shows these two taps taken off as one as I show it and always use it. Perfect control of regeneration in the P.A. is gained by the movement of tap "B." This is because it is the top or plate end of the C.O. inductance that acts as the grid coil of the P.A. The rest of this inductance should be adjusted to act as much as possible as a radio-frequency choke to the P.A. frequency, while the tank condenser acts as a series by-pass to complete the P.A. grid circuit. In adjusting the frequency doubling P.A., the whole L/C unit must be tuned to the maximum output of the crystal, and a few minutes playing around with the C.O. alone will familiarize any ham with its tricks. After that it is mostly a case of cut and try to get the P.A. to generate most of its own grid energy, but not sufficient to produce self-oscillation. The little kick supplied by the harmonic of the C.O. then does the rest, and high overall efficiency with crystal-controlled signals results. One other point: It seems easier to get going in the first place when two 210's are used in parallel in the P.A. than when one is used alone. (Addition of the second tube

increases grid circuit losses, halves the plate impedance and generally lessens the tendency to self-oscillation on the part of the amplifier. — *Editor.*)

HOW ABOUT 28 MEGACYCLES?

If past performance is any criterion upon which expectation for the future can be based, this season of the year should be ideal for 28-megacycle communication. Harking back to the first week of November, 1928, it will be recalled that during that time and the weeks following a great many successful DX contacts were made. Two-way communication was maintained between W1CCZ, using a beam antenna, and stations on the Pacific Coast. W1CCZ's signals were also copied "solid" during the week of the tests by ZL2AC. Details of these tests, as well as a number of recommendations for development of suitable antenna systems, are contained in the article beginning on page 9 of *QST* for January, 1929. The type of antenna system used plays a great part in determining the effectiveness of the transmission on this band, and further experimentation with simple single wire reflector systems is urged.

Above all, let every experimenter keep an active log of the work done. Record all observations whether they be of a positive or of a negative character. It oftens happens that failure to establish communication at a certain time may be as valuable, from the standpoint of scientific experiment, as the successful establishment of communication half-way around the world.

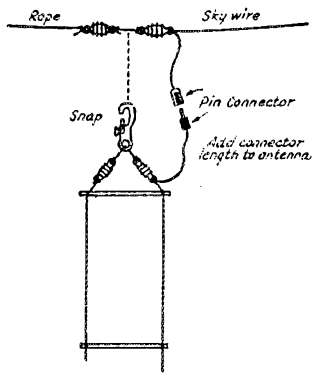


FIG. 2

A system of regularly reporting methods and results to the Experimenters' Section will be of great value. The compilation and averaging of the results obtained by a number of experimenters will go a long way toward advancing the utility of the 28-megacycle band to be the "reliable communication" status. Week-ends seem to be the most logical times for general two-way communication experiments, and it is therefore suggested that as many amateurs as possible get on the air with their 28-megacycle rigs Saturdays and Sundays. There will be at least one station operated by the Headquarters gang on 28 megacycles here in Hartford during the coming months.

QUICK-DETACHABLE ZEPP FEEDERS

Clyde DeVinna, FK6CR, Masaka, Uganda, British East Africa, suggests the novel arrangement shown in Fig. 2, commenting as follows:

"The enclosed rough sketch may interest those of the craft who have occasion to carry a Zepp rig around with them. Putting up antennas down here in varied locations, I hit on this stunt to avoid difficulties with the feeders coming out uneven, etc. The rig now hangs ship-shape whether the sky-wire be horizontal, vertical or what have you."

TUBE CHARACTERISTIC DATA

The increasingly varied applications of the many available types of vacuum tubes gives rise to an increase in the importance of the characteristics of the various tubes to the amateur and experimenter. Articles describing most of these tubes and giving their characteristics have appeared in past issues of *QST*. The following bibliography of vacuum tube articles which have appeared in *QST* is therefore given for the convenience of those interested.

BIBLIOGRAPHY OF *QST* TUBE ARTICLES

The New Magnavox Tube. By Herbert E. Metcalf, March, 1925, pp. 24.
New R.C.A. Tubes (the UX-120, UX-112, UX-210, UX-874, UV-876, UV-213 and UX-216B tubes). October, 1925, pp. 40.
The Raytheon Rectifier. By Miles Pennybacker, November, 1925, pp. 38.
New Tubes (the UX-200A, UX-171, UX-874). By R. S. K., May, 1926, pp. 33.
The UX-874 Regulator Tube. By R. S. K., June, 1926, pp. 32.
Radiotron Model UX-210. September, 1926, pp. 33.
The UX-213 Rectron and the UX-874 Voltage Regulator. By O. W. Pike, January, 1927, pp. 44.
Radiotron UX-240 (CX-340). By Robert S. Kruse, April, 1927, pp. 26.
The UX-852 Transmitting Tube. By R. S. Kruse, May, 1927, pp. 20.
The UX-222 Shield-Grid Tube. By R. S. Kruse, December, 1927, pp. 12.
The UX-250 (CX-350) Tube. By R. S. K., April, 1928, pp. 36.
The UX-860. By Harold P. Westman, September, 1928, pp. 31.
A New Type of Rectifier Tube for Amateur Use (UX-866). By O. W. Pike and H. T. Maser, February, 1929, pp. 20.
The UV-861. By Harold P. Westman, February, 1929, pp. 41.

(Continued on page 82

I.A.R.U. NEWS

Conducted by A. L. Budlong

IT'S really a lot of fun turning out this department of *QST*. It is interesting work, too — interesting to receive letters from all over the world with queer postage stamps on them, and interesting to be the first to read the information that sooner or later will find its way into the pages of *QST*.

But there is one cockroach in the soup, and he is a very permanent cockroach, too, not to be nonchalantly flicked away. We've mentioned him before — our old friend "time lag."

No doubt some of you saw the two fervent appeals for assistance in the October I.A.R.U. department, one dealing with "best times to work DX" and the other with a proposed scheme to speed up the transmission of foreign I.A.R.U. reports by means of amateur radio skeds. It is conceivable that some of you even went so far as to forward suggestions, information or offers of coöperation. In which case it is presumed that you will be looking forward eagerly to this present issue to see what your humble compiler has done about your — and other — such suggestions, information and offers of coöperation.

It is just about here that our friend the cockroach crawls steadily over the rim of the souplate and falls in incontinently with a glorious splash.

The truth of the matter is that although you are reading all this a month *after* the October issue came out, we are writing it a full ten days *before* the October issue is due for its appearance on the newsstands. So, while there may be plenty of response to those calls for help, we won't know about it for another two weeks yet.

If any replies were sent in to those requests, and if they were sent in reasonably promptly after the appearance of the October issue, we will have received them just in time to include in our copy for next month's issue — the December issue. By the time you read these lines, all the material for the December issue will be turned in to the printer.

So, if it should happen that you were one of those who actually did send in some material along the lines requested, don't think that we have dropped the matter simply because the results don't appear in this issue. It is a physical impossibility. If we got any replies, they will be duly chronicled next month. We hope there will be plenty to chronicle.

W.A.C.

The mention of the W.A.C. Club, several issues back, certainly did stimulate interest. Before that item appeared, we were getting applications for W.A.C. certificates at the rate of two or three a month. Since then, however, the applications have literally been pouring in; we get as many as eight in a single week. The total of certificates issued is now well over the 300 mark, and going strong.

JAPANESE HAMS WHO ATTENDED THE 14TH MEETING OF THE J.A.R.L., WESTERN DIVISION, AT MT. ROKKO, NEAR KOBE

The photo was taken at the top of the mountain. All those shown, with one exception, are J3's.

There are many who think that it is a little unfair to require League membership of the applicant for a certificate. We have given this matter considerable thought, and are now proposing an alternative scheme for W.A.C. certificates in the future.

Briefly, it is that W.A.C. should rightly be an affair of the I.A.R.U. It has been an A.R.R.L. proposition so far, simply because the League started it. It has been one of the League activities up to the present, and we required League membership as one of the conditions just as we require League membership before the Communications Department issues an O.R.S. appointment and certificate.

W.A.C., however, is primarily an international matter, and now that we have an international organization it is quite right that W.A.C. should cease to be a League affair, and should become a Union affair.

The matter is now pending, but it is probable that within another month or so, W.A.C. will be turned over to the I.A.R.U. Since the Union has no funds at present, it will be necessary to establish a fee to pay for the cost of printing up suitable new certificates, as well as for the special packing and registered-mail costs (now paid by the League) on the certificate and cards when they are returned to the applicant. These costs will approximate $1.

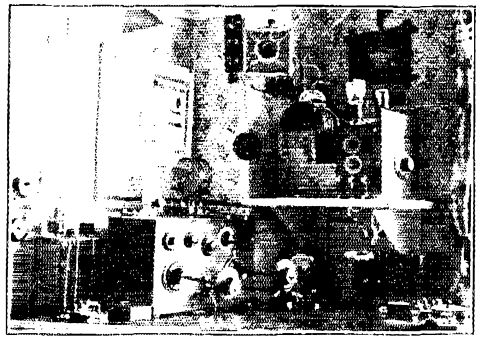
So there it is. It is expected that W.A.C. will soon be a Union matter, with League membership no longer a requirement. If this is carried out, anyone in the world may apply for a W.A.C. certificate, regardless of whether or not they are members of any amateur organization. We feel sure that this will meet with the approval, particularly, of our foreign readers, who have long been agitating for W.A.C. as an I.A.R.U. affair.

We expect to be able to announce final details in January.

FORWARDING QSL CARDS

We have received many requests to publish a list of the various foreign QSL bureaus through whom cards for foreign amateurs may be forwarded. The list follows:

Argentina: "Radio Revista," Lavelle 1268, Buenos Aires.
Australia: Radio "Williamson House," 51 Castlereagh St., Sydney, N. S. W.
Austria: D.A.S.D., Blumenthalstrasse 19, Berlin, W. 57.
Belgium: Reseau Belge, 11 Rue du Congres, Brussels.
Bahama Islands: Ian C. Morgan, "Southlands," Warwick East, Bermuda Islands, B. W. I.
Brazil: Vasco Abreu, 89 rue Riachuelo c/ IV, Rio de Janeiro.
Canada: Forward to A.R.R.L., Hartford, Conn.
Chile: Luis M. Desmaras, Casilla 50D, Santiago de Chile.
China: (*Under cover*) Send Chinese cards to A.R.R.L.
Czechoslovakia: (*Under cover*) Send cards to A.R.R.L. for forwarding.
Denmark: Experimenting Danish Radioamateurs, 5 Holmens Kanal, Copenhagen K.
England: F. E. King (R.S.G.B.), 166 Kentish Town Rd., London, N. W. 5.
Esthonia: (*Under cover*) Send to A.R.R.L.
Finland: S.R.A.L., c/o Pohjola, Helsinki, Suomi.
France: Robert Larcher, B.P. 11, Boulogne-Billancourt (Seine).
Germany: D.A.S.D., Blumenthalstrasse 19, Berlin, W. 57.
Hungary: Magyar Rovidhullamu Amatoeurok Egyesulete, 11 Buday Laszlo-ut 5/c, Budapest.
India: L. E. P. Jones, "A" Corps Signals, Karachi.
Ireland: QSL Section, I.R.T.S., 9 Upper Garville Ave., Dublin, S. 3, Irish Free State.
Italy: A.R.I., Viale Bianca Maria 24, Milan.
Japan: (*Under cover*) Send to A.R.R.L.
Jugoslavia: (*Under cover*) Send to A.R.R.L.
Kenya Colony: Times of East Africa, Box No. 194, Nairobi.
Latvia: Dr. Walter Brivibasiela, 107 Riga, Latvia.
Luxembourg: J. Wolff, 67 Avenue du Bois, Luxembourg.
Malay States: J. P. C. Bell, FMS Railways, Kuala Lumpur, Xelangor, Federated Malay States.
Netherlands: N.V.I.R., Post Box 400, Rotterdam. (Always send cards for the Netherlands in an envelope.)
New Zealand: N.Z.A.R.T., c/o New Zealand Radio, Box 779, Auckland.
Philippine Islands: Send to A.R.R.L.
Poland: L.K.K., Bielowskiego 6, Lwow. (Send in an envelope.)
Porto Rico: J. Augusty, 25 Pershing Ave., San Juan.



F8AXQ IS OWNED BY R. PIETON, AT FONT ROMEU, FRANCE

The station has always been low-power, but with a maximum of about 5 watts has managed to acquire a W.A.C. certificate. Phone has been worked to North America and New Zealand. The transmitter is a Mesny, with 160 volts on the plates of two BFI receiving tubes.

Portugal: R.E.P., Tenente Eugenio de Avilliz, 15 Costa do Castello, Lisbon.
South Africa: S.A.R.R.L., Box 7007, Johannesburg.
Spain: Association EAR, Mejia Lequerica 4, Madrid.
Sweden: Foreningen Sveriges Sandareamatorer, Svenska Radioklubben, Hamngaton 1A, 3tr, Stockholm.

(*Continued on page 52*)

Calls Heard

W1BFT, Carl B. Evans, 80 N. State St., Concord, N. H.

ce1ah ce1ak ce2ab ce3ab ce3ac ce3bf ce3bm cm2jt cm5cx cmz62 ct1aa ct1ae ct1br ct1bx ct2aa ct3am d4aar d4an d4uj d4uab d4uak d4vp d4xn ear10 ear37 ear65 ear96 ear116 ear155 ei8b f8axq f8brd f8aja f8cab f8da f8dmf f8dot f8ef f8eo f8er f8faf f8fk f8gdb f8hel f8he f8hz f8ix f8jcb f8jf g8oa f8pam f8pro f8rbp f8rko f8rvl f8sm f8swa f8tsn s8wb f8wlp f8wrg f8xw f8ypz f8zb f8zx feai fm8smu fm8rit g2bm g2gf g2ju g2kf g2sa g2xy g2yu g5bd g5bj g5by g5fs g5lw g5mq g5ms g5qa g5qu g5rm g5uq g5vm g5sw g5wp g6bd g6bx g6c1 g6gc g6gz g6hp g6kn g6ko g6mc h61b 6gnf g6nt h6nx g6pa g6qb g6rb g6rw g6uj g6vp g6wo g6wt g6wy g6xc g6xg g6xj g6xn g6xq gi6oa gi6wg haf3xx haf3c haf8b i1coc i1gl k4aan k4aar k4kd k4ni k6bqh k6dtg k6dv k6eqm kfr5 kfu5 la1g lu2ea lu3pa lu9dt nj2pa nn1nic oa4o oa4t oa1rv on4bc on4bz on4eu on4fe on4fh on4fp on4ft on4gn on4gw on4hp on4hc on4hv on4ja on4jj on4ro on4rs on4us on4vo on4ww oz7y pa0fp pa0hb pa0mm pa0qf pb7w py1aw py1br py1ca py1cm py1cy py1ib py1fp py2ay py2bc sm5uk sp3kv sp3kx sp3pb sp3yl su8rs su8wy uosx ve4aj ve4ar ve4bq ve4dj ve4du ve4ff ve4gq ve4gu ve4hu ve4uj vo8ae vk2sq vk3jk w6aak w6abg w6afg w6aov w6as1 w6awm w6awp w6axm w6bax w6bbo w6bck w6bgh w6bjf w6bjw w6b1u w6bto w6byy w6cj w6cnx w6cue w6cw1 w6cww w6dca w6dcv w6dgx w6dot w6dpa w6drn w6ds1 w6dss w6dtj w6dwp w6dxn w6dyj w6dyk w6dzz w6ebg w6eem w6egm w6ehi w6eii w6eiy w6elz w6eot w6emd w6ept w6eqi w6era w6erk w6etj w6fs w6ft w6hb w6re w6ts w7ac w7adb w7aij w7ao w7aof w7be w7dp w7fh w7ga w7it w7js w7lf w7li w7mo w7mq w7tj w7tx w7ui w7wi w7wp wfa x9a xf8hpg xf8wb xoz7s0 yi1mdz zl2go zp7ab

Asbury Blue, Box 164, Hyder, Alaska

14,000-kc. band

w1ii w2ait w2bjg w2dab w5aep w5afx w5auz w5dm w6aae w6ac w6afc w6akd w6am w6ame w6amw w6ann w6aov w6app w6aqj w6aqy w6asj w6att w6ave w6avj w6awf w6awp w6awz w6axj w6bam w6bax w6bcx w6bdj w6bet w6bg w6bga w6bgh w6bjd w6bj2 w6bsj w6bsp w6bsn w6gtj w6bto w6btx w6bvx w6bwk w6bxv w6byo w6cby w6cdi w6cei w6cut w6cwl c6cxv w6czm w6czx w6czz w6dev w6ddy w6dgm w6dgq w6dhs w6di w6dij w6diy w6dmq w6dog w6dpa w6drr w6dsl w6dss s6dtz w6du w6dui w6duj w6dwi w6dwp w6dxm w6dyd w6dz w6dzk w6dzq w6dzx w6dzy w6eau w6edt w6eem w6efc w6eft w6egv w6ehf w6ehi w6ehw w6ekw w6emd w6eop w6eph w6ept w6epx w6eqf w6eqw w6erk w6eug w6euk w6ff w6fk w6gm w6hb *w6ht w6ju w6pu w6qy w6wu w6re* w7aax w7aev w7afo w7ahx w7akz w7alm w7bh w7dm w7ed w7ej w7fa w7fh w7ga w7hn w7id w7if w7iv w7iy w7na w7nwf w7ov w7qr w8apb w8apd w8cut w8doa w8dps w8vs w9axf w9fbv w9fxj w9zzd ve2bb ve4br ve2dbb ve4br ve4gq ve5aw kfr5 ce3bm k6a1m x9a zl2ac on4o oa4q

V. S. Roddy, 9117 Connecticut Ave., Cleveland, Ohio

ce1ah ce1sv ce2ab ce2ag ce3ac ce3bf ce3bm e3cj cm5cx cm5ry cmz62 ct3ab ct3am ct1aa ct1bx ct1by cx2ak d4yt d4uak ear21 ear37 ear65 ear74 ear98 earl1 earl33 earl16 ear155 f8aja f8brd f8btr f8ct f8dot f8er f8fr f8gdb f8he f8jf f8j1a f8jt f8klm f8mrg f8lou f8rko f8rlt f8rrm f8rrr f8sm f8swa f8xg f8ypz f8zx fmtunl fm8smu fq8gom f28hpg f28wb fqpm g2ao g2bm g21z g2xv g5bd g5bj g5by g5bz g5fs g5oc g5yk g5yx g6da g6dh g6hp g6mc g6nf g6nt g6rb g6nt g6vp g6wo g6wy g6xb g6xj g6xn g6yq g6za haf3xx haf8b i1coc i1gl i1to k4aan k4ni k4kd k6a1m k6avl k6bjj k6cjs k6cke k6cyc k6dv k6est k6etf k6nl k7sq k7aib k7f2 k7ly kfr5 lg nj2pa nkf oa4 oa40 oa4p ao4q oa4s oa4t oa5o on4fe on4fp on4fq on4ft on4gw on4jj on4uu on4hp oz7ly oz7y oz7z pa0fp pa0gw pa0wr pa0zf pb7b lu3dh lu3fa lu4dq lu9dt py1aa py1aw py1ax py1br py1ca py1cm py1cl py1er py1id py2ad py2aj py2ak py2ay py2ag py2ih py2ii py2ik rwx sm6ua ti2hv vk2hc vk21m vk2ns vk2ow vk2rx vk3pp vk4rj vk5hg vk6he vo8ae vo8mc vo8wg w8bgk w8bgs x9a xoz8xu xf8wb xpa0zz xw7eff z1lao z11ft z11fw zl2ac zl4ae zl4am zl4ao ct6x

Mr. V. I. Eloranta, Box 36, Mikonk, Helsinki, Finland

14,000-kc. band

w1ajt w1bux w1ry w2amr w2arb w2bt w2el w2fp w2rs w3ai w4ahh w6bvx w6ju w7akv w7pv w8adm w8bec w8cc k4aam k4akv ce1ah ce2ab lu2ea lu3dh lu8dy pk3bm py1ah py1aw py1br py1ca py1cl py1cm py1er py1id py2ay py2bc py2bg ve1br ve4dq vk2ij vk3pa wdde rwy

K4KD, E. W. Mayer, Box 103, Ensenada, P. R.

w1aem w1alb w1aqt w1arg w1avf w1beu w1bke w1bsm w1cjz w1ia w1ii w1io w1kl w11v w1mk w1nx w1rw w1zl w2aer w2agx w2aoj w2aqh w2are w2ate w2aw w2axx w2azk w2bac w2bai w2bbp w2beh w2be w2bff w2bih w2bjl w2bki w2bou w2fk w2ku w2mb w2nm w2pe w2vd w2vj w3aal w3adv w3amx w3apn w3asa w3aus w3bcd w3ei w3ei w3gi w3jh w3kj w3oh w3wy w4aef w4afq w4aij w4ar w4cl w4de w4gv w4is w4js w4km w41t w4nh w4oa w4sh w4te w4wa w5avy w5bat w5bek w5bfp w5gg w5qo w5rb w5ta w6adp w6chw w6cog w6col w6cww w6eyx w6dbx w6don w6clg w6equ w8aly w8aq w8aut w8avf w8awp w8ayo w8bqe w8brh w8btr w8ccw w8cib w8cra w8ctj w8cut w8dbc w8dci w8dcm w8dgt w8dkx w8dld w8dre w8dsa w8duw w8sx w8tge w8vp w9buh w9bcw w9bjp w9bkx w9crj w9csq w9dbj w9dbw wdft w9dpv w9dqs w9dwd w9eln w9fax w9fbv w9fcw w9fgo w9fpw w9fxj w9fyp w9gcx w9gvc w9lf ce2bm cm7sh ct2ac d4ddm d4tv d4uak ear94 f8he g8hip f8klm f81da f8mrg f8olu f8pro f8pru f8rko f8pmf g5by g5lw g5mq g5ub g5uw g6lb g6nf g6wo k6dv on4fp on4uu py1ld py1sq sp3pb ve1ac ve1cc ve2aa ve2cg ve2fo ve3bp ve9co vk2ac vk2hc vk3pp vk4am vk5it vk7lj z11at z11fl z11fr z11ft z12ab xon4wk wdde 55x kfu5

ZL2GO, H. G. Fownes, Box 512, Wellington, New Zealand

7000- and 14,000-kc. bands

ve3ao ve3aq ve3bv ve3cl ve3dg ve3fc ve3vs ve4bp ve4cj ve4dj ve4dk ve4ei ve4fb ve4fn ve4go ve4gr ve4gx ve4hm ve4ic ve4jj ve4jb ve4ra gi5hn g95wd gi6wg gi6yw zs3gg gi6hi

28,000-kc. band

j1tx j2by w6xq vk7dx vk6sa vk5hg vk4bb vk4aw vk3bq vk3my vk3cp vk2rx vk3pm z11ax z11ao z11am zl2bg zl2ga z12bx z12go z13ar

W6OJ-FK6CR, Clyde DeVinna, Belgian Congo, Africa

7000-kc. band

wladg wlaue wlaxv wlbtf wlmk wlmp w2afr w2alu w2ase w2asg w2bch w2cuf w2cxl w3aac w3apf w3anh w3aws w3axz w3cjn w3ct w3ka w3mv w3nt w4aaq w4aev w4akq w4ft w4nq w4oc w5aap w5awd w5hx w5si s5uk w8agp w8aht w8anh w8axz w8apm w8bab w8baz w8bl w8bgx w8blh w8blx w8cfn w8ckl w8dlg w8fz w8gz w8jl w9ara w9baz w9bre w9bxk w9cvm w9dn w9etd w9gbx w9um klaf klce klhr k6avl k6dtg kfr5 kfr6 cm5fl

F8XD

QSLL Via R.E.F.

wlatm wlafb wlacd wlavx wlaci wlaxx wlbzj wlgb wlyb wlic wlzw w2api w2afj w2ajt w2azk w2akc w2cqo w2cuf w2bac w2box w2lkj w2rz w2et w3asg w3apo w3cfg w3nk w3mv w3cj w3kc w4acz w4aew w4ahl w4ft w4po w4zp w4agr w8awp w8drj w8cdb w8brh w8bhk w8did w8dyq w8jb velbr vo8azw vo8ae k4aah wladw wlaze wlcek wlcmx wlcmf wlbux wlcaw wlbkr wljg wlzz wlom wimo wllj w2aof w2arb w2cie w2bjr w2adp w2hq w2md w2gp w2bgo w3ahh w3bd w3hyv w3oh w4acf w4aek w4abw w4ft w4cq w5azr w5wg w6am w6awg w6bam w6uf w7afo w7ajj w7wp w8afg w8apb w8apl w8adm w8ahc w8bog w8cpc w8cag w8cfw w8cra w8cmb w8ccw w8dhc w8dme w8dre w8dno w8dcm w8cz w8hx w8kr w81v w8wh w8za w9afz w9ahg w9abd w9afn w8auh w9bpm w9dar w9dog w9ddy w9dgz w9dqu w9ef w4ka w9pu w9eaj vo8ae vo8wg velbc velbr ve2bd ve2ca ve2bb ve2bg ve3bm ve4aj

VK3CX, Alan G. Brown, 8 Mangarra Road, Canterbury, E. 7, Victoria, Australia

14,000-kc. band

wlagj wlanz wlry w2tp w2bjg w3ut w4aq w5ve w5rg w6anw w6ann w6asj w6asl w6ax w6bhr w6caz w6cuh w6dcv w6dmq w6dow w6dtu w6edt w6ehw w6eif w6ekw w6vz w7ga w7lp w7nr w8apb w8axa w9beu w9dfy w9dih w9dkg w9ef w9emr w9ffw w9fxj celah ce3ac ct1aa earl earö f8dmf f8gdb f8hz f8jla göby göbz g5ml götz g5uw g5wk k6zze k7mn oa4s oa4q on4uu on4ww oz7ly pa0ea pa0wr z9a wlat gabw xw7eff lg ve4aj

7000-kc. band

w3cdq w5mx w6akw w6ax w6bqk w6btf w6btw w6cgm w6cha w6cuh w6dca w6dgi w6dmq w6dtd w6ebg w6eqf w6erk w6exw w6nz w7acd w7afo w8fz w9hqw w9epz w9jl w9pu klac kljr klhr klce klcm klmc klpw k6dv k7aib k7ly ac2ay il11 jldcx j3cc om2rc om1tb ct1aa xoz7xu xw7eff pmz wlat

W6DTU, Floyd Easter, 1336 E. Monroe St., Phoenix, Arizona

wlacm wlaze wlbal wlbfz wlbux wlbws wlbxx wlcek wlcib wlcmx wlcox wlfi wljg wimo wlzl wlzz wlzzz w2abu w2ado w2atz w2bob w2bjm w2blg w2bnx w3acx w3age w3ut w3wy w4aaq w4afq w4aha w4aim w4ajk w4ale w4dv w4nn w7afp w7anz w7aof w7mw w7ph w7wy w8cnz w8dyk w8fz velbr velbv ve2bb ve2be ve2bv ve3aq ve3qs ve4aj ve4fb ve4dj rxlaa sm6ua su8an celah celai ce2ab ce2ac ce3ac ce3bf cm2sc kfr5 kdv5 luqfi lu3dh lu4d2 lu8ad lu9dt pylaa pylaw pylca pylcm zl2ac zl1fb zl1fw zl2bg zl4ae zl4ai zl4ba zs4m zs6o zs9p zu6d zu6e zu6n vk2ek vk2hu vk2ij vk2kl vk2lj vk2np vk2ns vk2rx vk2tw vk3gt vk3jy vk7lj vu2kt xplmcp wfat

W5AUC, Charles K. Smith, and Richard Glenn, Signal Office, Brooks Field, Texas

celca celah ce2ab ce3ac ce3ag ce3ab ce3bf k7kn k4aan oa4q pylaa r8brh ve2be ve3gt ve4bq va4k wfat wfbt wdde

BRS212, H. K. Bourne, 11 Elgin Park, Redland, Bristol, England

7000-kc. band

wlcae wlade wlek wlze wlsi wltd wlmk wlpx wlaf wledm wlalg wlaat wlenj wlbkf wlbsn wlamg wlbld s2bai w2avn w2qf w2bmm w2bch w2bem w2clx w2alu w2are w2afr w2vy w2bda w2box w2boa w2bfy w2bro w2wy w2acp w2ajf w2rd w2amh w2apn w2baz w2abn w2bij w2agp w3cjn w2aop w2bw w3ut w2aws w2ajh w3anh w3ado w3aso w2gq w3aoa w3ld w3ard w3bm w4aiw w4hm w4agh w4aff wlacc w4wk w4nq w4ajk w4is w4agr w4ait w4wz w5ww w5jc w5tu w4uk w5axb w8bab w8fz w8bcz w8axz w8ble w8bhz w8rh w8bae w8chd w8sx w8bcq w8wo w8bbs w8jl w8cau w8rt w8aup w8asy w8cfv w8boy w8cng w8bkl w8cnr w9cmf w9bpb w9azy w9dli w9akk w9etd w9fzl w9crd w9aid w9ara cm2s3 cmyi cmöfl cm2jm cm2yb zl4ao al4ab zl3as xpaofb xau8saz ve2dn kdv5 lx1 aulkae frear149 frear153 xf8hpg wsq xeu3bo xeu3cp ct2ac ct3aa au7kad

O. P. Taylor, Box 366, Sunnyvale, Calif.

g2lz g2od g2sw g2xv g5bj g5by g5ml g5ux g5yx g6dh g6hp g6nt g6qb g6rb g6wy g6xj g6xn g6yq f8btr f8cp f8dot f8eo f8er f8fd f8fk f8fr f8gdb f8ha f8hr f8ix f8jf f8klm f8lx f8mst f8orm f8ypz oh2npa oh5nl on4ew on4fp on4uu d4uf oz7ly sp4ar ct1bx zs4m zs5o zt5r zt6x vs1ab vs4ab file jltc j4gn ae1ax ac3fr vu2kt vu5ux pk1bh pk1jr pi4az k1cm jc9 nr2ea nj2pa rwx velbr x1j x9a zpbi kya1m k6ctj k6dtg k6dpg k6etf k6avl k7aer k7anq k7mn k7py kcb xw7eff xpa0ja xpa0zz cx1cv cx2ak py1aw py1br py2ak py3ah kfr5 ce1ah ce1ai ce1av ce2ab ce2bm ce3ac ce3ag ce3bf ce3bm ce3ci oa4h oa4o oa4s oa4q lu1ez lu2ca lu2bx lu2fi lu3de lu3dh lu4dq lu4de lu8dy lu8ei lu9dt zl1ax zl1fb zl1fw zl2ab al2ac zl2ae zl2aw zl2bg zl2bx zl2go zl3as zl3cm zl4ae zl4ao zl4au vk2ek vk2hc vk2hu vk2jc vk2jy vk2jz vk2lj vk2nx vk2no vk2rf vk2ro vk2rx vk2tw vk2zn vk3bd vk3cp vk3cx vk3dc vk3go vk3jr vk3jy vk3kb vk3lp vk3pa vk3pm vk3pp vk3rt vk3wx vk3xo vk3yn vk4bd vk4bh vk4gh vk5cm vk5gr vk5hg vk5wr vk7ch vk7lj

H. R. Twist, 38 Stanley St., Garston, Liverpool, England

7000-kc. band

wladj wlan wlarg wlaw wlawk wlbaq wlbbl wlblo wlbng wlbs wlbsn wlbvw wlmk wlnl wlnn wlsg wltk wlyb w2aaw w2aie w2ape w2apc w2apx w2ar w2asg w2asz w2auy w2avg w2avg w2avr w2bbh w2bbl w2bdj w2biv w2box w2bpa w2cb w2cuf w2cy w2cza w2fz w2nv w2rz w2sg w2tr w2uf w2wf w2zzc w3aaw w3aip w3ahh w3ahw w3anh w3apt w3aru w3avl w3aws w3ky w3nt w3wz w4afg w4ao w4ayk w4cf w4cl w4ei w4gw w1hc w1ie w4kn w4oc k4ni w4oc w4pb w4qb w4ql w4ta w4we w4we w4zp w5td w8ane w8axz w9bek w8bti w8sg w9cfj w9yja w5cm w5fl

H. W. Daly, 73 Castleton Road, Goodmayes, Ilford, Essex, England

7000-kc. band

wlack wlaxx wlbcb wlfc wlmk w2apv w2awv w2wy w3avl w8jy w9cm ct1as ct1c ct1cp ct2ac cv5or d4ad d4ddm d4hv d4ib d4kd d4kq d4mf d4nl d4rj d4ry d4kd d4kq d4mf d4nl d4rj d4ry d4utn d4xg earl31 earöl earö2 earl04 earl05 earl13 earl49 eu2ux eu3cf eu6am f8acm f8afa f8aly f8ax f8cco f8cla f8eb f8gf f8kko f8prw f8qkc f8rb f8to f8wba f8zic f8zx frearö g2cj g2gy g6hp günx g6wf g6ya g6yu hb9d helfg ilcoc ilfzi lilop la2k nn7nic nr2wd oh3na oklna ok2fz ok4y on4bc on4bz on4fh on4gn on4hc on4hl on4ia on4jc on4kb on4pj palaa palan palaq palck palfb palib palol palqq sm4xx sp5mb p3dk ti2hv

14,000-kc. band

wlanz wlawl wlbcf wlbkf wlcmx wldq wlda wldm wlhd wlii wlja wlmo wlngf wlqh wlry wlwe wlxac w2aom w2aeb w2ahz w2alo w2amm w2amq w2aog w2atz

(Continued on page 62)

Correspondence

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"As We Sow—"

Ste Anne de Bellevue, P. Q.,
Quebec, Canada.

Editor, *QST:*

I have been a member of the A. R. R. L. and have been on the air for over three years. During this time I have read of many complaints in *QST* so thought I would like to give my side of the question.

I am a man of sixty years and cannot be far from the Great Adventure so would like to voice my experience in Hamdom before shuffling off this mortal coil. This does not mean that this is my "Swan Song." N. D., but I want to be in time in case the little ticker that nearly stopped recently, may finally fail me.

In spite of my efforts, I have been unable to grasp the technical side of radio, so am forced to the conclusion that I have no mechanical mind; all I seem to know is, "when you press the button the figure works" so that my success on the air is the more extraordinary.

I have a set that I am very proud of, and my walls are covered with cards from all parts of the world. My air friends are many and my ham-life a very happy one. All this is due to the many favors of brother hams. A whole copy of *QST* would be insufficient to record all the many kindnesses I have received.

At first, hams persisted in continuing a QST in spite of me telling them that I had sufficiently bothered them. Visitors here are amazed to see the files of letters hams have sent me, all of them full of friendship and advice. One ham from New Jersey called and changed my antenna system and tuned up my set; another from the same district called and changed my set so that I could with the greatest ease change my wave band; another who hails from Maine, one of the best fellows on the air, because I told him that I could hear no DX, built me a set similar to his own, with the result that I can now hear most of the DX going. His only charge, the bare cost of material. Many things have been sent me from the States without being requested to send cash in advance.

Our local hams have spent no end of trouble and experience in order to help me out, and a trip here means a fifty-mile journey. When I ask for my bill a smile is the usual response. One came from Montreal this summer and completely rebuilt my set, and when I wanted to pay for the different things that had been added, I was told that they were "only lying around" though I believe he meant they were lying around the radio store, but wouldn't say so.

What is the result?

My radio world is a very happy one; my air friends are numerous, and many a time when wearied with pain and the anxieties of life I have sat down to my set and soon been in contact with one of my friends and after a chat have risen refreshed and happy, more ready to face the problems of life. Growing old? Yes! the body may be, but so long as I can pound brass, VE2BB will never grow old, for life will have no dull moment, and my circle of friends will be ever increasing. Complaints? None. As we treat the world, so the world will treat us. Nothing pleases me better than to be of service to a brother ham.

Our game is a great one and will do much toward the ideal of a Brotherhood of Man.

—*Chas. J. Dawes.*

A.R.R.L. Forwarding Service

807 W. Page St.,
Dallas, Texas.

Editor, *QST:*

Just a word in appreciation of your QSL card forwarding service.

I have, in the course of the past few years, been the recipient of many foreign QSL cards forwarded through your office and each one received reminds me that a word in appreciation would not be amiss. However, I have failed to take the time to express my thanks, until now when I decided the proper time was "now or never."

I think I speak for the "gang" when I say that the forwarding service is certainly appreciated, though most of us are too lax in courtesy to say so.

Please see that the proper man* gets my thanks for this service, though that is a small remuneration for his good work.

Again I say many thanks and keep up the good work. —*Edward A. Block, W5AFB*

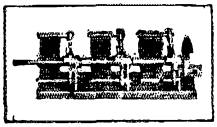
Off-Band Operation

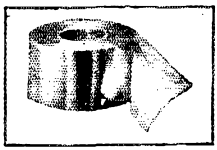
703 East 36th Street,
Oklahoma City, Okla.

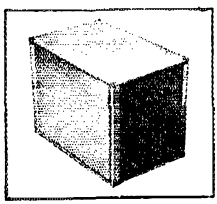
Editor, *QST:*

I would like to put in a word or so about off-band operation of supposed-to-be intelligent amateur radio operators.

*The proper "man" is a woman.—EDITOR.







THEY MEET THE DIFFERING CONDITIONS OF RADIO DESIGN

LIGHTNESS, permanent beauty, resistance to corrosion, high electrical conductivity, shielding efficiency and workability are a combination of qualities that make Aluminum the ideal metal for Radio.

Aluminum shielding insures greater selectivity, closer tuning and improves tone. It is easily worked into special shield shapes—cans, boxes or casings. It adds less to the weight of the set than any substitute metal, makes for greater compactness, and presents few limitations in matters of size and shielding design.

Aluminum condensor blades are fabricated from special ALCOA Aluminum sheet that meets new close alliances for thickness and flatness.

Aluminum foil has a high electrical conductivity and a very great covering area. A pound of Aluminum foil .0003 inch thick will cover 34,000 square inches.

We solicit inquiries on the use of Aluminum in radio, for the purposes just described—and for loud speaker frames and bases, condensors and condensor frames, drum dials, chasses and cabinets.

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Offices in 19 Principal American Cities

ALUMINUM

The mark of quality in Radio

On more than one occasion I have heard and even talked to fellows who were several meters below the forty-meter band. It's down around there where a good deal of DX is heard and these fellows who are off-band don't play fair with the rest of the gang. They usually land those DX operators first since they are down where QRM won't keep their signals from being heard.

I have told certain operators to QSY up into the band, but I still hear them down below the same as ever. This predicament should be looked into and matters like that given serious thought.

— *T. G. Banks Jr., W5HJ–W5BFW*

Impatient Hams

5 Pembroke Mansions,
Canfield Gardens,
Hampsted, London.

Editor, *QST:*

I would be glad if you will allow me to say a word or two on the subject of QSL cards.

Several American amateurs, having sent me one QSL card, have followed it up a few weeks later by sending another card, asking where mine was.

Now the United States possesses more amateur transmitters than the rest of the world put together, as we all know; as a result, an English station may work fifty or a hundred "W's" per month, and posting a card separately to each station is *not* an economic proposition.

As a result, batches of cards are sent perhaps at monthly intervals to the R.S.G.B., who forwards them via the A.R.R.L. This means that there may be a delay of a month or two.

As many U. S. A. "hams" fail to realize this, I think they would be saved considerable time and expense by the publication of this letter.

Just one more word — will amateurs the world over, if they *don't* wish to QSLL, kindly *say* so, at the time of QSO? The sending of QSL cards is a custom one is apt to take for granted; yet, out of the hundreds who have failed to send me a card, only two have *told me* not to send one to them!

— *L. A. Moxon, G6XN*

Rag Chewing

4544 Toland Way,
Los Angeles, Calif.

Editor, *QST:*

The purpose of this letter is to stimulate a little interest in the well-known art of rag chewing which most of the amateur public knows all about but doesn't know how to do.

It seems as though some fellows have the idea that a fellow who chews the rag is the "pest of ham radio" and ought to be kicked. I suppose that these fellows are the 73 type and so that leaves them out. There are a great number who think that the usual run of topics are YLs, WX, DX and ham radio and therefore do not want to talk about such things because they are tired.

Talk about your needlework or your pet theory of the evolution of mankind and if hams are considered humans or not. I'll bet that once you get

started chewing the rag, nine chances out of ten, you'll get more kick out of that than trying to work the impossible DX. You can chew the rag with your DX and get twice as much fun out of it!

— *Vincent W. Berry, W6DHM*

QSA System

10152 123rd St.,
Richmond Hill, L. I., N. Y.

Editor, *QST:*

Just a few lines from a new ham about a small matter that seems to bother quite a few of our fellow amateurs. The matter is the proper use and *interpretation of the new QSA system.*

I have been in the "shack" of fellow amateurs when they were QSO'ing with fellows in their immediate neighborhood and strange to say they were sorely disappointed at receiving a mere QSA 3 (readable, but with difficulty). Immediately after this happened the same amateur would "work" a station some few hundred miles farther away, and receive QSA 4 to 5 (very good, readable; to excellent, very loud and easily readable). Said amateur seemed very puzzled at this occurence. The fact was that he did not comprehend the primary intent of the QSA system. This amateur took it for granted that his signals were very loud a few hundred miles away, while hardly audible or very weak as to audibility in his immediate neighborhood.

Do not forget, fellow "hams," that QSA code was composed for an individual QSO, and not meant to stress the audibility of your signals as the old "R" system did.

I think the best remedy for this situation, fellows, is to ask the fellow you are QSO'ing to please give you a detailed description of the apparent strength of your signals. QSO3 may indicate just the usual QRM, QRN, power leaks, or low filament supply on the receiver of the station you are working, not the fault of the transmitting station. The discovery and surmounting of such obstacles go to indicate the real worth of the modern "ham."

— *Tom Norris, W2ATT-W2BFC*

I.A.R.U. News

(Continued from page 45)

Uruguay: Resident, Casilla de Correo 37, Montevideo.

U.S.S.R.: S.K.W., Polytechnic Museum 124, Moscow.

It will be observed that in some cases we advise sending the cards to the A.R.R.L. This is on account of radio conditions in those particular countries — we don't want to take any chances of endangering the amateurs concerned. In a few other cases we have noted that cards should always be sent within an envelope, the call to be on the card, but *not* on the envelope. Have the envelope addressed simply to the QSL forwarding address given in the list.

Incidentally, this is a pretty good policy to follow for all countries.

SM Own an S-M 677 —What More Would You Want?

A 50% gain in output plus 75% less hum—that's what the two '45 tubes in push-pull mean in the new S-M 677 light-socket amplifier. One '27 tube in the first stage in conjunction with the famous Clough-system transformers gives a maximum of amplification with a minimum of distortion. The power unit furnishes not only ABC power to the amplifier itself, but in addition heater current at 2½ volts, 9 amperes and 180 volts for B and C supply, as required for the S-M 712 tuner.

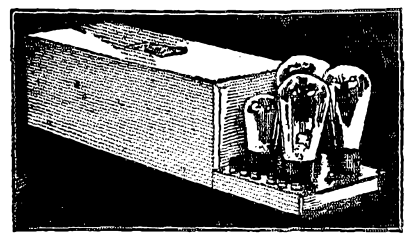
The 677 amplifier is a leader among S-M quality products, yet priced within the reach of all.

Tubes required: 1—'27, 2—'45, 1—'80. Operating power is obtained from any 105 to 120 volt, 60 to 50 cycle source. Size, 21" long, 5⅞" wide, and 5¼" high.

The 677 Power Amplifier as described above, factory wired and tested, packed in shipping case. RCA licensed, complete less tubes, only $58.50.

Total cost of component parts in 677 only $43.40.

67725 Power Amplifier (25-cycle) is the same as the 677 but for 25 cycle current supply. Price, $72.50.

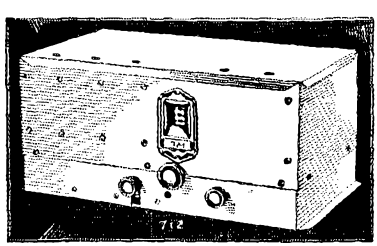


The 677 amplifier will operate 50 magnetic or 9 dynamic speakers, and is intended to be used with S-M 851 electro-dynamic speakers or any other standard type having a 70 to 120 volt (1900 to 2000 ohm) field and an output transformer having center-tapped primary. The 255R special input transformer provides an unusually high ratio, ideal for phonograph-pickup input, because of the resultant higher voltage impressed on the grid of the first tube

Newly Developed S-M Custom Receivers

S-M-712 Tuner

Going even beyond the famous Sargent-Rayment 710 in selectivity and sensitivity, the S-M 712 with band filter and power detector far outclasses competition at any price. New shielded coils effectively eliminate the stage verniers of the 710. Only 3 controls: on-off switch, tuning, and volume. All-electric, and feeding perfectly into any power amplifier, the 712 is truly an engineering triumph. Ideal for mounting complete as r.f. tuner on any rack-and-panel installation—by merely sinking control knob shafts through panel and cutting a small hole for dial escutcheon. Tubes required: 3—'24, 1—'27. Price only $64.90, less tubes, in shielding cabinet. Component parts total $40.90.



S-M-712 Tuner

722 Band-Selector Seven

Combining practically all the advanced receiver features the S-M 722 is, without question, the outstanding buy of the year at $74.75 net, completely wired, less tubes and cabinet. 3 screen-grid tubes (including detector), band-filter, 245 push-pull stage—are all included in the 722. Component parts total $54.90. Tubes required: 3—'24, 1—'27, 2—'45, 1—'80.

735 Short-Wave Receiver

The first a.c. short-wave receiver on the American market, the 735 is easily first in performance as well. Newly-designed plug-in coils, a regenerative power detector, a screen-grid r.f. stage, an excellent S-M audio amplifier, built-in power unit—all these combine with other features to present astonishing quality in a remarkably inexpensive and flexible receiver. Price, wired complete, with built-in ABC power unit, less tubes and cabinet, only $64.90. Component parts total $44.90. Tubes required: 1—'24, 2—'27, 2—'45, 1—'80. Two extra coils, 131P and 131Q, cover the broadcast band at an added cost of $1.65.

For battery use (735DC) price, $44.80, less cabinet and tubes. Component parts total $26.80. Tubes required: 1— 22, 4—12A.

Detailed descriptions of new receivers, parts, and other new developments as they are produced in the S-M laboratories are published in THE RADIOBUILDER before announcement anywhere else. The amplifier and receivers on this page were described in a recent issue. Write at once for a sample copy.

Custom builders have profited immensely through the Authorized S-M Service Station franchise. If you build professionally, write us.

SILVER-MARSHALL, Inc., 6409 WEST 65TH ST. CHICAGO, U. S. A.

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6409 West 65th St., Chicago, U. S. A.

....Send your new fall catalog, with sample copy of the Radiobuilder.

....For enclosed 10c, send five new S-M Data Sheets, including those on 722, 712, 735, and 677.

Name.....

Address.....

Vasco Abreu, PY1AW, worked all continents in one night. Anybody else in this class?

BRITISH NOTES

By J. Clarricoats, G6CL

With the approach of autumn, amateur activities are increasing, but during the late summer conditions were poor on most bands except after 2200 GMT on 14 mc. On this band static was strong, but during most evenings DX could be worked with even low power. On the whole, North and South America (Brazil, especially) came in with regularity, but the absence of South African and distant Asiatic stations was particularly noted. Australasia became more reliable toward the end of the summer, between 0600 and 0800 GMT. No outstanding performances were reported on this band, but many British stations have expressed disapproval of certain stations who persist in using unrectified a.c. Such stations are spoiling operating conditions, and unless an endeavor is made to improve the tones, the 14-mc. band will very soon become as bad as the 7-mc. band.

On this latter frequency conditions continue to go from bad to worse, and even a local QSO is almost impossible, owing to the interference caused by a.c. and 'phone stations. American stations have been heard on the 7-mc. band at about 0600 GMT, but very few contacts with Great Britain seem to have been effected.

Conditions on 28 mc. were poor, but with the approach of autumn an improvement is expected. Certain development work is being carried out on 56 mc., but no definite two-way work of a DX nature appears to have been accomplished.

NEW ZEALAND

By Ed. McKay, ZL1BE

In the N.Z.A.R.T. we now have about 178 members, of which number about two-thirds are active transmitters, although most low-powered on account of the cost of material, etc.

At the time of writing, considerable interest is being shown in connection with the reception of the signals emanating from the Byrd Expedition. Standard receivers are being installed at various centres and watches and logs will be kept, thereby obtaining reliable data with regard to skip, fading, and best times, etc.

Local interest was raised when the local gang put on a QRP tests, limiting the power to 45 volts on one tube. Some remarkable results were obtained.

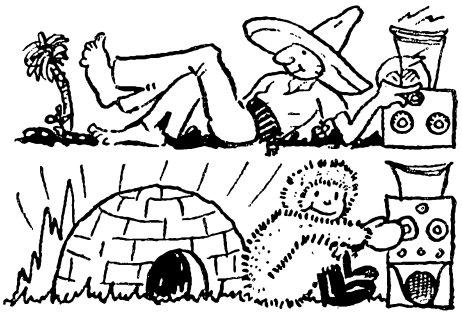
It might be mentioned that it is expected that the N.Z.A.R.T. will soon be admitted into membership of the Union.

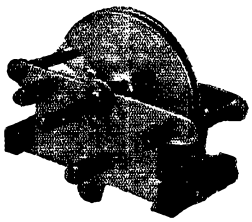
SPAIN

By Miguel Moya, Pres. EAR Assoc., EAR1.

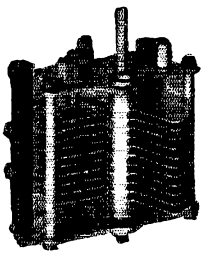
The EAR Association will celebrate its second anniversary during the latter part of November

"FROM PANAMA TO ALASKA"





Taper plate 191-E
Ideal for short wave receivers



Transmitting type 164-B
Capacity—.00022 mmfd.

MARTIN BENDER
LICENSED
ELECTRICAL CONTRACTOR
1343 HERSCHELL STREET
BRONX, N. Y.

July 30, 1929

Allen D. Cardwell Mfg. Corp.
Dear Sirs:

After using your products for the past five years and to be sure that I may use the proper condenser for the specific purpose I am asking that you send me literature concerning condensers for medium powered transmitters.

So far up to date I have used your products from Panama to Alaska, high power, low power, long wave, short wave, yet never have they broken down under trial and upon this rather vigorous performance I wish to congratulate you and your engineers who have placed upon the radio field a product that not only is consistently referred to as a standard but is the standard.

Hoping to receive the desired literature at an early date, I am,

Respectfully yours,

Martin Bender

CARDWELL CONDENSERS

◆ ◆ ◆

RECEIVING Condensers in all standard capacities. Transmitting Condensers for powers up to 50 K. W—Fixed (Airdielectric) transmitting condensers. One for every tube and purpose, and each one an engineering masterpiece.

We have prepared literature which we would like you to have. Requests will be promptly filled. Now, more than ever—Cardwell Condensers are "The Standard of Comparison."

Allen D. Cardwell Mfg. Corp.
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Brooklyn, N. Y.

◆

IF YOUR DEALER DOES NOT STOCK ✣ ✣ ORDER DIRECT

by holding a convention in Barcelona during the great International Exposition scheduled for that city.

During the exposition, the EAR Association will have a booth and will install short-wave apparatus, both transmitting and receiving. There will also be QSL cards from all over the world, literature, etc., and the Spanish section of the Union will do its best to see that amateur radio is given plenty of publicity at this international exposition.

At our own amateur convention, many high government officials are expected to be present; we also hope to have the pleasure of welcoming many foreign amateurs.

INDIA

From Mr. S. N. Kalra, VU2DF, at Lahore, India, we get a lot of interesting information with respect to amateur work in India. The maximum power allowed by the Postal authorities, for all general work, is 10 watts. The officially-assigned prefix is "VU."

Mr. Kalra states there are few amateur stations operating with regularity. DX conditions are none too good for many months of the year; Europe is heard with fair regularity, but North America short-wave signals are conspicuous by their absense most of the time.

Having saved one of our pet thoughts for the very last, in the October issue, we are going to do the same thing again this month.

It won't be very long now before New Year's will be with us. The thought we have in mind is this: It would be great for everybody to get on the air about midnight, local time, and pass on New Year's greetings to each other and to the hams in the time belts to the west, either before or after midnight hits them.

It is a great thrill to sit in on New Year's, and hear the greetings starting up in Eastern Europe, and then central Europe, and then swinging across to the States, then to the Pacific Coast, and on across to New Zealand, Australia, and Asia.

Try it.

The New England Division Convention

Bangor, Maine

THE annual Maine Section, New England Division Convention, was held at Bangor on September 6 and 7 under the auspices of the Queen City Radio Club. A large, loyal and enthusiastic bunch was on hand, the registration including delegates from Canada, New Hampshire, Massachusetts and other points in addition to those who came from all parts of the Pine Tree State.

The convention sessions opened at the Y. M. C. A. with the address of welcome and the Traffic Session at which the S. C. M. and the

THE AMATEUR'S BOOKSHELF

Readers of *QST* appreciate the need for good radio books. What we consider to be the best standard text books are handled by A. R. R. L. Headquarters for the convenience of members of the League and readers of *QST*. Those listed below pretty well cover the requirements of the average amateur or experimenter.

The Radio Amateur's Handbook, by F. E. Handy, Communications Manager, A.R.R.L., and R. A. Hull, Director, A.R.R.L. Technical Development Program. Fifth edition. Over 53,000 copies in use. A manual of amateur short-wave radio-telegraphic communication. The standard text book and manual for transmitting amateurs. Contains immense quantity of data and information valuable to experimenters and all interested in any phase of radio. Blue-and-gold Paper Cover. 232 pages, 188 illustrations **$1.00**

The Radio Amateur's Handbook, Cloth Bound Edition. Except for binding, identical with regular edition **2.00**

Radio Simplified, by Kendell & Koehler, revised by J. M. Clayton **1.00**

How to Pass U. S. Government Radio License Examinations, by Duncan & Drew **2.00**

Radio Traffic Manual and Operating Regulations, by Duncan & Drew. A book for commercial operators **2.00**

Radio Operating Questions and Answers, by Nilson & Hornung **2.00**

Experimental Radio, by Prof. R. R. Ramsey. Third Edition. A splendid manual for the student and experimenter describing in detail 117 experiments of particular value and interest to the amateur desiring a complete understanding of radio work. **2.75**

Elements of Radio Communication, by Ellery W. Stone **3.00**

Practical Radio Telegraphy, by Nilson & Hornung. 380 pages, 223 illustrations. A text for prospective commercial radio operators **3.00**

Radio Engineering Principles, by Lauer & Brown. An excellent general textbook **3.50**

Radio Theory and Operating, by Loomis. A good text book for commercial and amateur radio operators **3.50**

Manual of Radio Telegraphy and Telephony, by Commander (now Admiral) S. S. Robinson, U. S. N., published by the Naval Institute. "Ranks with the very best of all published radio matter. . . . Not only worth its cost but is perhaps the best radio book that ever came to this desk." —*QST* Book Review..... **4.00**

Thermionic Vacuum Tube, by H. J. Van der Bijl **5.00**

Radio Manual, by Geo. E. Sterling, edited by R. S. Kruse. For students, operators and inspectors **6.00**

Principles of Radio Communication, by Prof. J. H. Morecroft. An elaborate general textbook. 935 pp., 5¾ x 9 ..... **7.50**

Practical Radio Telegraphy and Telephony, by Duncan & Drew. An extremely good book **7.50**

Ideas for The Radio Experimenter's Laboratory, by M. B. Sleeper..... **.25**

Prices include postage

Read 'em and learn!

AMERICAN RADIO RELAY LEAGUE, INC.

1711 Park Street **Hartford, Conn.**

C. M. from Headquarters held forth. A brief but interesting discussion period followed this meeting. Code contests were next arranged, entrants being arranged in three groups according to "commercial, amateur or beginners" experience, the prizes being awarded to the high men in each group. Stunt night was quite appropriately held in the gymnasium at the "Y." It was well attended and enjoyed by both participants and observers. The latter part of the evening gave visitors opportunity to inspect the different local amateur stations, this of course resulting in group discussions of circuits, DX and brass pounding into the wee sma' hours.

Saturday morning opened with sightseeing tours to such points as the Electrical Laboratory and University of Maine campus, to the Radio Corporation's long-wave receiving station at Belfast, to Lucerne-in-Maine and to Bangor and Brewer points. A meeting of all the U. S. N. R. men present was held during the morning. Lt.-Comdr. William Justice Lee addressed this meeting and provided a lot of interesting and timely information. Dr. Bailey of Boston examined a goodly number of recruits to the U. S. N. R. ranks who took the first steps toward enlistment in the Communication Reserve. The rifle match held on the "Y" range was rare sport and a number of excellent marksmen were disclosed. The technical meeting Saturday p.m. disclosed Dr. E. C. Woodruff of State College as the principal speaker. The subjects of r.f. chokes and T. N. T. transmitters were thoroughly aired to the satisfaction of all concerned. It is a question whether "the smallest crystal oscillator in captivity" or the T. N. T. transmitter provoked most interest.

So many nice things took place that space hardly permits us to mention all that happened in detail. Needless to say, the banquet at the Penobscot Exchange was a fitting event to bring such an enjoyable occasion to a close. Director Best had his hands full as toastmaster with an exceptionally long list of speakers to introduce — and with the awarding of generous quantities of apparatus prizes donated by the radio manufacturers. Radio Supervisor Kolster, P. J. Bell, District Supt. of Plant N. E. T. & T. Co., Lt.-Comdr. W. J. Lee, F. E. Handy of Headquarters, and many others were speakers. Col. Herbert L. Bowen, U. S. Army, sounded the keynote of the evening with his remarks on the value of organization, and *loyalty* to organization. After the speakers had finished, the Lee cup was awarded to G. C. Brown of W1AQL for the highest individual achievement in naval communication reserve organization work during the past year. Bids for the next Maine Section convention were requested and Portland was voted the popular choice of the delegates. With plans for meeting at the Elm City next year, and with congratulations and thanks to the Q. C. R. C. for a successful and enjoyable convention the gang finally left the banquet hall, some remaining for more sightseeing tours or hamfesting Sunday.

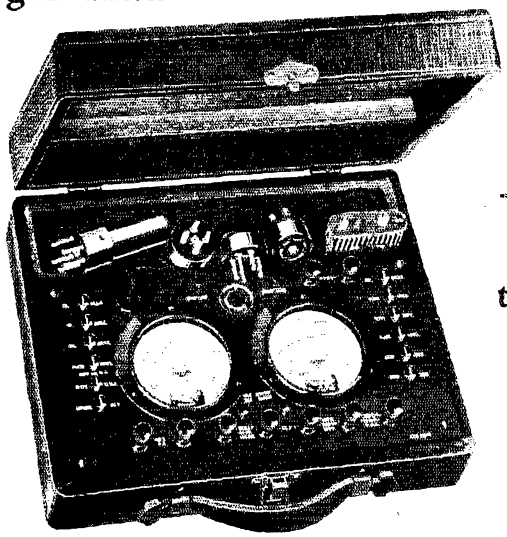
— *F. E. H.*

The lowest priced, high grade set analyzer. Dealers' Price . . . $73.12

Used by many of the largest radio organizations

Makes every essential radio field test

Endorsed by radio manufacturers and engineers



Simple to operate. Doesn't require a radio engineer to use it

Backed by the most complete Radio Data Service

Built to Specifications of Servicemen

GOOD Service equipment pays for itself. *If you don't have good service equipment, you pay for it over and over again in wasted time, costly service, troublesome complaints, and loss of business.* The Jewell Pattern 199 represents the greatest value available in field service equipment today.

Built to the highest standards of quality, and providing every essential field test, the Jewell Pattern 199 is a marvel of simplicity.

Developed to accurately meet the needs of radio service — backed by the most complete radio data service — the Jewell Pattern 199 is the lowest priced, high-grade set analyzer on the market.

The price of the Jewell Pattern 199 is so reasonable that you can't afford to have your servicemen use inferior or obsolete equipment. It will pay you to build your service around Jewell Pattern 199's.

The latest edition of the Jewell booklet, "Instructions for Servicing Radio Receivers," is just off the press. It contains data on receivers of 38 manufacturers, or 139 of the most popular sets. This booklet is an example of the complete service rendered to radio servicemen by Jewell. Write today for a copy for your files.

29 YEARS MAKING GOOD INSTRUMENTS

JEWELL

199 Set Analyzer

The UV-845

(*Continued from page 26*)

be connected in the grid lead to each tube. These may have a resistance value of 100 ohms each and should be connected as near to the tube grid terminals as possible. This precaution will preclude the possibility of the tubes oscillating at ultra-high radio frequencies.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of *QST*, published monthly at Hartford, Conn., for April 1, 1929.

State of Connecticut } ss:
County of Hartford }

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

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The American Radio Relay League, Inc., Hartford, Conn.; Editor, Kenneth B. Warner, Hartford, Conn.; Managing Editor, none; Business Manager, Kenneth B. Warner, Hartford, Conn.

2. That the owners are: (Give names and addresses of the individual owners, or if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock). The American Radio Relay League, Inc., an association without capital stock, incorporated under the laws of the State of Connecticut. President, Hiram Percy Maxim, Hartford, Conn.; Vice-President, Chas. H. Stewart, St. David's, Pa.; Treasurer, A. A. Hebert, Hartford, Conn.; Communications Manager, F. E. Handy, Hartford, Conn.; Secretary, K. B. Warner, Hartford, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements, embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct, or indirect in the said stock, bonds, or other securities, than as so stated by him.

5. That the average number of copies of each issue of this publication, sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is .....
(This information is required from daily publications only.)

K. B. WARNER.

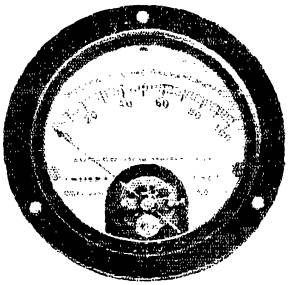
Sworn to and subscribed before me this 31st day of October, 1929.

George E. Boesch
(My commission expires February 2, 1933.)

Strays

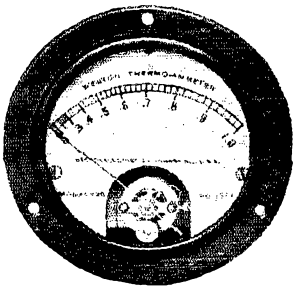
The list of "Fixed and Land Stations" may be obtained from the International Bureau of the Telegraph Union, Radiotelegraph Service, Berne, Switzerland, for $1.50, or from the Radiomarine Corporation of America, 66 Broad St., New York City, for $2.00.

The Radio Season Is On



Model 425 Thermo-Galvanometer

AIR HUNTING—that's what millions of devotees of the great, indoor-outdoor fall and winter sport are now thinking about.



Weston Model 425 Thermo-Ammeter

RADIO sets to be conditioned—circuits gone over and new tubes installed. It's just like oiling up guns and getting a supply of cartridges for that other great annual sport—GAME HUNTING.

In air hunting, electrical measuring instruments are your licenses—you can't operate satisfactorily or safely without them. Moreover, your instruments, like your licenses, must be backed by authority or else they won't do you any good. Weston Miniatures are the first choice and the last word in radio. From the great broadcasting station to the individual radio receiver Weston stands for all that is best and authoritative in electrical measurement.

Amateur transmitters, radio service men and dealers—manufacturers—research laboratories and technical schools—all whose business or scientific interest is concerned with radio developments know that Weston is synonymous with highest quality and the most dependable service.

Supplied in a variety of models and ranges. Reasonably priced.

Weston
PIONEERS SINCE 1888
INSTRUMENTS

WESTON ELECTRICAL INSTRUMENT CORPORATION
602 Frelinghuysen Avenue :: Newark, New Jersey

Calls Heard

(Continued from page 47)

w2bai w2bcg w2bda w2bl w2boa w2bon w2boz w2bpn w2bui w2cu w2cuq w2cv w2el w2gp w2ig w2ka w2rs w3adm w3apn w3apo w3auo w3bai w3bk w3bpa w3cee w3cjn w3gf w3pf w4ax w4ef w4tn w8aav w8adm w8aq. w8alm w8axa w8bck w8cib w8enh w8dcm w8djh w8djv w8dpo w8duw w8ke w8zza w9aed w9bqe w9bwv w9etb w9fbv w9mt ar8ufm ce2ab ce2ah ce3ac ce3bf ce3bl cm2jt ct1by ct1bx d4kd d4du d4kg d4rj eu2br fm8amo fm8fz fm8gk fm8gkc fm8kik fm8rit g2ax g2bm c2nx g5bz g5rm g61b g6nf g6rm g6lb g6nf g6rm g6sm g6tx g6ut g6yw g6xn kfr5 lu2et lu2fi lu3dh lu9dt on4gn on4ja py1aw py1be py1ca py1er py2ag su8an uocy uory ve1dm ve2bb ve3bm ve3cs ve3vs vo8ae vu2dr vu2kt ddea cma2

G6YL, Miss Barbara Dunn, Felton, Northumberland

w1aof w1awk w1bdo w1bx w1fc w1rp w2a1u w2cx1 w2jc w3cjn w4akq w4zp oaeo 55x xoz700 y12ad au7ao xau7skw ctbj fga fnfj kgfc lw1 oex oupa rwy sdpa sgva ws1 8fse

A. G. Weynton, 1 Harcourt Flats, Brierley St., Cremorne, Sydney, Australia

14,000-kc. band

w1af w1bjd w2amr w2aof w2bkg w2nr w3bm w3ut w4adb w5aec w5aep w5atf w5atu w5bek w5rg w6agy w6app w6aqj w6avj w6awp w6awz w6ax w6bax w6bnu w6bto w6bw w6bz w6eut w6ezm w6ezw w6dev w6djw w6djx w6dmk w6dpa w6dtu w6dwi w6dyo w6efc w6ek w6eug w6eop w6ju w6ku w6nh w6qy w6vz w7abg w7agd w7afo w7aij w7axh w7cw w7eo w7fw w7kq w7mo w7nr w7si w7un w8afo w8aju w8ajv w8apn w8ayo w8dvj w8dgz w8gz w8li w8wl w9ban w8dih w9diy w9ef w9end w9fxj ce1ah ce11k ce2bm d4uj egeu7axq f8fd f8pro f8fr f8pgo f8hz f8eo f8jd f81x f8ep f8rrr f8hr g5wd g6wi g6mq g6by g5ml g21z g5bz i8ba j1dcx k4bh k6acw k6akw k6bxw k6c1j k6dtg okaa2 ok1fm oq3s oa4h on4fp sp3ar ve4cu x9a u0sx x1j xm2px xn3 xn4 xf5 xo4

W1BUX-W1CMX, Douglas Borden, Touisset, Mass.

ar8ufm ce1ah ce1ai ce1as ce1av ce2ab ce3ac ce3bm cm2jt cm5cx cmz72 ct1aa ct1ae ct1br ct1bx ct1by ct2ab ct3aa ct3am cw1cx cx1oa cx2ak ear10 ear18 ear21 ear37 ear62 ear65 ear74 ear91 ear98 ear113 ear116 ear155 ei2d ei7e ei8b ei8c es3cx eu6ak f8aap f8aja f8axq f8azo f8bf f8bl f8b1g f8cab f8ep f8ct f8da f8dmf f8dot f8dox f8ef f8eo f8er f8faf f8fk f8fr f8fst f8gdb f8gdf f8grm f8ha f8he f8hm f8ho f8hr f8hz f8il f8ix f8jc f8jf f8k1m f8kv f8kz f81da f81gb f81x f8mg1 f8mrg g8mst f8oa f8o1u f8orm f8pam f8pro f8ra1 r8ra2 f8rbp f8rcm f8rrm f8rrr f8rmf r8rhj f8rko f8rv1 f8sm f8sup f8swa f8toy f8tsn f8wb f8whg f8wkz f8wrg f8xyo f8ypz f8zb f8zic f8zx f8nm fk4ms fk4cr fk6cr fm8gko fm8jo fm8rit f8smu fmtun1 fmtun2 fq8gom fq8hpg fqpm g2ax g2bm g2cx g2dz g2gf g2hh g2hp g2kf g2km g21z g2nu g2oa g2od g2ow g2qv g2sw g2ux g2xv g2xy g2yu g5ad g5aq g5bd g5bj g5br g5bz g5da g5e1 g5fs g5gq g5gy g5jo g51w g51y g5m1 g5mq g5ms g5p1 g5qa g5qf g5qv g5rm g5rs g5ru g5sy g5ub g5uf g5uq g5uw g5ux g5vm g5wk g5wp g5yk g5za g5bd g6br g6bx g6ci g6cj g6cl g6cr g6da g6dh g6ge g6gs g6gz g6hp g6ia g6km g6ko g61b g61k g6me g6nf g6nt g6nx g6uh g6uj g6us g6ut g6uz g6vp g6w1 g6wn g6wo g6wy g6xb g6xe g6xe g6sg g6xj g6xn g6xq g6ye yq g6yr g6za gi5nj gi6mu gi6yw d4aar d4abg d4al d4an deby d4dkf d4fw d4go d4go d4ib d4j1 d4kg d4ku d4kza d4ns d4ox d4tv d4uah d4uak deuo d4uj d4vp d4wa d4xn d4xy d4yo d4yt haf3an haf3ca haf3x haf3xx haf6b haf8b ilcoc ilg1 k4akv k4kd k4ni laig laiw nj2pa oa4j oa4q oh2nad ok1ab ok1a ok1m ok1rv lu2bx lu2ca lu2fi lu3de lu3dh lu3fa lu3fk lu3pa lu4da lu4d2 lu6fj lu8dy lu8en lu9dt on4au on4bc on4bu on4bz on4ea on4eu on4fe on4fh on4fm on4fp on4fq on4ft on4gg on4gm on4gn on4gw on4hc on4hp on4ia on4ic on4ja on4jj on4lo on4ro on4rs on4te on4us on4uu on4vo on4vu on4ww onr33 oz5a oz7b1 oz7jo oz7y oz7z pa0aq pa0dm pa0dw pa0fb pa0f1x pa0fp pa0fr pa0gt pa0hb pa0kv pa0mm pa0qf pa0sb pa0vd pa0vn pa0wim pa0wj pa0wr pa0sg pa0zf pb7 pb7w py1aa

EFREM ZIMBALIST (center), the famous Russian violinist, aids in developing the marvelous tone quality of Crosley radio in New York. Powel Crosley, Jr., president of the Crosley Radio Corporation, receives the artist's comments, suggestions and advice, while Henry P. Joslyn, the young composer (right), listens with keen interest.

TONE QUALITY NOW TESTED

by AMERICA'S foremost musical artists

POWEL CROSLEY, JR., in his search for finer tone quality, has gone a step beyond the laboratory — a step further than radio has ever gone before. And in doing so, he has provided you with a sales idea that will place Crosley radio above and apart from all other sets!

Briefly, the idea is this: Crosley has actually engaged the nation's leading musical artists to give Crosley engineers the invaluable benefit of their experience. They listen to Crosley sets, comment, advise. . . . Under their guidance is achieved a marvelous tone quality that mechanical tests alone could never attain.

Naturally, this idea is being given the publicity it deserves — full pages in the leading national magazines and farm papers. And it is being backed by sets that embody every modern feature — *at the lowest prices in radio history.* Your distributor will gladly arrange to have you prove this to your own satisfaction.

THE CROSLEY RADIO CORPORATION
Powel Crosley, Jr., Pres.
Cincinnati, Ohio
Home of WLW

You're there with a **CROSLEY**

pylad pylah pylaw pylbe pylbr pylbs pylca pylcd pylcl pylcm pylcr pylib py2ad py2aj py2ak py2ax py2ay py2az py2pa py2bc py2bf py2bg pyabk py2ih py2ii py2ik py2qa qq1a rv1g rx1aa py1e sm5rg sm5tm sm5wg sm6ua sm6zb sm7to sp3ar sp3fg sp3kv sp3kx sp3lp sp3pb sp3py1 sp3yl spps su8an su8gm su8kw su8rs su8wy ti2ags ti2ca ti2hv un7ww vk2dy vk2h1 vk2jf vk2jw vk2lj vk2lm vk2no vk2ns vk2ow vk2re vk2rx vk3cx vk3kb vk3pa vk3pp vk3wx vk4rb vk5bj vk5hg vk7cw vo8ae vo8an vo8ei vo8me vo8wg vp5oux vq2bh x1g x9a yi1mdz zp1ac zs6z zt6x ap1 1g feai gx kfrt kibq kofd kgfx onva xok1fm xoz7so xoz7xu xpa1l1 xpa0zz xf8wb wdde

W1ABG, Al Giddis, 53 Lamb St., Lowell, Mass.

7000-kc. band

cx7 oz7nn vk3pp

14,000-kc. band

ce1ah ce2ab cm2jt ct1aa ct1br ct1bx ct3aa d4xn ear21 f8btr f8df f8eo f8fk f8gdb f8zx g5bd g5bj g5by g5ux g6bd g6nf g6hp g6oo g6rb g6uj g6vp g6w1 g6wy haf8b i1bo i1to kfr5 k4aan k4kd k4ni 1u2ca 1u3pr 1u9dt nj2pa oc1ya on4ca on4fm on4fp on4ft on4gn on4gw on4ww pa0wim pa0wj pa0qf pylaa pylaf pylaw pylbr pylca pylcm pylcr pylcq py2ad py2ag py2bg py2ij py2ik sp3kv ti2hv ve5js vk3wx vo2ae vo8me x9a xf8wb wdde

W8AFG, Paul Adanti, 3 Hulbert St., Auburn, N. Y.

14,000-kc. band

ce1ah ce2ab ce2ac ce3ac ce3bf ct1aa ct1ae ct1au ct1bx ct1by ct3a d uj d4xn d4yt ear16 ear21 ear62 ear74 ear98 ear116 f8aap f8aja f8axq f8acj f8act f8btr f8et f8eo f8er f8dmf e8da f8gdb f8fr f8he f8hc1 f8mrg f8mop f81gb f8pro f8oa f8toy f8orm f8rmf f8wb f8xd f8xh f8zx fm8gkh fm8rit fm8gkh fm8rss g2ax g2zp g2od g2bm g2nm g5by g5bj g5bz g5bd g5m1 g5rm g5wk g5yx g5ux g6bd g6dh g6ei g6hp g6qb g6pa g6nf g6nt g6pa g6pp g6rb g6rw g6vp g6wy g6xb g6jx g6xn g6za gi5wd i1g1 k4akv k4aan k4ni 4kkd kfr5 kdv5 k6a1m 1u2ca 1u2gp 1u3dh nj2pa pa1fp pa1fr pa1fw pa1gw pa1qf xpa1ja ok1rv py1aa py1ab py1ae py1aw py1ah py1ib py1ca py1id py2ad py2ak py2ax cm2cf cm2jt cm5cx su8rs su8an sm6ua vk2jw vk3cp vo8ae vo8an z12ac z12be x9a x9b zs4m wdde rwx

K6CIB, L. A. Walworth, Honolulu, T. H.

w4ao w5beb w5bek w6agr w6agx w6ajf w6akk w6ann w6ary w6aul w6ave w6awn w6ax w6axe w6axm w6axw w6agn w6bbe w6bbg w6bbj w6bby w6bib w6bjw w6bqk w6gtu w6btz w6bzr w6ega w6egj w6eha w6eib w6enn w6epp w6exw c6dcm w6dfg w6dg w6dni w6doj w6dpw w6dw w6dwa w6dzx w6eaa w6eak w6eao w6eau w6ebg w6ebn w6efo w6egh w6egm w6egt w6egu w6egv w6ehi w6eiv w6ekw w6ekk w6eos w6etj w6evv w6hs w6ju w6of w6og w7aaa w7aiz w7ajw w7alk w7alm w7ans w7ao w7as w7bb w7bq w7dd w7dp w7ic w71g w9ara w9axj w9ciy w9dgs w9dwn w9eer w9fmx z13cm

Louis B. Cox, Box 306, Shelley, Idaho

7000-kc. band

av3 cx7 k1ce k1cm k1cy k1se k1ya kdvh k6axw k6bqh k7ak k9p1 om2rc pmz pk3bm ti2hv vk2aw vk2gr vk2je vk2k1 vk2ow vk3hs vk4do vk4vk vk4wh vk5cm vk5gr vk5it vk5ti vk71j v1am x9a x29a

W2AVP, Maurice G. Suffern, 607 W. Beech St., Long Beach, N. Y.

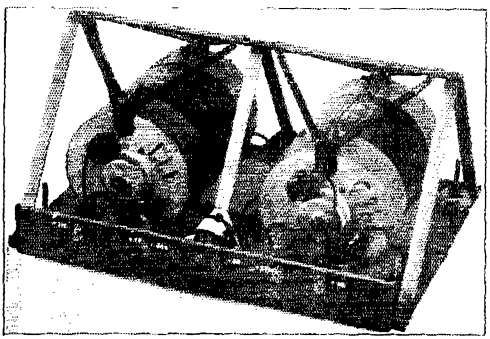
(Heard while at anchor in Barrios, Guatemala, Central America.)

7000-kc. band

w1bcb w1qv w1mk w2a1u w2asy w2cx1 w3afx w3alf w3ard w4acy w4ahz w4ao w4gk w4hm w4kv w4rz w4si w4sy w4va w4vk w4vz w5aem w5ain w5apg w5aqe w5axs w5bhv w5eu w5hy w5qa w5qj w5td w5ww w6bpm w6dob

BARGAINS

ARMY AND NAVY RADIO SURPLUS

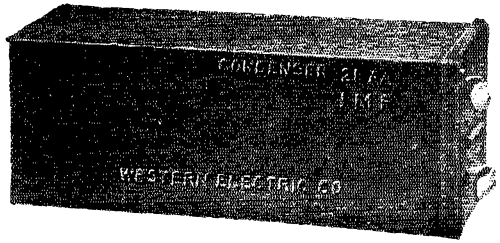


Western Electric Dynamotor System No. C. W. 927. Two 27/350 volt dynamotors in shock-proof hanger. May be used in parallel to give 160 mils at 350 volts, or in series, giving 80 mils at 700 volts. Can be used to operate transmitters up to 50 watts power from 32 volt D.C. mains. Ideal for Delco systems.
Two dynamotors in hanger $25.00
Single dynamotor without hanger 15.00

Western Electric Switchboard C. W. 928. Control board for Dynamotor System, C. W. 927. Consists of starting switches, fuses, 0-50-500 volt voltmeter with switches for testing main lines and output. Also contains complete filter system. Very special $8.00
Dynamotor, Western Electric 12/350 volts, C. W. 1056 mounted on heavy bakelite base, complete with filter, 80 mil output 18.00
Dynamotor, General Electric Navy Airplane, 24/1500 volts. Aluminum frame, unusually good for airplane test work. Specially priced 32.50
Dynamotor armatures, General Electric triple commutators, two sizes. D. C. 12/750 volt and 24/1500 volt, complete with ball bearings (build field and save $30 ..... 10.00 and 12.50
Ammeter, Westinghouse, type C. A., either 0-1, 2 or 3 amps., zero adjustment, flush mounting. State size .. 5.00
Ammeter, Thermo-couple, Weston 425, 0-7 amps., complete on bakelite base with large double throw knife switch 7.50
Ammeter, D. C. Westinghouse type PX2, 0-5 regular price $10.00 ..... 5.00
Ampere hour meter, Sangamo, Battery charge and discharge, type MS, 2 sizes, 0-300 and 0-500. List $50.00 ..... 10.00
Milliammeter, Westinghouse, type C. A. 0-500, zero adjustment, flush mounting 5.00
Voltmeter, Westinghouse, type C. A. 0-25, zero adjustment, flush mounting 5.00
Voltmeter, Westinghouse, A. C. 8" diameter with external resistance 0-175 volts 12.50
Voltmeter, Westinghouse model PT, 3 scale, 0-5, 0-7.5, 0-150 for measuring A, B and C voltages, portable bakelite case. Special 3.00
Motor Generator, Crocker Wheeler, 110 D. C., 206 A. C., 500 watt 500 cycle, ball bearing 50.00
Complete line of 500 cycle motor generators from ¼ to 5 K. W. Prices on request
Motors, Edison, universal, 50 watt, double shaft, 110 volts 3.50
Motors, Underwood, D. C., 75 watt, double shaft, 1200 R. P. M., 110 volt 3.00
Gasoline Engine, 1 cylinder 2 cycle Smith 2 horsepower, complete 25.00
Gasoline Engine, 2 cylinder 2 cycle Sterling 5 horsepower, complete 50.00
Transformers, Peerless, 120 input, 5-10-15 volt output, ¼ K. W., 60 cycle 7.50
Transformers General Electric, current type, 125 to 2500, with center tap, 60 cycle, 200 watt 7.50
Transformers, Simon, 220 to 11500 closed core, ½ K. W., 500 cycle 5.00
Air compressors, Kellogg, Model T, 1½ cu. ft. per minute, weight 6 lbs., 600 R. P. M., 125-lb. pressure 3.00

WANTED

RECEIVERS — 1P-501, SE-1420, SE-143, CGR-1, SE-1220, CN-294.
DETECTORS, TUBE — SE-1071, SE-1071A.



Western Electric Fixed Condenser 21AA, 1 microfarad, 1,000 volt A.C. test. Ideal filter condenser for low power transmitters. Fully guaranteed. Excellent value $1.00

Relay, Foote and Pierson, made for Western Union, 170 ohms resistance, Silver contacts, Adjustable magnets, heavy slate base. Fine keying relay to operate on 6 volts. Special $5.00
Condensers, Century, 500 volt, 4 mfd 1.25
Condensers, Dubilier, mica, working volts 12,000, capacity .0004 ..... 10.00
Condensers, Dubilier, mica, working volts 3600, capacity .32 ..... 10.00
Condensers, Century, volts 500 A.C., capacity 4 mfds .. 1.25
Condensers, Wireless Specialty, copper leyden glass jar, 10,000 working voltage .002 mfd 2.00
Condensers, Dubilier, mica, transmitting, 8500 working voltage .004 mfd 10.00
Condensers, Dubilier, mica, transmitting, 12,500 working voltage .004 mfd. Prices on request
Condensers, Wireless Specialty, transmitting, 12,500 volt .004 mfd. Prices on request
Transmitter, Holtzer Cabot, Utah type, carbon granular. .95
Western Electric Radiophone transmitter unit 326W. Special 1.50
Transmitter, telephone, U. S. Navy 40 ohm (used) ..... .75
Headphones, Holtzer Cabot, U. S. Navy. New. Utah type ..... .75
Headphone, Army, with strap, 120 ohm ..... .75
Headphone, Navy Radio School type, leather headband, 75 ohm 1.50
Keys, transmitting, Army practice 1.00
Keys, transmitting, Airplane flameproof, silver ¼" contacts 1.50
Keys, transmitting, Airplane flameproof, silver, 3/8" contacts, with blinker light mounted on bakelite base. List $7.50—Special 2.00
Keys, transmitting, Navy ½ K. W., "Mesco" silver 2.00
Buzzers, Century high freq., 2 coils 1.50
Buzzers, Western Electric, Extra quality high frequency 1.50
Receivers, Signal Corp, type B. C. 14A, 200-600 meters, with cry. det. and Century buzzer in portable case.. 7.50
Receivers, Navy, C. N. 113, 300-2500 meters 7.50
Receivers, Marconi, 300-2500 meters, type 106, commercial ship type 35.00
Receivers, Navy, C. N. 240, 1000-10000 meters 50.00
Receivers, S. E. 143 and 1. P. 500. Prices on request
Insulators, Electrose, strain 7"-15, 12"-35, 18" ..... .35
Heterodyne, Signal Corps, type B. C. 104. For use with SCR 97 1000 to 3000 meters, with detector 15.00
Coils, Retardation, Western Electric Co. 57C, 83 ohm, 2 windings 1.00
Loudspeaker Unit, Western Electric, 193 W. Ideal for monitoring your transmitter. Without cord 3.00
Magnetos, Army mine and ringer type, has 4 large fixed magnets good value 1.00
Switch, Telephone, toggle, 3-4-6-8 point ..... .50
Switch, Knife, unmounted, back connected, polished copper, D.P.D.T., 250 volts-15 amp ..... .75
Variometers, General Radio No. 107D and 107E, with series and parallel connections 5.00
Telegraph and buzzer portable sets, mahogany case, 2 tone platinum contact high frequency buzzer, 2 telephone toggle switches, potentiometer, sending key, 3 mfd. condensers, transformer and 2 choke coils, receiver, $30 value 5.00
Battery, U. S. Army, lead-acid type, 16 volt, 20 ampere hour. Consisting of 8 individual 2 volt cells in sturdy wooden carrying case, minus electrolyte 5.00
Individual 2 volt cells, minus electrolyte 1.00
Generator, airplane, Signal Corps, with propeller, can be used as motor, 12 volts, 33.6 amp. Price 10.00
Sounders, Signal Corps, 120 ohms, with adjustable magnets, Price 2.50
Generators, 110 volt, A.C. 900 cycles, 200 watts. Price .. 15.00
Condensers, Kellogg, U. S. Navy, 3 M.F., 400 volts. Price 75c
General Radio Variable Inductor, type 190, 150 M.H. or 650 M.H. Price 6.50

Largest Radio and Electric Supply House in U. S. devoting eight floors to and specializing on Army and Navy Surplus. Due to rapidly moving stock and as new items are continually arriving we are unable to publish a catalog. Write us your particular requirements. *Sufficient* postage and deposit of 20% required on C.O.D. orders. NO C.O.D. ON CANADIAN ORDERS.

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

w0djw w0dsj w8azq w9dzm w0eaj w0efe w0enr w0eqe w9ftz w0nr ddv5 nn1nic cm2yb

14,000-kc. band

w1om w2buo w2mb w2rs w4ft w2px w5to w8bkp w8em

W2DK, Irving Ellingham, 1308 East 37th St., Brooklyn, N. Y.

14,000-kc. band

ce1ah ce3bf ct1bx ct1cb d4abg d4dkf d4uah d4xn ear37 ear62 f8bf f8dmf g2bm g5by g5m1 g6eq g6hp g6lk g6rb g6wy g6xb ifg1 kfr5 k4ni 1u2ea 1u2fi nj2pa oa4q on1ea pa1fp py1aw py1ea py2ad py2ak py2az py2bg py2ih py2ik un1fmt ve1ft ve4gq ve4gu ve4hr vo8ae x0a z12be z12bg z12bx z12go z14ba w5ahq w5hq w6rg w0d1n w0ds1 w0uqq w0erd w0awp w0avq w0dzk w0bvk w0ddy w0cza w0dzi w0erk w0dtu w0dvj w0emd w0dzy w0aax w0dev w0dqj w0bze w0dhs w0bto w0bsp w0by w0hsj w0eif w0dwp w0ehi w0dsg w7aof w7na w7be w7nr w7akv w7aax

LU2CA, Angel Radaelli, Paraguay 2233, Buenos Aires, Republica Argentina

Stations heard and not worked on 14,000-kc. band

ce1ai ce1av ce2ad ex1na ex2ak f8btr f8bra f8dm f8je f8mrg f8rrr f8swa f8xz g2xv g2lz g5yg g5ub g5wk g6dr g6mc g6pa g6vj g6xe g6xj g6vj 1u8pa 1u4da 1u4dq 1u9dt oa4h oa4o on4bz on4fe on4ft on4gm ozf1g ozld paogw paogt pa1aa un1g1 ve3hb w1kn w1da w2czr w2bjg w2bm w2aeb w2rs w2jn w2ap w2kd w3pf w4ni w4to w4js w4ab w5awd w5aot w5att w5rg w6bza w6bt w6bep w6bug w6bup w6cnu w6cpu w6cnx w6dtj w6drb w6dqq w6dns w6drb w6dch w6eud w6ehf w6eqp w6eif w6ekw w6erk w6ehi w6emd w6uf w7mt w7aij w7mx w7anz w7aax w8ri w8afm w8bud w8eut w8ed w8fz w9fdh w9gft w9mt

Mr. Martin L. Croft, Martinsburg, Penn.

14,000-kc. band

ce2ab ce3bm cm2jt wx2ah ct1aa ct1bx d4xn ear21 ear37 f8aja f8awc f8mgl f8mst f8sup f8wb f8vpz f8zx fm2gkc g2ax g2bm g2ux g2xy g5by g5lp g5lw g5m1 g5mq g5rm g6hp g6nt g6rb g6uh g6yw ifg1 ilgp kfr5 k4asn k4akv k4kd k4ni 1u2fi 1u3de 1u3dh 1u5fa 1u3pa nj2pa on4j on4ft on4ia on4ww oz7jo paofr pyiaa pylah pylaw pylbe pylcs pylel pylcm pylcr py2ak py2bg py2ik py2qa su8an su8kw veldm veldq ve4bq ve4hr vo8ae vo8mc w0afc w0akd w0amw w0avj w0azy w0bsj w0bup w0cub w0dev w6di w0dmq w6dns w0dog w0duj w0dwp w0dzk w0dzm w6fhi w6ehw w6ekw w6epi w6pu w7acy w7aof w7iv w7na w7nr pxr wdde wm1

7000-kc. band

k1hr k4kd k6boe k6cjs k6dtg k6n1 ve2bb ve4zz ve5en vk2ac vk2dy vk2hc vk3pp vk4eg vk4cm vk5hc w5ado w5ain w5al w5aor w5awq w5axm w5bam w5bbu w5beb w5ev w5gq w5gr w5ie w5ip w5mb w5ql w5rg w5zk w6ak w6akk w6ayc w6bph w6bmt w6bpm w6cha w6etx w6euh w6cui w6eww w6dea w6dgx w6dns w6dok w6dot w6dqv w6dsh w6dtd w6dvj w6eau w6ebg w6eqi w6zf w7ao w7bb w7dc w7dd w7gk ys9a s11fr w11ft w12gr z13em

Ben Stevenson, 21 Randolph Place, Newark, N. J.

14,000- and 7000-kc. bands

w6fk w6wm w6bam w6adp w6dgq w6ajm w6aqj w6eje w6ql w6eub w6chw w6avj w6erm w6qa w6agx w6dne w6cgq w6ebn w6eqe w6exv w6wb w6duj w6dab w6dav w6cui w6bxv w6tj w6cme w6eds w6bem w6ur w6bjq w6eiy w6enu w6axe w6bhr w6adw w6bgh w6ehi w6axm w6se w6eru w6btz w6bek w6dnm w6dip w6aro w6cuh w6ax w6bvg w6bxi w6ebx w6cgm *w6eif* w6bya *w6anl* w6akk w6ekw w6eos w6bzd w6sf w6atq w6bjj w6blu w6byb w6dui w6dhw w6esq w6nz w6dzg w6eqv w6ebg w6dja w6ju w6pw w6bqk w6bqa w6eaj w6eem w6cuc w6dtu w6btx w6dxm w6djj w7vk w7aoo w7aax w7aiq w7ho w7aep w7ui w7wi w7aof w7om w7abh w7lt w7aim w7aho w7akz w7le w7wp f8swa f8eij f8cte f8grg f8gko f8gdb f8bw f8wk f8orm f8ypz f8wkz f8j1a f8dmf f8pro f8im ve1br

AN AMAZING IMPROVEMENT IN RECEPTION FROM YOUR PRESENT RADIO RECEIVER WITH NEW

EVEREADY RAYTHEON 4-PILLAR TUBES

THE inevitable jolts and jars of shipment and handling can't budge the elements in an Eveready Raytheon Tube by as much as a thousandth of an inch. Their accurate spacing, which assures maximum performance, is immune to these common hazards.

The *4-Pillar construction*, which gives Eveready Raytheon Tubes their remarkable strength, is patented and exclusive. With no other tube can you get all its advantages. If you examine the illustration at the bottom of this page, you will see the superiority of this construction.

This is especially important in receiving tubes which have large and heavy elements — tubes such as the 224 screen-grid, the 280 rectifier, and power tubes used for push-pull audio amplification, requiring perfectly uniform characteristics.

People everywhere, using Eveready Raytheons in their receivers, report increased distance, more power, better tone and quicker action. To get the most from your receiver, put a new Eveready Raytheon in each socket. Your dealer has them in all types — including the famous B-H tube for "B" power units.

4-PILLAR TUBES

Showing the exclusive, patented Eveready Raytheon *4-Pillar construction*. Notice the sturdy four-cornered glass stem, the four rigid supports, and the stiff mica sheet bracing the top.

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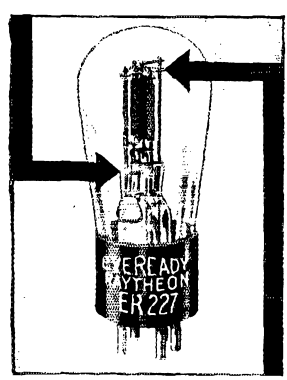


4-PILLAR SCREEN-GRID

Eveready Raytheon Screen-Grid Tube, ER 224. The weight of the four large elements in this type of tube makes the exclusive Eveready Raytheon *4-Pillar construction* vitally important.

ve1cc ve1bh ve5az ve5hc ve4jb ve4dk ve4dj ve4hr ve4eb ve4hy ve4fn ve4fv ve4gq ve4hh ve4aj x9a py2a1 py2ik py2az py1aa py1aw py1ca sc1dr g6w1 g2za g6nt g6xn g6xj g6rb g6bd g6cr g6ut g6pa g6dh g2bm g2od g5wk g5ux g5ml on4gm on4dv on4fq on4ea on4hp on4ja on4rs ct1aa ear6 k4ni k4akv k4kd vk3pp vk2oj vk4rb vk3bq vk2dy nr2ea nr2ags ti2hv kfr5 cp1aa ct3ab nj2pa vo8mc vo8ae nh1ug he1dr cx2ak yi2gq yi1mdz cm2jt cm5im ce2bm ce2ab ce1ah ce3bm k6bh1 k6ekx k6dtg k6dmm k6av1 ap1 sm6ua sp5ar wfa swq xw4vy cmz62 sp3pb fm1un1 d4xn pa0zz pa0wr pa0fp

W2AXO, King Stodola, 505 East 22nd St., Brooklyn, N. Y.

7000-kilocycle band

cm2jm cm5by f8xz k6awx k6boe k6bra k6dki k6dv k6n1 kdv5 ve4bq ve4gd ve5bu vk2hc vk2oj vk3ax vk3go vk3pp vk5aw vk5ia vk5it w5ade w5ain w5bbc w5acc w5bbv w5bbx w5bhj w5gq w5gr w5lo w5rj w5ta w5uf w5wf w6aaz w6af1 w6aro w6azm w6azn w6axe w6bbm w6bjv w6bjy w6bin w6bjw w6bkk w6b1m w6bpm w6bpo w6bqp w6btm w6btz w6by w6byz w6bzy w6caz w6cbw w6cgj w6chw w6cxg w6deg w6d1u w6dpf w6dpx w6dsi w6dsj w6dtd w6dtl w6ebg w6ehf w6ehi w6eii w6eiv w6wiy w6elm w6enq w6emy w6eop w6eou w6epe w6epz w6epf w6equ w6eru w7acv w7amb w7asd w7ts w7wp wfa wuaf z11ft z12be z13cm

W3WG, Eugene B. DeTurck, 1914 H. St., N. W., Washington, D. C.

14,000-kilocycle band

w6afc w6ags w6ajm w6akd w6ant w6anz w6aqj w6aqq w6ary w6asl w6avj w6avq w6awp w6baj w6bam w6bax w6bet w6bkt w6bnd w6bnu w6bnx w6bto w6btx w6byz w6bz w6cgm w6crw w6cub w6cuh w6cui w6czm w6dch w6dcv w6dfs w6dgq w6dln w6dmb w6dns w6dpf w6dpj w6drb w6dsn w6dte w6dtu w6dtz w6dug w6dwi w6dwl w6dyb w6dzy w6ec w6edt w6edz w6ehf w6eif w6ejx w6eop w6eoz w6erk w6erm w6ern w6eug w6euk w6fk w6gb w6hb w6ju w6kw w6mx w6qd w6ql w6qy w6rc w6rv w6uf w6vz w6wb w6wd w6zzj w7aby w7acy w7afo w7ago w7ahx w7aij w7aip w7aja w7ajq w7akp w7akv w7alk w7alw w7amq w7anx w7anz w7aoo w7aoq w7as w7be w7by w7cx w7dd w7ek w7eo w7fh w7ga w7gu w7if w7iy w7le w7li w7nf w7os w7pl w7pv w7si ax3 ce1l ce2ab ce2ah ce3ab cm2jt ct1aa ct1ae ct1bx ct1by ear65 ear121 ef8aap f8cp f8dmf f8dzn f8eo f8er f8geb f8he f8hr f8klm f8mrg f8olu f8pam f8pao f8rrr f8ypz g2qv g2xv g5bj g5by g5ml g5ux g5yg g6hp g6nt g6wy g6xb g6xc kfr5 k4nd k4ni k6aiy k6cfq k6etf nj2pa on4bc on4fp on4ft on4uu on4wk ok1fm pa0fp pa0wr py1aw su8an ve1ap ve1br ve1bv ve1co ve1dm ve2ce ve2cg ve3bp ve3cs ve3dr ve4as ve4ff ve4fv ve4gd ve4gm ve4go ve4gq ve4gu ve4hc ve4jb ve5ef vk2ai vk2jy vk4nw vo8ae x1j x4ci x9a z11ao zl2be zl4ao rwx

W8CVJ, Don Langham, 107 North St., Auburn, N. Y.

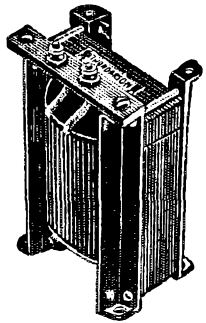
14,000-kilocycle band

ct1aa ct1bx ct1by d4jlear98 f8acj f8axq f8btr f8dg f8eo f8er f8fd f8fr f8gdb f8he f8hof8hr f8jd f8jt f8LX f8mgr f8orm f8pro f8rko f8rmf f8tsn f8sh g2a0 f2ax gs1z g2yu g2zp g5bj g2by g5ml g5m2 g5ux g5vl g5wk g5wp g5yn g6bd g6br g6gc g6k0 g6qb g6ta g6vp g6wo g6wy g6xb g6xn on4ar on4di on4fpon4ft on4gm on4jj paodm paofp paogw paozf pylaa py1cm py1id py2ad py2ak k4ni k4kd k6dv ce3bf fqpm ne8an nj2pa la1k rx1aa sm7us x9a sw7eff zl2ac zl4ao

7000-kilocycle band

cm2cf cm5fl cm5ni ct1bv ct1bx ct1by ct1cn d4aap d4au d4kf d4oa d4uj d4xabw earo ear10 car62 ear69 ear98 ear116 ear122 ej7dd f8aap f8acj f8azq f8baf8btr f8ceo f8cp f8dmf f8ef f8eo f8er f8fd f8gdbf8hip f8jb f8jc f8ld f8mit f8nng f8oqp f8on f8ra2f8rhj f8rj f8rmf f8sm f8tlr f8wb f8wrg f8ypz fm8rit g2ao g5by g5ml g5vl g5yx g6qb g66rb 11fu jc7es k6dqq k6dtf kdv5 kfr5 kfr6 kdwu kfkh kgaz lg7 1bg nj2pa nn8nic nr2ags nr2fg okaa2 on4bd on4di on4dj on4ew on4fe on4fm on4ep on4hp on4kd on4rk paodmpaoga pylid rx4fn uojh vo8an vo8rg x1ab x1f x9a xmoi ys1aa ys1dn c7z er3 ervt vo8azw vk2rb vk2yi vk3jk vk4nw vk5hg zl3ar zl3cm

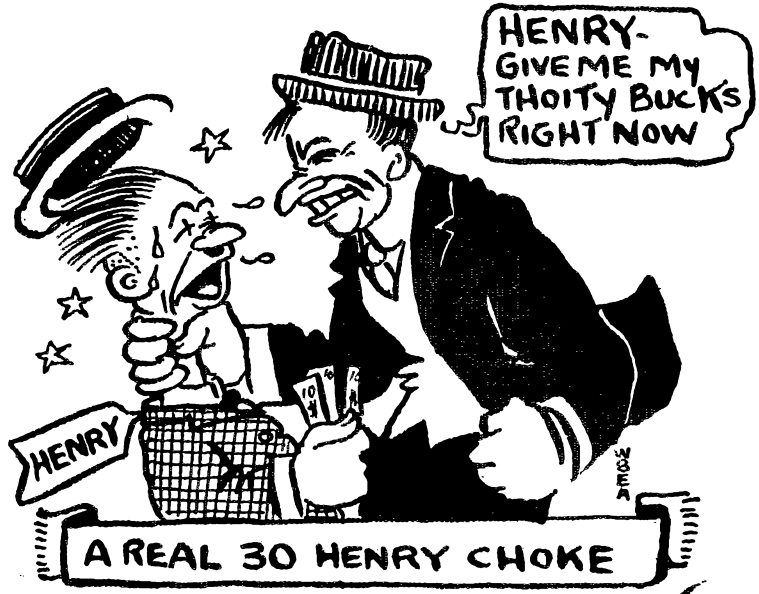
(Continued on page 90)



T-2071 ~ CHOKE ~~~ PRICE $16.00
30 HENRY, 150 M.A., 3000 V. INSULATION, OPEN FRAME
DIMENSIONS: 2¾"×3½"×6" HIGH. WEIGHT, 5 LBS.

T-2027 ~ CHOKE ~~~~ PRICE $22.00
30 HENRY, 150 M.A., 3000 V. INSULATION, OPEN FRAME
DIMENSIONS: 5"×3½"×8" HIGH. WEIGHT, 14 LBS.

T-2073 ~ CHOKE ~~~ PRICE $30.00
30 HENRY, 150 M.A., 3000 V. INSULATION, OPEN FRAME
DIMENSIONS: 4½"×5½"×9½" HIGH. WEIGHT, 24 LBS.



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Strays

The term kilohertz, introduced by German professors, has been adopted by the Union Internationale de Radiodiffusion to replace the term kilocycle (1 kilohertz = 1 kilocycle).

— *E.W. and W.E.*

FHS, formerly of our own Communications Department, asks the following from the Technical Information Service:

What sets are equipped with propellers for motorboating?

How many "shove and jerk" audio stages are necessary to pump 600 kilocycles into a short circuit?

What size ampere would you use to push two tight circuits apart?

FHS says that as he advances in radio, the questions will become more difficult.

Printer's brass "leads," which may be purchased from your local printer, will be found to make good wiring for tank circuits. The pieces come in 2-foot lengths, and are ¾" wide and 1/36" thick. They are of high grade, soft-drawn, drill easily, and take a high polish.

The "Year Book of the Institute of Radio Engineers" has grown up within the last few years. It is now a volume of more than 300 pages, containing information about the Institute, directory of membership, report of the Committee on Standardization, definitions of radio and acoustic terms, graphical symbols, data on measurement of vacuum tube characteristics, tests of radio receivers, and much other worthwhile information.

BURGESS CIRCULARS

Baby Radio Transmitter "D" of 9XH-9EK, Burgess Battery Co. Engineering Circular No. 8.

Arctic Radio Equipment with Battery Supply, Burgess Battery Co. Engineering Circular No. 10.

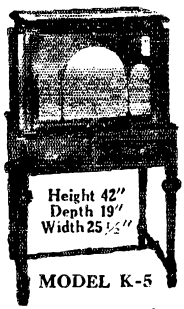
Experimental High Frequency Radio for Aircraft, Burgess Battery Co. Engineering Bulletin No. 15.

The French Section of the I.U.S.R.T. is conducting a series of test transmissions on 24, 36, 56 and 95 meters wave length, 6:40 a.m to 7:40 p.m. E.S.T., November 14 and 16 and December 12 and 14. Experimenters and observers who can check on all four frequencies and log the audibility and quality throughout the tests are requested to address the Communications Department requesting copies of the complete schedules and special log sheets that have been provided. The number of copies is limited so please don't ask for the detailed information unless you will be free to help on these dates.

KOLSTER

Electro Dynamic Reproducer

Combined with 210 Power Amplifier and "B" Supply Unit



This famous genuine Kolster K-5 AC Electro-Dynamic Reproducer is complete with a 210 Power Amplifier and "B" Supply Unit all self-contained on a steel frame. This real fine matched rugged Unit weighs 45 lbs. without the Cabinet. The Cabinet itself is Pencil-Striped Walnut, beautifully designed with Cathedral grille.

If desired, the 210 Power Amplifier will also supply 22, 67 and 90 volts "B" current, sufficient for any set using up to 8 tubes. An automatic voltage regulator tube, UX-874, maintains the "B" voltage silent and steady.

This Electro-Dynamic Reproducer can be used with any battery or AC set, replacing the last audio stage, or be used with all tubes of the set. Wherever used it will bring out every shading and range of tone; every note is reproduced with utmost faithfulness, pure and undistorted. It will modernize any radio receiver.

Uses 1 — UX-210, 2 — UX-281 and 1 — UX-874 tubes.

A 20-ft. cable is included with each instrument. Operates direct from 50-60 cycle, 110-120 volt AC current.

BRAND NEW IN ORIGINAL FACTORY CASES AND GUARANTEED

Every Reproducer is serial-numbered and has factory guarantee tag enclosed

List Price $175.00
(without tubes)

Never Before **$49.50**

SIZE 6" x 5" x 3½"

AEROVOX OR Dubilier

HIGH VOLTAGE FILTER CONDENSER BLOCKS

Finest non-inductive High Voltage Filter Block ever made. Designed for use with UX-250 Power Tubes but can be used safely in filter circuits of transmitters or high power Amplifiers in any combination of capacities desired.

Each Unit is equipped with long, heavy, flexible leads, convenient for easy wiring, and also has mounting brackets.

The insulation resistance of these Condenser Blocks is in excess of R.M.A. and N.E.M.A. standard requirements.

Due to the request of manufacturers of these Condenser Blocks we cannot divulge the high list price of same.

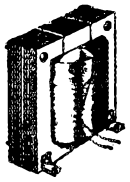
All brand new, never been used, latest design.

CAPACITY	RATED D. C. WORKING VOLTAGE
2.0 MFD.	1000 V
1.0 " "	800 V
3.0 " "	400 V

SPECIAL

$3.25

PER BLOCK



50 HENRIES **FILTER CHOKES** 85 MILLS

These are very efficient Chokes for use in Filter Circuits for your Transmitter, A and B. Eliminators or Power Packs.

The Choke Coils are very well constructed and are made with air gaps to prevent magnetic saturation from direct current.

SPECIAL

$1.50

FARADON High Voltage Filter Condenser Block. Tapped 4 MFD.—400 D.C. Working Voltage—1 MFD.—600 D.C. Working Voltage. **$1.75** Per Block

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	SPECIAL
R.C.A. Uni-Rectron Power Amplifiers — Model A. P. 935 List $88.50 ea.	$19.75 ea.
E210 BRADLEYSTATS, list $4.00, fine for A.C. Line Voltage Control	1.60 "
Kolster K 5 Dynamic Reproducers. List $175	49.50 "
U. S. ARMY Aeroplane Spark Transmitters, Gov. cost $47 ea.	4.75 "
G. E. Kenotron Rectifying Tubes (Type T.B.1.)	1.25 "
Gould Kathanode Unipower, Automatic Radio "A" Power (6 volt), list $39.50.	13.75 "
G. E. V.T. 14 — 5 watt Transmitting Tubes (A good power amplifying tube)	1.50 "
Eby A. C. Adapter Harness with volume control for 6 tube sets. List $10.00	3.75 "
Kolster 135 Volt "B" Eliminators, List $39.50 (without UX213 or 280 tube)	10.50 "

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Book Reviews

Aircraft Radio and Navigation, by Ross Gunn, B.S.E., Ph.D. Preprint from the Journal of the Franklin Institute, Vol. 205, No. 6, June, 1928.

This paper reviews the subject of aircraft radio in a very brief manner touching upon such subjects as antenna systems, power supplies, ignition interference and direction finding. None of these are covered to any great extent.

A Treatise on Testing Units for Service Men, by John F. Rider. Published by Radio Treatise Company of New York City. 43 pages, about 60 figures and illustrations. Price, $1.00.

This is an interesting and instructive booklet for the service man who is desirous of constructing or becoming familiar with suitable equipment for making tests upon radio receivers and component parts. It describes the construction of many testing devices which make it possible to put a broadcast receiver through its paces in short time. Tube-test sets and reactivating units are included. Suggestions for the design of a practical service station test bench and a general idea of suitable methods or testing are outlined.

Radio Movies, by Jenkins. Published by Jenkins Laboratories, Inc., of Washington, D. C. Contains 143 pages and many illustrations.

The general problems of television, radiovision and radio movies are outlined and some of the methods employed in their solution are described. Detailed data on the construction of simple equipment for the reception of radio movie transmissions from the Jenkins' experimental station is given for the benefit of those who are interested in taking an active part in this field. A brief description of the Jenkins' system of transmitting weather maps by radio is included and the application to aviation of some of the devices studied in the pursuit for suitable radiovision equipment is given.

Standards Yearbook for 1929. Bureau of Standards Miscellaneous Publication No. 91. Contains 392 pages and is sold by the Superintendent of Documents for $1.00.

A description of the accomplishments and general activities of the many standardization bureaus of the Federal Government, states, counties and municipalities is given. In addition, accounts are given concerning activities of technical societies and trade associations. Results obtained by foreign standardizing bodies are described and a bibliography of recent publications relating to standardization is included. An interesting publication from a general engineering viewpoint.

Note on a Piezo-Electric Generator for Audio Frequencies, by August Hund. Research Paper No. 40. Obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents.

Describes briefly and shows two photographs of two piezo-electrical oscillators the outputs of which are passed through a screen-grid amplifier and detected thus yielding an audio frequency which by proper design can be kept within a few parts in 100,000.

Unidirectional Radiobeacon for Aircraft, by E. Z. Stowell. Research Paper No. 35. Obtainable for 10 cents from the Government Printing Office.

Methods for the production of unidirectional fields from transmitters are discussed and suitable circuit arrangements and field patterns are shown.

The Radio Industry Standards. Issued by the Radio Manufacturers' Association, Inc., Chicago, Ill.

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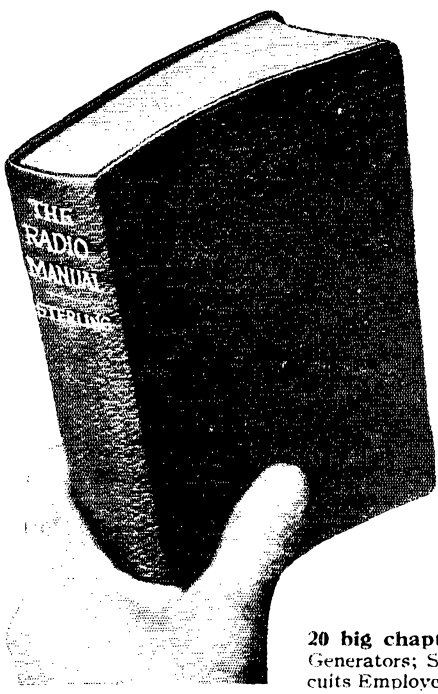
Thoroughly revised—greatly enlarged and offering a wealth of new, up-to-the-minute information

THE RADIO MANUAL

Revised Edition



Complete new chapters on aircraft radio equipment; Practical Television and Radiomovies with instructions for building a complete outfit; radio interference; 100% modulation; latest equipment of the Western Electric Co.; the Marconi Auto-Alarm System; and many other developments of the past year. All this information is added in the new edition and, besides, the entire book has been brought right up to date with much new material. **The Radio Manual** continues to be the one complete and up-to-the-minute handbook covering the entire radio field.

A Complete Handbook of Principles, Methods, Apparatus for Students, Amateur and Commercial Operators, Inspectors

By G. E. STERLING, Radio Inspector and Examining Officer, Radio Division, U. S. Dept. of Commerce.

Edited by ROBERT S. KRUSE, for five years Technical Editor of QST.

Complete Preparation for Government License

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

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This is a small brochure of but 25 pages total and contains the recommended manufacturing standards of the R.M.A. No attempt has been made to cover the territory already taken care of by the Institute of Radio Engineers and the recommendations set forth are devoted entirely to manufacturing problems. It concerns itself primarily with the standardization of color codes, types, sizes and tolerances and such matters pertaining to the manufacture of established articles.

Daylight Transmission of Wireless Waves over Sea Water, by R. O. Cherry, M.Sc. Four pages issued by the Broadcasting Company of Australia.

These field intensity measurements were made by means of a tuned loop and calibrated tube volt-meter. The equipment was set up on the deck of a passenger vessel and for distances up to about 45 miles (the maximum distance indicated) the curves followed the shape of those previously obtained over flat land although the signal intensity over water was always greater for a given distance than that over land.

Official Frequency System

(*Continued from page 40*)

tions may be assumed equal to the figures as herein given. While no responsibility, financial or otherwise, is assumed for the accuracy of these transmissions, every effort will be made to have it exceed the figure given.

Reports on Standard Frequency Transmissions are solicited from all who take advantage of this service. No matter how far from or how near to the transmitting station you may be, your report will be of value to us. Standard blanks which will facilitate your filling out and our handling of the reports are available on request. All such requests and reports should be addressed to: Experimenters' Section, American Radio Relay League, 1711 Park St., Hartford, Conn.

After your report has been checked and acknowledged, it will be forwarded to the Standard Frequency Station upon whose signals it comments.

OFFICIAL FREQUENCY STATIONS

(Required accuracy 3-10 of 1%)

W1AAC, W1AVW-W1ZL, W1AWW, W1AXA, W1BD, W1BZQ, W1CCW, W1CK, W2BO, W2CDC, W2CLA, W2DS, W2EF, W2MU, W2UV, W4BY, W4LK, W5EW, W5OX, W5SP, W4ZAV, W6AKW, W6AM, W6AYC, W6ACE, W6AVJ, W6BB, W6BGM-W6CVO, W6BMW, W6BRO, W5BZU, W6CAE, W6CDY-W6CPX, W6CMP, W6EC-W6XE, W6QL, W6QX, W6WN, W6ZV, W7AAT, W7GQ, W8APZ, W8BAV, W8BZT, W8EQ, W8GZ-W8ZC, W9AHQ, W9ACG, W9BGH, W8BGK, W9BVC, W9CPM, W9EFO, W9EGU, W9IG, G2PD, G2NM, G5BY, G5YK, GI5NJ, VE2BE, VE3CO, VE3FC, VE4BT, VK5BG, VK5LF, VK7CW and ZL2AC.

STANDARD FREQUENCY TRANSMISSIONS OF WWV

Schedules of standard frequency transmissions from WWV, The Bureau of Standards, Washington, D. C., will be found on page 19 of the August issue of *QST*.

— *J. J. L.*

Radio Inspectors $2000 to $4500. *a year.*

Radio Repair Mechanics $1800 to $4000 *a Year!*

Radio Operators $90 to $200 *a month* (board free).

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SEE how thousands of men just like you easily make big-money in Radio. It's a big pay business. Salaries from $2,000 to $25,000 a year are common.

Broadcasting stations and manufacturers are now eagerly seeking trained men . . . Thousands of ships require experienced operators...and now, new opportunities in nation-wide radio telegraph service, telephony, television, and photoradiograms.

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The Radio Corporation of America sponsors this marvelous, simplified home training course . . . Prepare for success in every phase of Radio . . . By actual experience with apparatus given with this course . . . learn to solve every Radio problem.

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As a student you will receive an agreement signed by the president of this school assuring you of complete satisfaction upon completion of your training—or your money refunded.

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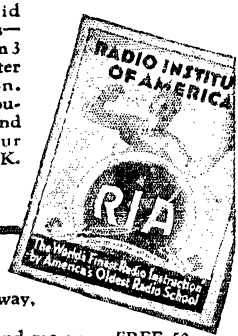
Free . . . everything you want to know about Radio . . . 50 fascinating pages . . . packed with pictures and descriptions showing brilliant opportunities in this fast-growing profession. See for yourself why R.I.A. training has placed thousands of men in well paid positions—usually from 3 to 10 days after graduation. Mail this coupon now and receive your FREE BOOK.



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Dept. ST-11, 326 Broadway,
New York, N. Y.

Gentlemen: Please send me your FREE 50-page book which illustrates the brilliant opportunities in Radio and describes your laboratory-method of instruction at home.

Name_____

Address_____

A Simple 1750- and 3500-kc. Receiver

(Continued from page 29)

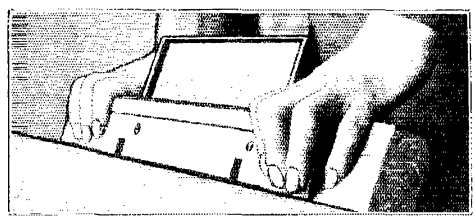
should be in clear space and as high and free from trees or buildings as possible. A wire 50 feet long will serve very well, although if space is available, a slightly longer antenna could be used to advantage for the reception of 1750-kc. signals. The ground may be connected to a pipe driven into moist earth, or may be connected to water pipes in the building. While it will be possible to receive some signals without either antenna or ground, it is best to pay as much attention to the antenna and ground as to the construction of the receiver if best results are to be obtained.

Building Shields

(Continued from page 23)

turned will fit into the cuts when turning the other two edges. The slots should be slightly greater in depth than the width of the lips, usually ½".

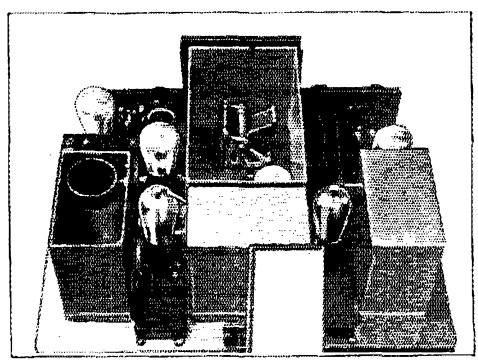
Holes in the top block are provided for two wood-screws, the spacing between these holes being the width of the metal sheet plus 2 inches.



FORMING A CORNER

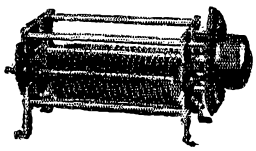
The bend is made along a line scribed on the upper side of the metal sheet. A rolling motion is used to make a good corner.

The piece of material to be formed is clamped between the two blocks with the scribed line coincident with the front edge of the upper block.



HOME-MADE SHIELDS IN THE AUTHOR'S SUPERHETERODYNE RECEIVER

The wood screws are tightened and the bend made by pressing the protruding part of the metal against the bench or table as shown in the photo-



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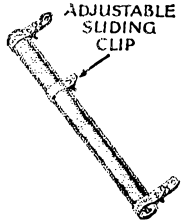
New York's Headquarters for Transmitting Apparatus

When in Town Visit Our Store

General Radio Transmitting Condenser

Type 334-R —.00025 cap. 3000 volts R. M. S. (3500 v. peak) **$5.50**



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Fixed Resistances

from 1 ohm to 100,000 ohms—can be tapped at any resistance.

We carry a complete line of Electrad products.

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

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

Prices per turn

Ham Green, double silk covered, No. 16 receiving inductance.

2" diameter.....30c per inch
3" diameter.....35c per inch

Aluminum Shield cans and panels of every description to order.

Everything in

Cardwell

Acme
Thordarson
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Flechtheim
Signal
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Fleron
General Radio
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NATIONAL RECTOBULB

An unusually reliable and efficient rectifier tube. Price each..... **$10**

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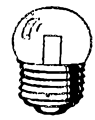
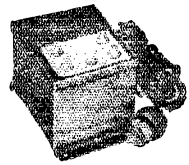


NEON GLOW LAMPS

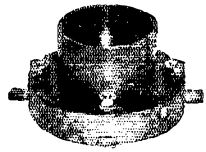
Made by General Electric Co., type G. 10, standard base, 101 uses, as illustrated in *QST* May issue page 17. Price only.....65c

$7. THORDARSON R-195 TRANSFORMER



for B-Eliminator using the Raytheon B-H tube. Will carry the maximum current consumption without overheating. Low 235 volts either side of centre tap—high 285 volts either side of centre Just 50 left, after that no more at any price.

$2.25



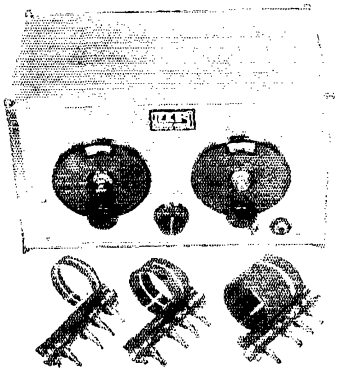
By Insistent Demand

LEEDS 50-watt socket, positive contact; heavy phosphor bronze springs, heavy brass shell; will hold your tube in one position.

Special..... **$2.50**

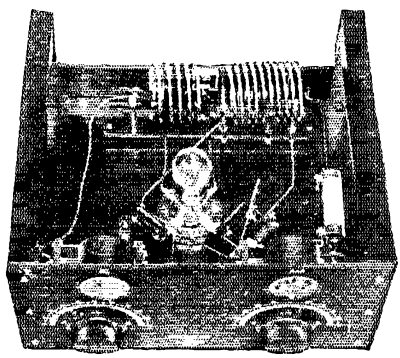
FEATURING

3 new items — Leeds Radio Lab. — others to follow in future issues. 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.



New LEEDS all aluminum plug in Short Wave Receiver. Coils not exposed, thereby insuring 100% shielded job. Short Wave — 3-tube Receiver — detector — 2 audio, using three 201-A tubes. Universal type, continuous range 15 to 100 meters; amateur type covers Ham bands 20-40-80 meters with generous spread on the dial.

List price $60.
Special Offer, net..... **$37.50***



New LEEDS 7½-watt Hartley 1929 type Transmitter. Ideal for the beginner or anyone desiring a transmitter extremely simple to adjust and operate. Will operate with a 201-A tube, with 90 volts on the plate, up to a UX-210, with 30 watts imput; has plug in transmitting coils. List price —kit $55. Completely constructed $70.
Special Offer, completely constructed..... **$57.50***

PLEASE PRINT YOUR NAME AND ADDRESS PLAINLY to AVOID DELAY | **WRITE FOR SPECIAL PRICE LIST** | **MAIL ORDERS FILLED SAME DAY** *10% Must Accompany All Orders*

graph. With proper pressure and a rolling motion, a good square bend will result. The screws are then released and the sheet aligned for the next bend. After the sides of the shield have been formed, measurements should be made to determine that the dimensions are correct and that all corners are square. The ½" lip is then soldered or riveted to its adjacent side.

In laying out the lines for bending the lips on the top and bottom, it is advisable to use the body of the can as a template rather than to locate the lines by rule measurement. This is accomplished by placing the body of the shield on the already cut-to-size top (or bottom) piece and scribing around it. The slight variation in dimensions between different cans will be thereby compensated for in securing a good fit of the respective tops and bottoms. Before attempting to make the bends the squares should be cut from the four corners of the top and bottom pieces. The lips are formed by bending along the scribed lines exactly as in forming the body of the shield, the longer sides being bent first. The slots cut in the upper block accommodate the lips of the longer sides when the other two lips are formed.

Provision should be made to permanently fasten the body of the shield to the bottom piece after the apparatus has been mounted. This can be accomplished by drilling and tapping holes in the sides along the lower edges, machine screws through the lips fitting into these holes. If the material is too thin to permit tapping, angles may be employed to the same purpose.

Shields constructed in this manner have been found to be entirely satisfactory in effectiveness as well as in ease of construction and low cost.

Marine Radio of To-day

(Continued from page 22)

equipped with short wave transmitters for use during the static season; that bugbear of marine radio. Ships with short wave transmitters usually act as clearing houses for traffic, and take a great load off the coast stations. One can readily see that it is much easier to maintain contact with only one ship on S.W. schedule than to sweat over sketchy QSO's with many ships on 600 meters.

The Scandinavian countries have been in the vanguard of short wave marine radio development, as many amateurs already know. A fellow with a tube set on 600 meters may smile superciliously at the low rolling note of a Norwegian spark, but when it comes to real DX, said Norwegian has it all over the other chap, by reason of his short wave rig.

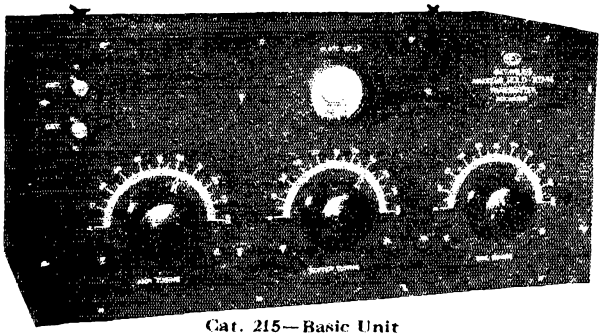
The spark transmitter most frequently found on American ships are, first, the Navy Standard which is, perhaps, the best spark transmitter ever built, but after being operated by and being operated upon by many operators in its 10 years or so of life, is sometimes found a little the worse for wear. A Navy Standard spark, in good condition, can give one of the best notes

For Exclusive Amateur Purposes—

REL MULTI-STAGE TRANSMITTERS

First Time Offered at Prices Within The Reach of Everyone

No longer need to envy the fellows who operate expensive high power crystal control transmitters. You can secure one of the new REL multi-stage transmitter kits and attain absolute frequency stability plus a pure crystal note for telegraph purposes. If you desire telephony you are offered the most modern 100% system of modulation. Tone, frequency precision, quality and consistency are yours for a very small investment. Install an REL Catalog No. 215 basic unit in your station. Use your present power supply and various other antenna equipment. Modernize your station. Join the ranks of the quality transmitters.



Cat. 215—Basic Unit

REL offers four new kit combinations to attain the features described. Each of these units are supplied in kit form and include all the necessary parts such as drilled and engraved aluminum panels, pressed metal cases, the finest tested individual parts and a very thorough and concise instruction booklet.

(NOTE: At slight additional cost the Catalog No. 215 and the Catalog No. 226 units can be supplied for crystal control operation. Otherwise they are regularly furnished with master oscillator type high "C" frequency control circuits. This latter is more advantageous for amateur operation especially where quick changing of frequency is desirable.)

Catalog No. 215 basic CW telegraph unit housed in metal case measuring 9" high x 19" wide x 10" deep. Designed to employ UY-227 master oscillator tube, UY-224 screen grid buffer tube and UX-245 power amplifier tube. Can be used as an independent CW telegraph transmitter capable of supplying 10 to 15 watts to the antenna.

Catalog No. 225 independent modulator speech amplifier kit designed to operate in conjunction with Catalog No. 215 basic unit. Employs UX-250 modulator and UY-227 speech amplifier. Designed to function as 100% system modulator. The combination will give approximately 30 watts peak modulation antenna output. Housed in metal case 9" high x 13" long x 10" deep.

Catalog No. 226 telephone and telegraph transmitter kit combined in one cabinet. Essentially same parts as used in Catalog No. 215 and Catalog No. 225 kits plus special filament heating transformer which supplies 2½ volts and 7½ volts for tubes used. Housed in one metal case measuring 9" high x 28" long x 16" deep.

Catalog No. 206, 75-watt linear amplifier kit. This may be connected after either the No. 215 or the No. 226 units. Adaptable for telephone or telegraph purposes. Employs one UX-852 tube. Housed in metal case measuring 9" high x 19" wide x 16" deep. Rated 75 to 100 watts output for CW telegraph and 100 watts peaked modulation output for telephony.

Descriptive literature and prices forwarded upon request

RADIO ENGINEERING LABORATORIES

100 WILBUR AVENUE, LONG ISLAND CITY, N. Y.

heard in the game. It is found in the 2-kw., 1-kw. and ½-kw. sizes. Sometimes on extremely small craft, such as sea-going tugs, etc., the ¼-kw. set is encountered. The P4-PS and P5 type sparks of the Marconi Company or R.C.A. are still found on many ships and rendering efficient service. Cutting and Washington, Kilbourne & Clark and sets by other manufacturers are found to a lesser extent.

The A.C.C.W. set most commonly found is the converted 2-kw. P4-PS spark, now known as the ET-3628. The P5, ½-kw. spark, has also been converted in many instances. New installations are either the ET-3627, 200-watt, C.W.–I.C.W. rig, or the ET-3626 C.W.–I.C.W., a 500-watt transmitter with both long and intermediate waves available.

The Navy Standard receivers, which were part of the regular installation on Shipping Board vessels during the war days, have proven themselves excellent when adapted with tube detector and amplifier units. Still, it was not long ago when crystal detectors ruled supreme and if an operator wanted to use a tube detector he had to bring along his own. Nowadays, all ships are equipped with tube receivers. The latest receiver, part of all new installations today, is a modification of the Navy Standard receiver and is about the best in the field.

Oftentimes new operators, fresh from the schools or from the ranks of the amateur, are greatly disappointed after a trip on some third-class tramp. As in every other field, the best jobs go to the more experienced workmen and unless the new man just happens to fall into a good job from the start, he is often assigned to some tub that the old timers pass by with a sniff. However, the Radiomarine Corporation makes it a policy to assign the new man as a junior on a passenger ship for a few months, if practical, for the breaking-in period.

Commercial operators are of various degrees of efficiency but the standard, as a whole, is exceedingly good. As in the amateur game, the proficiency of the operator is in direct proportion to the interest he takes in the work.

As most commercial operators are ex-amateurs, they have a keen appreciation of the amateur and his accomplishments, and take pride that it was in the ranks of the "ham" that the bug first bit them.

Midwest Division Convention

(Continued from page 21)

watt, crystal controlled BC station, and to such local shacks as were not "going 1929"; and two banquets at the Hotel Jayhawk, one as guests of WIBW, the other the official "eats-fest," completed the program.

McCollum, W9BQW, of Dodge City, fifth in code speed, first in the liars' contest and third in cracker-consumption, was high-point man in the contests, while our genial R.M., W9FLG,

of Topeka, carried off the monitor offered Kansas' most popular OM.

And now — welcome back in 1930, gang!

—*W9DEB*

Experimenters' Section

(Continued from page 43)

A New Low-power Screen-Grid Transmitting Tube (UX-865). By O. W. Pike and E. E. Spitzer, April, 1929, pp. 43.

Two Recently Announced Tubes (UY-224 and UX-245). By Harold P. Westman, June, 1929, pp. 41.

Little-Known Tubes (UX-841 and UX-842). By Harold P. Westman, July, 1929, pp. 25.

The UV-845. By James J. Lamb, November, 1929.

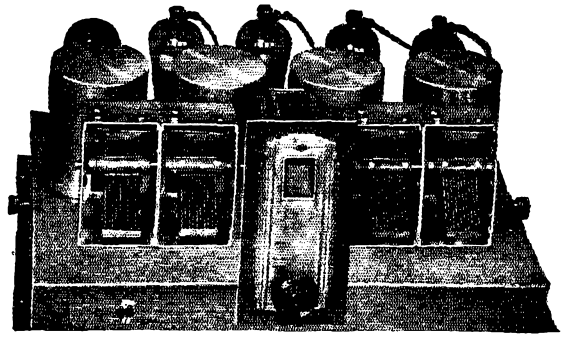
The Rocky Mountain Division Convention

ALTHOUGH the weather was not very propitious the Fourth Annual Rocky Mountain Division Convention held at Denver, September 6th and 7th, under the auspices of the Associated Radio Operators of Denver, was well attended. To the regret of everybody Director Segal was unable to attend, but the program was so well prepared by the committee everything went off as planned. E. H. Carter, W9CJC, chairman of meetings, saw to it that the speakers were properly introduced; not forgetting C. R. Stedman, the S.C.M., who presided at the Traffic Meeting. Parley James, W6BAJ, S.C.M., for Utah-Wyoming section, made a good report for his section although it is small in number; Hebert of A.R.R.L. Headquarters, speaking for the Communications Department, stressed the point of proper traffic handling and told us also how *QST* was "manufactured," demonstrating with proof sheets, dummies, etc. Willard Wright, W9BQO, route manager, spoke on his work and the importance of schedule arrangements. The first evening ended with a lot of discussions and visiting of "ham stations." Further talks were given by Lt. La Gue on Aircraft radio; Mr. Glasscock, W9ENM, proved interesting with description of compass work with which he has had so much experience. Mr. Perigrin of KOA gave us a good idea of the complexities in the handling of chain programs.

The "eats" were good; Toastmaster J. H. O'Connor did justice to the position and Hebert of A.R.R.L. Hartford was in good trim and struck right from the shoulder against those thoughtless members who are always "Rocking the Boat." There was good food for thought in his remarks.

One of the interesting events of the convention was the visit to the new Bell Telephone Building, where the "gang" was cordially received and shown the very latest in "fone" installation. The visit to KLZ enabled the fellows to buy a lot of parts at ridiculously low prices and there should be from now on better and more powerful

Built to Give Performance—Plus!



4 SCREEN-GRID Tubes for utmost sensitiveness and distance, — a newly designed system of Power Detection necessary to get the most out of the modern high-percentage-modulation broadcasts; — Band-Pass Tuning for complete separation of stations without any cutting of side-bands, — these are only three of the outstanding features of the new NATIONAL MB-29 Tuner.

The NATIONAL Velvetone Amplifier Power Supply is an RCA licensed push-pull power amplifier, sold completely wired, and designed for finest performance with the MB-29. Write today for complete information.

The shielded aluminum chassis, precision matched coils, new NATIONAL Projector Dial and Weld-Built Condensers, all make possible the construction of an A. C. Receiver which combines the cleancut finish and appearance of the finest factory-built model with the quality and perfection of a custom-built job.

There are available a selection of beautifully finished and specially priced consoles and tables for housing the MB-29, in various popular combinations.

NATIONAL CO., Inc. **Malden, Mass.**

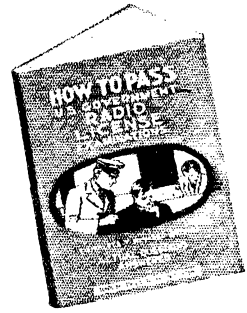
Est. 1914

NATIONAL SCREEN-GRID— MB-29

Just Published!

A Sure Way of Passing Your Government Examinations! Here Are All the Questions—Completely Answered IN

How to Pass U. S. Government Radio License Examinations



By R. L. Duncan *and* C. E. Drew

Radio Institute of America

Don't take any chances with your examinations. Careful study of this book will insure success in obtaining your Government Radio License, because it contains full particulars, questions and answers, on the latest radio examinations by the government.

It will not only give you all the data, but through the question and answer method used in the text, will teach you how best to express yourself and put that knowledge into words.

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Gentlemen: Kindly send me on approval Duncan and Drew's "How to Pass." At the expiration of ten days, I agree to remit $2.00 or return the book, postpaid.

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Address.....

Reference.....

Q.S.T.-11-29

CONTENTS

Calls Heard

(Continued from Page 49)

nc-2bw nc-3wab nc-5go ne-8af nj-2pz nm-5c nm-9a nm-1aa nn-1nic nq-2cf nr-2fg nx-1xl fm-8ma fq-pm oa-2at oa-2jw oa-2no oa-2rc oa-2ro oa-2s8 oa-3am oa-3xo ox-4bd oa5ax oa-5bg oa-5hg oa-7cw oa-7hl od-anf oo-9aa oz-1ao oz-2al oz-2bg oz-2br oz-2ga oz-2xa oz-3ai oz-3aj oz-3ap oz-3ar oz-3au oz-4aa oz-4ad oz-4ae sa-fh4 sb-ptp sb-2ag sb-2ax sc-2bl se-1fg su-1oa.

eg-2XV, G. A. Jeapes, "Chandos," Great Shelford, Cambs, England

(20 meters)

1bux 1bat 1byv 1ii 1aal 1vw 1big 1rr 1ajm 1aep 1beb 1nx 2amd 2or 2nm 2cvj 2ayp 2aib 2tp 3bqz 5agq 5mx 5dq 8adg 8ahc 8axa 8rh 8aly nc-1bt np-4pq sc-2ah sb-2ar wnp.

eg-5HS, M. F. J. Samuel, 16 Blenheim Rd., London, NW8, England

1adm 1aff 1ajm 1asu 1axa 1ayg 1bkv 1cmf 1dm 1ii 2agn 2aib 2aiu 2alw 2bg 3ads 3bgg 3hs 3mw 3nr 3tn 4io 4nh 4rr 5acl 5afb 5aga 5agq 5avs 5hh 5mx 5sh 5wz 6agr 6azs 6bam 6bgq 6bjf 6bjl 6bux 6bxi 6ccl 6cuc 6czq 6dfe 6gw 6hm 6rf 6vz 6zat 6zi 7de 7gb 7kf 7tm 7uq 7vh 8agh 8aro 8atv 8ben 8ve 9anz 9ara 9asc 9ask 9ayr 9bmx 9bqy 9cei 9cdw 9cmv 9cuy 9db 9dbz 9dce 9dkc 9ef nc-2al nc-3bt nc-3fc ne-3jm ne-4du nc-4fv nc-5au.

eg-5MQ, E. Menzies, School House, Faakerley, Liverpool, Eng.

1ry 1bql 1zw 1on 1vc 1fs 1mv 1ic 1amu 1bat 1aci 1gh 1bqd 1bke 1alr 1bms 1ag 1atv 1cnz 1adm 1arc 1cjp 1xm 1aur 1rf 2iz 2cwm 2fg 2tp 2ats 2agn 2cuq 2awu 2cyx 2mz 2czr 2qf 2ard 2bbx 2crb 2bad 2azk 2bqh 2gx 2amf 2hc 2cvj 2gp 2ayj 2ajm 3ank 3aef 3mv 8sz 3qe 3tn 3sh 3jt 3hc 3ceb 3pf 3bva 3tm 3bn 4hx 4dx 4af 4aar 4rr 4iz 8jq 8cxc 8pl 8ut 8zae 8drj 8aks 8axn 8box 8ajn 8djp 8cnh 8alv 8anc 8djg 9za nc-1ad nc-1br nc-2bg nc-3ae nr-2fg np-4pq nz-ez5 sa-cb8 su-fc6 sc-2bc sc-2ar sb-1am sb-1ao sb-1cl sb-1ar sb-1cg sb-1aj sb-1br sb-1ic sb-1ag sb-2ax sb-2as sb-2ag sb-2af su-2ak sh-bzl ardi.

Miss B. Dunn, Stock, Essex, England

(20-meter band)

1ads 1aff 1ajm 1arc 1aur 1axx 1beb 1bvv 1cjh 1cmf 1dm 1ia 1ii 1nv 1ry 1vw 2alm 2avb 2bal 2bg 2cvj 2sy 2xad 2xr 3afl 3cec 3mv 4pi 4qy 7aw 8adg 8aj 8aly 8dgx 8dhx 9dkc nuw nc-cf np-4sa ef-8sis eu-4qy sb-2ar od-anc od-and.

(40 meters)

1bzc 1cjc 1ql 1xv 2aod 2cyx 2vd 2xaf 3cbt 3rf 3qe 3wj 4ll 4xe 5kc 8ajn ed-7lk ek-aeq ek-dep el-1ala ep-3gb et-jach et-pbn eu-1kp eu-rkv eu-4qy eu-lora fm-8ju sa-cb8 sb-1ao sb-4as nm-8a ss-2bn oz-1ac oz-1ax oz-2ar oz-3aj oz-4aa ea-Omp ee-ear70 ej-7xo ew-ki xel-tsb hzal suc2 1xr pjd xkp.

H. and W. Hazeldene, 23 Barry Rd., E. Dulwich, London, England

1aac 1abd 1aci 1acv 1afa 1aiq 1akm 1aks 1alr 1amu 1ani 1anv 1anz 1aoh 1aoi 1aor 1apu 1apv 1aqt 1arc 1asi 1atr 1atv 1avk 1awm 1ayl 1azd 1ban 1bat 1bbc 1bbl 1bcn 1beb 1bed 1bft 1bgc 1bje 1blf 1blw 1bqm 1bvr 1bxl 1bym 1byx 1cax 1cbh 1ccp 1ccs 1cfr 1cjj 1ckj 1cng 1com 1ctm 1fl 1ic 1iu 1lw 1mp 1mt 1nf 1om 1qv 1sk 1vr 1vw 2abf 2abp 2aby 2acd 2ach 2adl 2afr 2afx 2agn 2agp 2agr 2agw 2ahb 2ahf 2ahg 2ahi 2aib 2aiw 2alj 2alm 2alv 2amf 2amj 2amy 2ang 2aow 2apc 2aqo 2asb 2atk 2ats 2aun 2avk 2avq 2awq 2axg 2ayn 2azk 2bad 2bbc 2bc 2bcb 2bck 2bco 2bcp 2bcv 2bdj 2bgz 2bmj 2bmr 2bs 2bsc 2bur 2bvd 2bxj 2cc 2cjx 2cns 2cs 2csb 2ctm 2cwm 2cx 2cy 2di 2du 2dy 2ea 2ez 2fm 2fp 2fs 2ha 2hr 2ih 2iz

generator with single-phase, 110-volt, 3450 r.p.m. motor was used for the plate supply. The centrifugal starting switch on the motor would "go democratic" about once a month and nearly as often the commutator insulation on the generator gave 'way. When the new building was built, a new motor-generator was obtained and this machine, in use ever since, has given excellent results. It is a double-commutator Esco job rated at 3000-volts, 500 milliamperes. The motor is a three-phase, 110-volt, 1750 r.p.m. one, which at once solved the starting difficulties. The generator has the distributed type of field winding described in *QST* as used on the Bowdoin generators. The picture of the power supply equipment shows the big generator at the rear with its exciter at the left. The old single phase motor generator is at the left. The motor generators are connected and switched through the slate power control panels shown in another photograph.

The power panels are of slate, 24 inches by 30 inches, and are mounted on angle iron frames. At the bottom of the center panel are plugs and sockets for switching the high voltage from the various plate supplies to the various loads. Provision is made for starting both motor generators, the high voltage plate transformers, and the transmitting filaments, either at the panel or by relays from the control desk. Other switches give control of the A and B supplies, A battery Tungar charger, a.c. control circuit and so on. Field rheostats of the motor generators are on the power panels. The switchboard and circuits were laid out in the light of past experience to give a maximum of convenience and flexibility.

Lately a three-phase rectifier using the new mercury vapor tubes has been put into use. The high sides of three 120- to 1400-volt distribution transformers are connected in star, each leg going to a rectifier tube and the neutral through a choke to the negative terminal. The a.c. input is about 2400 volts r.m.s. per leg and the d.c. no-load voltage is 2700. This drops to 2630 volts with a 300-milliampere load, from which it may be seen that the regulation is excellent. A 2-μfd. condenser after the choke lowers the hum on 'phone transmission to less than the generator ripple. On c.w. with no filter condenser there is just a suggestion of an 180-cycle ripple in the wave. Save for the difficulty of reducing the 2700 volts to a value usable in the low power stages of the crystal controlled transmitters, this supply is every bit as good as the big expensive motor-generator.

A Thermo-Regulator for Quartz Crystals

(Continued from page 18)

priced and is an ideal instrument for use in the more elaborate amateur stations where it is desirable to keep the temperature of the quartz crystal within narrow limits, since adjustments may be made from the front, away from the heating element. Of course when such a temperature control unit is used, the crystal must be housed in a temperature insulated box to realize the maxi-

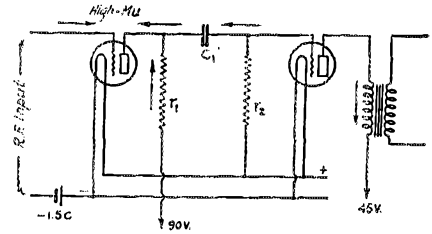
mum advantage from such a thermostat. The regulator unit may be obtained from the Central Scientific Co. of Chicago.

B. D.

Cascading Rectifiers

(Continued from page 39)

Coming now to the physical requirements of the circuit whereby cascade rectification may obtain. The lop-sided potential appears in wrong phase for successive plate rectification, but if plate and grid rectification alternate this difficulty may be obviated. In plate rectification the positive lobe preponderates, in grid rectification the negative; therefore, such a sequence, as in Fig. 2, is consistent, as the arrows for instantaneous current directions indicate. Also, since both a.c. and d.c. in proper relation to the datum potential must reach the second grid, resistance coupling is employed. A high-μ tube is preferred, the coupling resistance being a 2-megohm grid leak which serves the double purpose of reducing potential to a rectifying value and also of providing a large RI drop. For a 201-A tube the constants will be about the same, but the output inferior.



C_1 = .00025 mf
r_1 = 2 megohm gridleak
r_2 = 2 to 5 megohm gridleak
Second tube to be high-Mu also if resistance coupled amplifier is used.

FIG. 2

Expansion of the arrangement means the addition of more tubes in alternate plate and grid rectification. For radio oscillations the use of more than the two is hardly advisable, owing to distortion caused by overloading; the latter follows as a natural consequence of the voltage-squared term in the output factor. Before overloading occurs, however, the second rectifier will pass enough good quality energy to load up a speaker on one audio stage. Nevertheless, some means of limiting the input must be provided, and it is imperative that this limiter or volume control be placed ahead of the detectors.

As to behavior at frequencies high as or higher than those of the broadcast band the writer has no data available; but at frequencies tried its fine performance indicates an upper limit very much higher than 380 kc. As to stability, the low plate potential of the added tube constitutes in effect an oscillation control. In this characteristic lies its advantage, the gain of another stage where an added amplifier would prove unworkable. Viewed from this angle it is believed that, in the general case, stability will not be upset if the principle is applied to existing amplifiers.

ASK FRANK LESTER

Station 2 A M J

(President Bronx Radio Club)

If you want to get the real line-up on the service Wholesale Radio gives to amateurs, just signal the well-known 2AMJ (Frank Lester himself). Frank is the active head of our Amateur Dept. He *knows* your requirements. He fills your orders **PERSONALLY.** And, if you want additional proof, just call 2X2BBN. Johnny Wilcox will inform you that Wholesale Radio Service is "right on the job." He ought to know because he himself helps to make that slogan truthful.

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Remember this: When you deal with Wholesale Radio you receive careful attention from people **WHO KNOW YOUR PROBLEMS!** In this unique service we are the only organization of its kind in the world! Send for big catalog explaining this.

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36 Vesey Street, New York City.

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Street.....

Town.....*State*.....

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One-inch oscillating blanks.....**5.00**

We also supply "POWERTYPE" crystals to broadcast and commercial stations.

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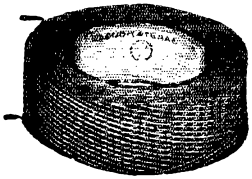

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Range 17 to 200 meters.....$12.50
Complete set of SHORT WAVE FOUR parts $62.50

Calibrated instruments built to order. Special construction work made to your design.

Ask for our quotation

Calls Heard

(Continued from page 68)

W1ABG, Al Guldis, 53 Lamb St., Lowell, Mass.

14,000-kc. band

ce1ah ce2ab ce3ac ce3ag cm2ft ct1bx ct1by ear96 ef8aap f8acj f8orm f8fk fqpm k4kd k4ni k6eha lu2bx lu2ca lu3dh nj2pa on4ip on4it py1ah py1aa py1cg py1cr py1id py2ak py3ah su2bc ve5ef vk3cp vk3pm x1j x9a zl1av zl2ac zl2ak zl4ao bp kduw xpa0ja pa0gw

7,000-kc. band

cm5ni ct1bx d4au ear62 ear92 ear98 eb4cz eb4cw eb4ww cegcl ef8dmf ef8acj f8btr f8he f8mrg f8tlr f8wb f8xd f8xh ilfu kdv5 kfr5 k4aan le1a on4vg ys1aa ys1dn en0ir pa0gw c7z ddm vp vz wfbt

Below 7,000-kc. band

cm2ay cm2co cm2iq cm2jt cm2sc cm5fc cm5fl cm7sh cm7sz f8yp kfr6 nbbc3 ng2jc nj2pa nn8nic nn1nic nr2ags nr2ea nr2hc x1r x9a zs2b kf1f

W. N. Wherry, S.S. Chester Valley, c/o Radiomarine Corporation America, 518 St. Peter St., New Orleans, La.

w1aba w1acd w1acv w1afb w1afl w1anz w1aqo w1axx w1bal w1bcr w1bcu w1caw w1cfi w1cgd w1chg w1cmp w1cpb w1gw w1kw w1pv w1qz w1si w1tb w1wu w1wv w2abn w2ace w2aeg w2adp w2aib w2ak w2apy w2arq w2axx w2baq w2baz w2bcm w2bcb w2bdj w2bel w2bfy w2bhv w2bim w2bkf w2blg w2bme w2boz w2cbp w2cs w2cuf w2dpw w2hq w2is w2mb w2rs w2rz w2vy w3aaj w3adz w3afx w3ajh w3amb w3aun w3apn w3aqs w3ard w3asg w3avi w3bij w3bmk w3bnf w3bph w3bre w3cjn w3ee w3kr w3nf w3nk w3pf w3ql w3an w3sz w4abz w4ac w4adf w4aeb w4aef w4afk w4ahq w4al w4bl w4drw w4ei w4ib w4oc w4pau w4to w4tz w5ahb w5aqv w5gx w5bdd w5by w5pa w5rh w5vv w6acm w6aqj w6avj w6bpo w6cbp w6cjn w6dqv w6dsg w6eif w8aav w8aff w8ahc w8avs w8avw w8aoq w8akz w8ayo w8axz w8bad w8bax w8bcu w8bfh w8bly w8boy w8bpa w8brh w8brl w8bti w8ccm w8clo w8ciw w8cnr w8cnt w8cnx w8djv w8drj w8duw w8fc w8fl w8hx w8tv w8vn w8wp w8xc w9ack w9aeo w9alm w9bre w9bqe w9bsh w9cmx w9cvn w9dsw w9dws w9ecx w9ef w9efw w9elb w9ejo w9etd w9ezt w9fon w9fxj w9gdh w9ghk w9ghr w9ot w9us w9mt w9xi g5by g5bz ve1ak ve2bd on4ka eu5bp zl4am zl2ac zl1ft wbae whd

W9FVM, Frank M. Davis, Monett, Mo.

ap1 ce1aa ce1ai ce1by ce2ab ce2bm ce3bf cm2yb f8er f8hr g6pp k1bd k4kd k6alm k6aew k7gm kfr5 kfr6 nj2pa oa4o oa3q on4uu rxfr5 su7rs ve1ar ve1br ve1ca ve1co ve1cc ve1ap ve1bv ve2bp ve2bb ve3bm ve3cs ve3eb ve3eq ve3rf ve3hb ve3dr ve3co ve3el ve3da ve4as ve4fk ve4jg ve4bb ve4hr ve4dj ve4jb ve4ff ve4bx ve5aw ve5ef xpa0zz x9a yi1mdz wfat wfbt

W6DUT, F. L. Easter, 1336 Monroe St., Phoenix, Arizona

14,000-kc. band

Phoenix, Arizona, during April 16th to May 15th

w1apj w1apq w1ave w1awq w1axm w1aze w2aav w2acg w2amm w2ajd w2apf w2arb w2arn w2avr w2aun w2avd w2axx w2bcw w2bff w2bjg w2bjv w2blg w2bnb w2bnx w2bvg w2cub w2cwk w2dn w2ei w2el w2gp w2mb 3ach w3adq w3aou w3apx w3aqq w3aqs w3aur w3bph w3cee w3db w3ut w3wy w4aau w4aaq w4aiq w4aim w4ajk w4akg w4akh w4eq w4dv w4kz w4to w4ts w4uv 7afo w7aof w7mw w7pv w8aq w8aat w8aja w8apb w8avp w8avo w8bad w8bae w8bbs w8bdp w8bgy w8bkm w8bpr w8bpz w8bvt w8bsr w8bud w8buh w8bys w8cbw w8cft w8cib w8cnz w8cur w8cut w8dhc w8djv w8dld w8dloa w8dps w8dqk w8iq w8dyk w8hh w8jd w8tb ce1aa ce2ab ce2ag ct1aa ctkbx d4uj f8fr g2bm g5by g6nt jw3aq k6aew k6alm k6eat k4kd k4ni nj2pa oa4q on3gx py1na py1aw py2ii rxfr5 kdv5 ve1ay ve2bb ve3ay ve3qs ve4ff ve4gd ve4gi ve4gx ve4he ve4hy ve4jb vk2jy vk2pa wfat zl4ao

HAM-ADS

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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 B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel Available immediately, filament and plate transformers for the new 866 rectifier, complete plate power units. Rectifier Engineering Service, radio W8ML, 4837 Rockwood Road, Cleveland, Ohio.

THE most complete line of modern short wave receivers for every particular service. Four to nine tube designs. Radiophone-CW transmitters, of any power or type. We make a complete line of apparatus including speech amplifiers, filter coils, transformers, rectifiers, variable condensers, inductances, etc. Any special apparatus, designs, made to order using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Ensall Radio Laboratory, 1208 Grandview Ave., Warren, Ohio.

OMNIGRAPHS, Teleplexes, transmitter, receivers, Vibroplexes, 50-watters, "8" tubes, bought, sold, traded. Ryan Radio Company, Hannibal, Mo.

SPECIALLY made rectifier aluminum with small percentage copper, stand more amperage, last longer, square foot $1.25. Lead $1.00. Elements, holes punched with bolts and nuts, new kind 1" x 4" 15c, 1" x 6" 17c, pair prepaid. Best Silicon steel .014" cut to order 25-35c lb. Postage extra. Geo. Schulz, Calumet, Mich.

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QSL cards. 'Nuff sed. W8CUX, Millington, Mich.

PANEL engraving — finest workmanship on radio laboratory apparatus. Request price list. A. L. Woody, 19 S. Wells St., Chicago.

MOTOR Generator Bargains. 750-volt, 250-watt direct connected to 110-volt, 60-cycle, alternating motors with field resistance, $49.50. Also 150-watt, same as above, $40. ¼-horse, 110-volt, General Electric and Westinghouse alternating motors with pulleys, $8.75. We are also offering many other bargains in motor generators voltage to 3000. Also separate generators, motors, etc. Write us for quotations on any machines you are interested in. Electrical Surplus Co., Radio Dept., 1911 Chicago Ave., Chicago.

SELL — synchronous rectifier, $20. W6EA, 343 South Fremont Ave., Los Angeles, Calif.

ARRL sweater emblems should be worn by all League members. They are yellow and black 5" x 8" diamond, felt letters and embroidered symbol. Only $1.00. Money order or currency only accepted. Erie Robinson, 135 Jefferson Road, Webster Groves, Mo.

LET us build or bid on your station, broadcasting, amateur phone, or CW. Satisfaction guaranteed. Prices the lowest in the country. Try us. Uncle Dave L. Marks, 117 North Pearl Street, Albany, N. Y.

TRANSMITTING tubes. Wanted any size. We buy any size station. What have you? Uncle Dave L. Marks, 117 North Pearl St., Albany, N. Y.

SPECIAL: Amertran 1200 volt each side of center 2-7½ volt center tapped filament windings at $8.00 each. 3/16 inch Signal Corp. silver contact keys 95c each. 30 Henry 150 mill, chokes $1.90 each. Signal high frequency buzzers 95c each. Two microfarad 1000 volt unmounted condensers 85c each. Westinghouse Aeroplane generators $4.50. Microphone cases $2.25. Mershon condensers $2.00 each. Flechtheim 1500 volt pig-tail leads one microfarad condenser $2.75, with two microfarads $4.50, with four microfarads $6.50. Freshmann 375 volt and two 7½ center tapped windings $2.75. Thordarson 220 and 285 volts center tapped transformer $1.95. All sizes of variable condensers 75c to a $1.00. Thousands of other buys. Send for monthly ham sheet. Uncle Dave, 117 North Pearl St., Albany, N. Y.

SELLING out — two complete stations and parts. Write Dick Mitchell, P. O. Box 212, Vincennes, Ind.

PLATE supply Transformers — 300 watt. 1000 and 1500 volts each side of center tap $11.50 — 2000 and 2500 volts each side, $14.50 — 2500 and 3000 each side $16.00; — 500 watt, same voltages as above, $14.50, $17.50, $20.00; — 750 watt same voltages as above, $18.50, $21.50, $24.00; — 1000 watt, same voltages as above, $21.50, $24.00, $28.00. All 110 volt, 60 cycle. All mounted, heavy construction. Excellent regulation. No heating. Any size and voltage to specifications. Scott Coil & Transformer Co., New Albany, Mississippi.

SELL 4 tube screen grid short wave receiver shield stage with tubes, $25. Weston galvanometer model 375. T. Alfred Cox, 1030 Church, Hannibal, Mo.

FOR sale — complete remotely controlled mercury arc rectifier including Thordarson plate transformer. A good buy at $45 cash. W9CNM, 7512 Indiana Ave., Chicago.

JEWELL 1000 ohms per volt, meters No. 54 d.c. 0-2000 $14, 0-1000 $13. No. 74 a.c. 0-1000 $11. 60 lb. 30H 500 M.A. choke $25. Hilet products in stock. See Hilet advertisement. Write for specifications. M. Leitch, Park Drive, W. Orange, N. J.

COOPER Hewitt mercury arc rectifier complete with KA transformer, Tungars, resistances, chokes, etc. $25. 204A guaranteed with socket, $30. Many other bargains. What do you need? W8CRF

NEED cash. Western Electric 212D 250 Watter $35. Lot surplus transmitting equipment including tubes, 75 meters, transformers, etc., reasonable and guaranteed. List for stamp. Walleze, 597 North James, Hazelton, Penna.

QSL cards 75c per hundred, two colors, free samples. W8BML, 3306 Eastside Ave., Cincinnati, Ohio.

FREQUENCY precision is the most urgent need of modern radio. Let us calibrate your new frequency meter from Piezo standards. American Piezo Supply Co., Dept. C, 1101 Huron Bldg., Kansas City, Kans.

WANTED — filter, meters, tubes, xtals, for 75 watt outfit. W9ERU

1 Benwood synchronous rotary quenched gap $30. 1¼ h.p. synchronous motor $20. 4 Faradon UC490 1750 volt, 1 mf condensers each $2. 1 UV203 Radiotron 50 watter $10. 3 Murdock sections of condensers, each $2. 1 kw Thordarson 110-20,000 volt spark transformer, $10. 1 0-500 Weston milliameter type 301 $7.50. 1 Jewell 0-4 rf meter tc type, pattern 84 $10. 1 Jewell 0-15 AC volt meter, pattern 74 $7.50. Carles S. Chapman, 705 Plummer Ave., San Jose, Calif.

NEW UX852 never used, $20. H. E. Wing, Greenfield, Mass.

LEARN the code at home. Our famous code machine is creating a sensation. The low price will amaze you. Compare our price with others and see what you save. Codegraph Mfg. Company, Winchendon, Mass.

MAKE offer — *QST's* 1916 to date. Robert Brown, 1857 East 18th St., Brooklyn, N. Y.

TUNED-grid, tuned-plate transmitter, 7-½ watt bread-board mounted, High-C. Worked 24 foreign countries during July, August. $25.00. With power $40.00. Hal Justice, W4TS, Canton, North Carolina.

SELL UX852 $20, 212-A $25. The following fully mounted Acme transformers: 500 watt plate 1000–1500 $15, 200 watt plate 550–750 $12, 150 watt filament $10, 0–1500 volt Weston meter with external resistor $15, 0–500 Jewell Milliammeter $3.50. Kelwin Kearney, 16626 Outer Drive, Detroit, Mich.

---

275 volt used generators d.c. $5, 500 cycle 200 watt $10, 500 cycle motor generators, $25, ½ k.w. new $50. Other material. R. Wood, 46–20 102nd St., Corona, N. Y.

TRANSFORMER Specials, 500–0–500, 7½, 150 watt, $4.50, 650–0–650, 7½, 7½, 170 watt, $7. 250 watt 550, 750 each side, two 8 volt windings center tapped, $9.00. 0–600, 7½, 75 watt $3, 30H 85 MA double choke $1.75. 350–0–350, 5, 2½, 2½ electric set transformer $4.50. Condenser blocks for the new 245 tubes, working voltage 450, 2–4–4–1–1 MF $4. Write for new catalog listing a complete line of transformers, chokes and filter condensers for transmitters, power amplifiers and electric set packs. Electrone Labs., 834 N. Randolph, Phila., Pa.

SELL — UV204 and WE212D, $35. each. DeForest ½ k.w. tube, $50, or trade for any of the following. Theatre amplifier *complete, public address system complete or 1000 volt motor* generator, 60 cycle, 110V drive. Box 21, Seaford, N. Y.

QSL cards, two colors, $1.00 per hundred. Free samples. W8DTY, 257 Parker Ave., Buffalo.

TWO WE212D, $45. each. What have you that you are not using? What do you want to trade for? Lowell Ecker, Sedan, Kansas.

SELLING out. Have REL short wave super, new Corona four typewriter, 7½ watt Hi C Xmitter, etc. W7ACV, Box 94, Clatskanie, Oregon.

NEW Morton Elec. Co. MG sets 1000 volts, 250 watts $50.00, 2000 volts, 500 watts $160.00. Wickoiled, 110 volt, 60 Cy. 3450 RPM motordrive, J. Hanson, 4832 Rice St., Chicago, Ill.

SELL G.E. 1000 W. transformers to give 1100–2200–4400V each side center tap. Unconditionally guaranteed. 110 or 220V advertised 19 months in *QST*, $12. F.O.B. Detroit. F. G. Dawson, 5740 Woodrow.

WANTED — Navy standard receivers, SE143, SE1220, SE1420, IP500, IP501, also 203A and 204A tubes and spark gap units. State condition and price. Paul Trautwein, 88 Park Place, New York City.

1929 station for sale. Absolutely complete. Metered 7½ watt Hi-C transmitter, plate power, rectifier, filter, receiver, fones, monitor es all tubes, $69. A real bargain. Pictures es dope on request. WSDMK, Jewell Knoth, Utica, Ohio.

TRANSFORMERS — 100 watt, 110 volt, 60 cycle, 750 volts each side of center tap, one 7½ volt, center tapped filament winding, $7.25. Same as above but with two filament windings, $8.00. Same as above but 150 watt, $9.25. Same as above but 250 watt, $11.50. Above Transformers will operate two to four 210 tubes for Transmitting. They are also well suited for Power Amplifier use and if desired may be supplied with lower plate and filament voltages at prices quoted. All Mounted, heavy construction, no heating. Scott Coil & Transformer Co., New Albany, Mississippi.

---

5 WATT TUBES, new, guaranteed, similar to UX210 with standard bases, one dollar each. Renmo Tube Company, Atlantic, Massachusetts.

QSL cards, individual designs. W5ANC, 173 Albany Ave., Shreveport, La.

FOR sale — surplus radio parts. Send postal for new list. H. F. Schmidt, 511 10th Ave., Belmar, N. J.

NAVY VT14 five watters are popular with the fellows who do not want to do their experimenting with expensive tubes. At one buck you can't go wrong. All voltage ratings same at UX210. These tubes are all new and in original navy boxes. Shipped PP or COD. Postage extra. C. L. Lang, 1128 Springfield Ave., Irvington, N. J.

POTTER condensers, test voltage, 1mfd 2000 $2.50, 2500 $3.25, 4000 $8.00, 2mfd 1000 $2.50, 2000 $4.00, 4000 $15.00. Thordarson 650 volt Power-Filament transformer $6.90. Aluminum square-foot 85 cts. Lead 85 cts. "Ham-List" 4 cts. Curtis Sales Company, 1109 Eighth Ave., Fort Worth, Texas.

JEWELL analyser, perfect, $53.50. W1AVE.

CRYSTALS: Ground to maximum output at your approximate specified frequency — 3500 Kc. band $12.00. C. Pearce, 427 Asia St., Baton Rouge, La.

MONITORS built October 1928 *QST*, page 17, $12.00 with batteries and tubes. Parts including batters and tube, $10.00. Wavemeters and *QST* sets built. Send for literature. Blumberg, 321 West 78th St., New York City.

3000V, 4000W, 7½ Hp. 3-phase drive double commutator motorgenerator, complete $50.00, 2500V, 500W, double commutator, single phase drive complete $225.00. 500 Cycle 1 kw. ballbearing motorgenerator, 110V. DC drive $175.00. 250 Cycle 1¼ KW. ballbearing motorgenerator 110V. DC drive $165.00. 2-5KW. Rotary spark gap 110V. DC drive $35.00. 1000V, 200 W. Esco 1-phase drive $75.00; 300W. GE $95.00. 750V, 250W. new General Electric motorgenerators $52.50, 200W. $42.50. 32V. drive motorgenerators, 750V. 150W. $37.50; 200W. $42.50; 300W. $65.00. 400V. 100W. generators $8.50; ¼ Hp. 3450 speed motors $10.50; ½ Hp. $16.50. ½ Hp. 110V. AC synchronous 1800 speed motors $20.00. 8V. 5 ampere generators $6.50. Queen City Electric, 1754 Grand Ave., Chicago.

NAVY Dynamotors ideal for battery operation. Shafts for external motor drive $3. additional. General Electric 24/1500 volt $37.50; 24/750 volt $27.50; 12/350 volt $18. Westinghouse 6–15 volt 500 watt $15; 10/350 $18.; 27.5/350 $15. Twins for 700 volts $25. 900 cycle $25. ½ kW 500 cycles $15. Largest stock in country. Complete list. Henry Kienzle, 501 East 84th Street, New York.

QSL cards, stationery, message blanks, wall cards, etc. Selden's, Cranesville, Pa.

MAKE Offer: Hanscom Super; Grimes Reflex; Rectobulb; W.E. 540-AW Cone; General Radio type 400 B supply and pwr amplifier; 250 oscillator with finest equipment; Jensen Dynamic; Several Westinghouse PA meters; 8 Flechtheim 1500 v condensers. All above equipment new and unused. P. H. Craig, 2545 Harrison Ave., Cincinnati, Ohio.

QSL cards, 100 two color, $1.00. Free samples, W0CKA, Corwith, Iowa.

SELL — New RCA super-heterodyne catacombs, RCA No. 8150. Fine for short wave experiments and portable receivers. Formerly $75.50, now $13.95. Ludwig Hommel & Co., 929 Penn Ave., Pittsburgh, Pa.

CONDENSERS: Dubilier 4 Mfd., 600 volts DC working, Metal-cased — $2.45. Unmounted 2 Mfd., 500 volt — 40c. Five for $1.80. *Splitdorf 1 Mfd., 1000 volt* — 40c. Four for $1.40. 1½ Mfd. add 15c. W. E. microphones — 96c. Good UX–281's, UX–250's — $2.95. See our ad page 66. William Harrison, 35 Ft. Washington Ave., New York City.

AMAZING screw-holding screw driver! Factories, garages, workers buy on sight! Profit 75c each. Exclusive territory. Free trial offer. Jiffy, 1265 Winthrop Bldg., Boston.

TIPS for *QST* all-purpose superhet. We wind intermediate coils — get our prices. Weston, Tobe, Hammarlund, Sangamo, Pilot, National and Yaxley parts. Electrad transmitting leaks are wows. Hatry & Young, Hartford, Conn.

RCA UV 217s — $3.50. 217As — $8.00. 204s for $40.00. 204As $75.00 (used less than 50 hours.) 203s for $13.00. 203As used, $17.00. Western Electric 250 watters tubes $45.00. Western Electric 212D $45.00. New rectobulbs type R-3 $10.00, postage prepaid. Baldwin phones type C $4.00. Motor generator 2500 volts at one amp. 133 segment commutator coupled to 5 horse power GE motor, practically new for $300. Amertran 1000 volt each side of center with two heavy 7½ volt filament windings center tapped. New price $5.95. Splitdorf unmounted 1½–2½–5 volt filament center tapped 250 volt high voltage center tapped for $1.50. General Radio Signal Corp Flame Proof Key ¼" silver contact $1.25. Jefferson three thousand volt each side of center transformers $1.95. Freshman 375 volt winding and two 7½ volt center tap windings transformers $2.75. RCA UX 210s — $6.00. RCA UX 250s $7.25. RCA 281s $4.75. 30 Henry 150 mill. chokes $1.90. GE unmounted 3½ microfrad 1000 volt condensers $1.85. 284W microphones $4.00. Mueller *30 watt transmitting tubes $7.50. Silver-Marshall round the* world four sets $29.00. .002–001–00025 Sangamo 5000 volt mike condensers $1.50 each. 5000 ohm wire wound grid leads $.40. Amateur Call Books $.85. Microphone cases $2.25. Tungar commercial battery chargers $20.00 up. Thousand of other buys. Send for free list. David L. Marks, 117 N. Pearl St., Albany, N. Y.

CRYSTALS — see our display on page 89. American Piezo Supply Co.

SELL Teleplex Sr. with six rolls, $13.00. W1BSM, 35 McKinley St., Everett, Mass.

TRADE crystals for what have you? W6EBV

Q R A SECTION

50c straight with copy in following address form only:

W2BCH — A. S. Harrison, 6941 62nd St., Glendale, L. I.

W2BTB — Tom W. Ladd, 345 W. 43rd St., New York City.

W6EQJ — J. B. Kilpatrick, 703 Kensington Rd., Ocean Park, Calif.

W1MK
A.R.R.L. Headquarters

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

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

W1BDI–W1XL F. E. Handy "fh."
W1AL B. Dudley "bd."
W1DF — Geo. Grammer "hg."
W1EH K. B. Warner "kb."
W1BUD A. L. Budlong "bud."
W1CEI J. J. Lamb "jim."
W1ES A. A. Hebert "ah."
W1FL–W2JR G. Donald Meserve, "dm."
W1PX C. G. Kenefick "ok."
W1SZ–W1BIZ C. C. Rodimon "rod."
W1UE E. L. Battey "ev."

Members' Correspondence Stationery

One color (black) heading now being used at greatly reduced cost to members.

Write your radio letters on League stationery — it identifies you.

Lithographed on 8½ x 11 heavy bonded paper.

100	**sheets**	**50c**
250	**"**	**$1.00**
500	**"**	**$1.75**

(Postage Included)

A.R.R.L.

1711 Park St. ***Hartford, Conn., U. S. A.***

YOUR A.R.R.L. EMBLEM

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

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

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

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

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

The American Radio Relay League, Hartford, Conn.

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

For Your Convenience
QST'S
INDEX OF ADVERTISERS IN THIS ISSUE

Look at these Specifications *of the* New 1930 BROWNING-DRAKE *screen-grid* radio

YOU fans who bought Browning-Drake kits in by-gone years know what Browning-Drake quality meant. In the New 1930 Browning-Drake Set you'll find just that same quality plus every up-to-date and proven radio feature.

That is why these sets give such superior tone quality and selectivity and get distant stations so readily.

Look at some of the specifications:

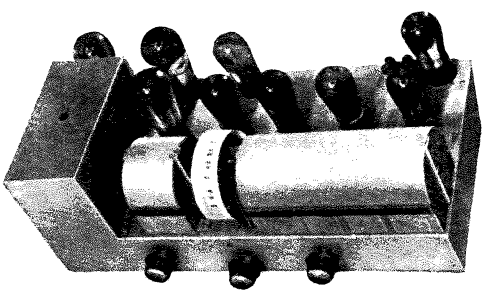
Semi-automatic tuning with band so designed that you can readily obtain your favorite stations in the section of the country in which set is used.

Mershon Trouble Proof Condenser which automatically seals itself if accidentally short-circuited.

Each set locally tested to insure perfect reception under individual conditions in every locality.

Television, phonograph, home movies and short wave connections.

Special dynamic speaker enabling you to regulate tone, without distortion, from full volume to a whisper.



Chassis of the New 1930 Browning-Drake—Screen-grid and Heater types

Voltage Regulation Adjustment (manual)

Five tuned circuits using nine tubes

Tuned antenna

Push-pull audio

Power detection (optional)

Hum Eliminator

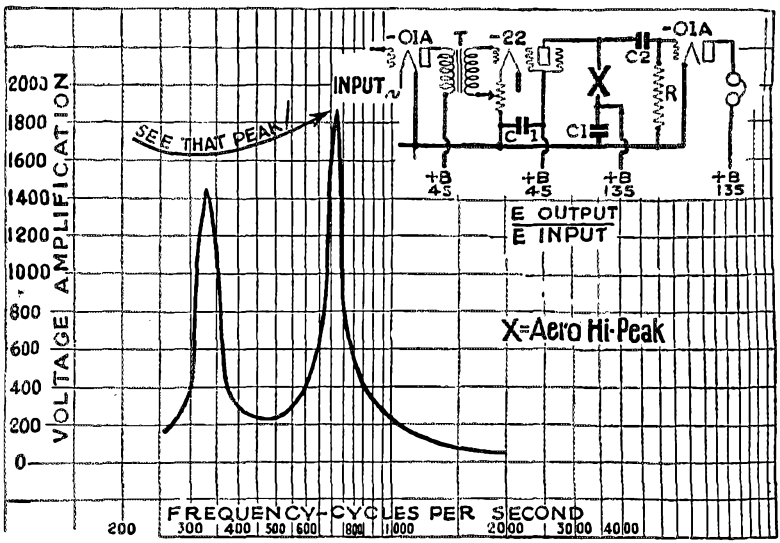
Band-pass Filter Effect

In eight models — Console and Table — heater and screen grid types. Prices, table models $98 (heater), $102.50 (screen-grid); Consoles from $137.50 to $188.50.

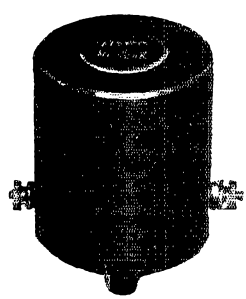
We welcome inquiries at any time and can present an unusually attractive franchise proposition to dealers

BROWNING-DRAKE CORPORATION, 228 Calvary St., Waltham, Mass.

Aero Short-Wave Products



See That Peak!



$6.50

THAT is the Aero Hi-Peak of amplification and selectivity, the peak of amplification which is many times greater than you get with just ordinary transformer amplification, and which brings signals through QRM.

In these days of modern amateur radio and heavy QRM, you need more than amplification alone — you need selectivity more than ever before. The Aero Hi-Peak is a properly designed audio choke, tuned to a frequency which gives greatest signal response with the average headphones. As shown in the diagram, the Aero Hi-Peak is used as the second audio stage of amplification, connected in the plate lead of the screened-grid type (— 22) tube. The first audio stage of amplification may be any good audio transformer, but for a Hi-Peak like the one shown, the AE-300 audio transformer is recommended for best results. The Aero Hi-Peak is connected as shown by X. Not recommended for program music or voice reception.

Ordinarily, amateur short wave receivers have been sensitive enough to satisfy the user, but they have been lacking in selectivity — that extreme selectivity so desirable for successful operation. Hundreds and hundreds of amateur radio stations are operating within the very narrow limits of the amateur bands, and there is bound to be some QRM. The Aero Hi-Peak makes it a real pleasure to operate your station without the usual "SORRI OM QRM VY BAD ON UR WV."

Mounted in heavy bakelite case, 2⅝ inches high and 2¾ inches across mounting supports. Shipping weight about one pound.

If your dealer cannot supply you, write to us direct.

AERO PRODUCTS, INC., Dept. 389,
4611 E. Ravenswood Avenue, Chicago

Dear Sirs:

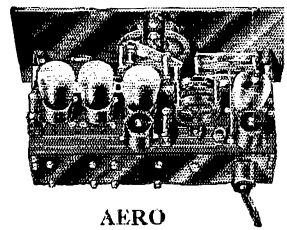
Please send me advance information on the new short-wave developments now being perfected in your laboratories as announced in September issue of *QST*, also your literature on the new audio frequency transformers.

My Name.....

Street and Number.....

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

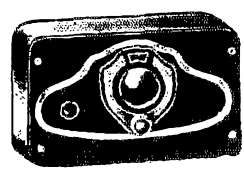
4611 E. Ravenswood Ave., Dept. 389 — **AERO PRODUCTS** INCORPORATED — Chicago, Illinois, U. S. A.



AERO INTERNATIONAL Short Wave Receiver

The first receiver designed exclusively for short wave broadcast reception. Gets programs remarkably clear and free from static. There is only one tuning control and the set is extremely easy to operate. The complete kit includes everything necessary to put the set together without spending another cent. Full size pictorial wiring diagram makes assembly easy.

Aero Kit No. 18 Price **$55.30**

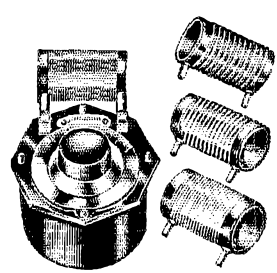


Only $15

Aero Listening Monitor

Enables any amateur transmitter to check his own note, to know whether it is pure D.C. or not. It is a safe, sure and accurate way of knowing your station without depending upon the reports of others. Watching the ammeter won't help you — you need the Aero Monitor to be absolutely positive.

Model M-29 Aero Monitor, including Dry Batteries, but no tube. List Price..... **$15.00**



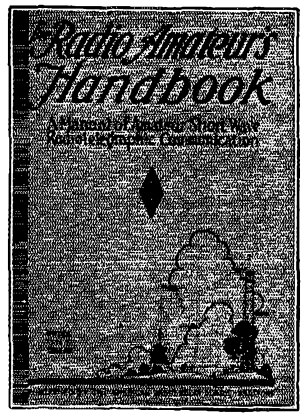
Aero Wavemeter

Using the principle of the "series gap," condensers, and having a definite fixed minimum capacity, the amateur wavelength bands are spread over a great many dial divisions. The velvet vernier dial has 100 divisions, each of which may be read to one-tenth of a division. Each wavemeter is individually hand calibrated. Standard coils shown are 20, 40 and 80 meters, included in price. 5- and 10-meter coils extra.

List Price, each..... **$24.00**

RUMFORD PRESS CONCORD

Wouldn't *You* Like To Be a Radio Amateur? Are You Wondering How To Go About It?



The American Radio Relay League, the national association of radio amateurs, has undertaken to make it easy for you by publishing a book designed for that very purpose. Amateurs everywhere hail it as the most valuable guide to practical amateur radio which has ever appeared.

The Radio Amateur's Handbook

(FIFTH EDITION—in its 59th thousand)

By F. E. HANDY and ROSS A. HULL

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

Here is information about amateur radio from men who are real radio amateurs themselves, written so you can understand it. It starts in at the very beginning of the subject and tells you just what Amateur Radio is, what it's all about, how to be a radio amateur, how to get started in this most intriguing of avocations, how to learn the code, how to get your licenses, how radio works, how to build the apparatus for a simple station, how to operate a station. It has chapter after chapter on the construction of apparatus; different kinds of receivers and senders, power supplies, frequency measurement, transmitting antennas, how to build amateur phone transmitters, all written so that you will be able to build them yourself and make them work. The whole story of amateur radio is in this book — its very purpose is to tell these things to the folks who are looking for the key to this great hobby.

The Handbook is printed in *QST* format, to keep the price down. In usual text-book printing style it would be a book of over 500 pages and would cost around $5. The simpler style puts it in 200 pages like *QST*'s style and makes the price a modest $1. It is the biggest dollar's worth of radio information you ever saw.

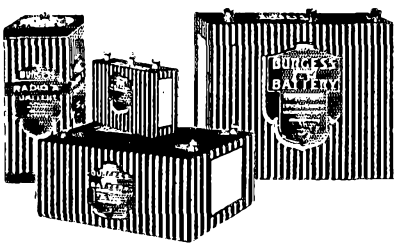
Break In—Let the Handbook Be Your Guide

Blue-and-gold paper cover $1 — Postpaid Anywhere — Stiff buckram cover $2

American Radio Relay League, Hartford, Conn., U.S.A.

Take no Chances ~ ~ ~

BURGESS BATTERIES



Have proven their worth under every possible condition where batteries are used, since the beginnings of radio.

They are outstanding in the Amateur radio field, in the broadcast field, in the field of science and investigation. Wherever dependability is an essential, the black and white stripes are recognized as "the standard of quality."

You are playing a sure thing when you use

BURGESS RADIO BATTERIES

"Ask any Radio Engineer"

Madison, Wisconsin, U. S. A.

The Communications Department

F. E. Handy, Communications Manager
E. L. Battey, Asst. to Coms. Mgr.
1711 Park St., Hartford, Conn.

How to Handle Traffic

By Eugene A. Hubbell*

The Communications Manager invites contributions on every phase of amateur communication activity, offering a prize for the best article selected each month. The author whose article appears to have the greatest value each month has his choice of (1) a buckram-bound copy of the Radio Amateur's Handbook, (2) six pads of A.R.R.L. message blanks, or (3) 500 A.R.R.L. log sheets. The right is reserved to use other articles at any time with the usual credit to the author. A wide variety of subjects on which to write was suggested with our original announcement (March QST, page 62) and the offer stands good for all articles received in 1929 marked for attention in connection with the contest. Why not sit down and send us your ideas today?

IN this amateur radio game there seem to be three very distinct divisions into which all amateurs may be divided. These divisions are: the DX seekers, the experimenters, and the traffic-handlers. All three are important, in fact, I do not see how we could get along without all of them. An amateur falls into one class or another, due to a number of things: his own inclinations, his pocketbook, his location, and the time he has to spend on his hobby. The DX seeker must have a good location, first of all, while the experimenter is not nearly so dependent on the location as on his pocketbook. To be a traffic handler, neither is as necessary as is the inclination. Time is equally important to all three.

The purpose of this article is to discuss traffic handling, and the problems to be met in becoming a traffic handling station. Why should a station be a traffic handling one? There is not the thrill of two-way communication over immense distances, nor the joy of accomplishing something new in receivers or transmitters. But there is the pleasant feeling of doing something to help someone else, and doing a hard job well.

The traffic station handles messages, nearly every one of which brings a pleasant thought to the recipient. This station is the most ready in time of disaster by fire or flood to carry on the work of keeping up communication with the outside world. Often long distance traffic is handled which not only beats the mail by weeks, but many times equals or beats cable service.

By far the greatest benefits are realized by the amateur directly engaged in handling messages. He gains an operating ability obtainable in almost no other way. He secures an ability to copy code through interference that is almost uncanny. He gains a readableness, through long practice of sending for accurate reception, that makes him envied among the fraternity. His favors to others in the way of handling messages are often reciprocated when most needed, and least expected. He becomes well known. If he operates as he should, his reputation for reliability is proven beyond a doubt.

Beyond all this, his station is made more efficient. He uses break-in, if possible. His transmitter must be arranged to put out a good readable signal in any kind of weather. His signals must be consistent. His receiver must be better, since he cannot let his schedule go merely because there is QRM on the air. And he must be able to either QSY at a moment's notice, or must put through a crystal-steady note that can be read through the QRM.

To take up the station details of the traffic handler, we will begin with the transmitter. High power may be desirable, but many of the highest of BPL totals are obtained with a 210. Consistency of signal is easier with more power, but the difference is not nearly so great as is thought. The transmitter should be arranged so that it causes little or no QRM in the receiver, that break-in may be used. Break-in *can* be used with crystal. I know of at least one case where the receiver is not five feet from a 50-watt doubler stage on the next lower frequency band, and no trouble is experienced except over about 15 kc.

If crystal is used, it is desirable to be able to QSY to at least one other point in the band, necessitating one extra crystal. If not, then an accurate monitor must be used, or the dial settings very carefully noted, that the transmitter must be QSY'd to another point or two on the band. The transmitter, for the utmost in efficiency, should be capable of operating on the 3.5-, 7- and 14-mc. bands, which can be done with the same antenna, if wished. The transmitter and power supply should be so located that little QRM will reach the receiver.

The latter should be entirely shielded, and use a separate antenna, as far from the transmitting antenna as possible. The tuning should be quite wide. The receiver should be as quiet as possible, since QRN and QRM provide plenty of noise to tell whether it is oscillating or not. Calibration should be obtained by a semi-adjustable lump capacity in parallel with the main tuning condenser, that a different detector tube may be used without losing a third or more of the band. A peaked amplifier is desirable at times for copying through QRM.

The fist of the sending operator is important. A straight key should always be on the sending table. A side-swiper, or bug, may be desirable, *if* it is correctly used. Side-swiper fists are rarely as good as those obtained after long practice with a real "bug" or Vibroplex. To adjust the Vibroplex, turn on the transmitter, with the Vibroplex in circuit. Note the milliammeter reading in the plate circuit with the key on the dash side. With the key swung to the dot side, the milliammeter should read two-thirds as much as on the dash side. This is to give "heavy" dots, necessary for readability.

Message blanks should be readily accessible. These can be obtained from A.R.R.L. Headquarters, or from some amateur who is also a printer. Or the traffic handler can make his own on a mimeograph machine. Half letter size is ample. A message file, with compartments for north, south, east and west blanks, and handling messages should be built. Rubber stamps come in handy, for dating traffic or for making

* W9ERU, ORS, 227 N. 4th St., Rockford, Ill.

message blanks from scratch paper. A stamp with the station call letters, address, and city is most useful.

Nearly all U. S. traffic is handled through schedules. If we were to depend on chance QSO's for QSP, there would be very few in the BPL. With a few good scheduled stations that have traffic, one hour a day on the air will suffice to keep a traffic station in the BPL. The usual schedule seems, at least on 3500 kc., to be of about fifteen minutes' duration, which allows three or four messages to be handled, depending on conditions.

Among famous schedules which will go down in history are the schedules which form the Twentieth Century Limited traffic route, which, originally between Chicago and New York City, now extends from coast to coast. Another is the famous K1HR-W6BJX sked now handled on the U. S. side by W6EEO.

It is easy, with a few well-arranged schedules to handle traffic, and it is a satisfying feeling to know that one can dash into the operating room a minute before schedule time, check frequency, and click with another station to get off traffic in the most expeditious manner. Contrast that with the laborious CQs and calls necessary to get off two or three messages when no schedules are available.

Schedules should, if possible, be arranged in star or five-point fashion as recommended by the A.R.R.L., that is, a series of schedules one in each direction, north, south, east and west. Choose a good large city to the east, and one to the west of you, or if you are located on the seacoast, north and south of you, with perhaps a sked southeast and southwest, to cover the south direction, or even three skeds that way, if you have the time. If not, make the skeds every other evening, instead of daily, staggering the sked times and stations to be able to QSP any direction inside of 48 hours. Don't pick your schedules all within 50 or 75 miles, unless they have efficient schedules from there on. If a message were to be relayed across the U. S. with only 50- to 75-mile jumps, and with usual haphazard timing, it would have whiskers by the time it reached its destination. However, too long jumps to scheduled stations will mean mailing a large amount of traffic. It is best, if the time can be spared, to have two sets of schedules, one in each direction, a short distance away, and one in each direction, far away.

If the relay station is located a short distance from a large city, such as Chicago, N. Y. C., Los Angeles, etc., it is imperative to have a schedule that way, since much of the traffic handled will be found going to the large cities. Also, you will have a chance to handle a lot of the originated traffic from that city.

The best way to get skeds is to listen on the air for consistent stations, noting the times they operate, and whether they seem to handle traffic or not. Look them up in the Divisional Reports, and note their traffic reports. When it is decided that they are consistent enough for a schedule, try to QSY, or write, and ask for a schedule, naming all the possible times you could be on, and giving your preferred time. The other station will invariably reply with a "Sure thing, OM, be glad to sked you." Another way of getting schedules is to look up stations who appear to handle traffic from their reports and BPL standing, and write, asking their frequency, and for a try at QSO and a schedule. Or write your Route Manager (who is nearly always traffic-handler himself, and who may be able to sked you or get you the necessary schedules).

Time your skeds to your best advantage. Don't make a sked which you know you will not be able to keep. The early evening, from 6:00 to 8:00 p.m. is the best for all three bands, the freakish fading not coming on usually until later. This time is not quite so favorable for 7-mc. work, due to heavy QRM. It should be entirely possible to handle six skeds in two hours, leaving the last fifteen minutes of each hour blank, in case of running over from one sked into another. Six skeds can handle lots of traffic, and leave the rest of the evening free for other entertainment.

Of course, DX skeds must usually wait until late evening for successful accomplishment, although early morning is also desirable, though not so easy to do. A number of amateurs use the 3500-kc. band for early morning schedule work until 7:00 a.m. or so. The long-haul skeds, such as W6EEO-K1HR, and W6EEO-AC8RV, and others are on 7 mc. early in the morning.

The average station, which does not handle traffic as an object in itself, originates a few messages, which are generally from the amateur operating. Some amateurs are afraid to handle traffic, for fear of being "commercialized." So long as the amateur or his station receives no compensation or pay of any kind, *any traffic may be handled*, no matter how much it competes with the W. U., etc. Arrange with the nearest large hotel to handle messages. They will ordinarily be glad to allow you to put your blanks on their desk, with a small sign explaining the service. They often make an effort to get this sort of service.

The same can be done at large stores, especially in radio stores. Originated traffic can also be obtained when some convention is in town, by making the service known through newspapers, etc. At Christmas time, greeting messages will swamp the traffic handler, with a few well-located signs and pads of message blanks.

A note on mailing messages may be helpful. It is not necessary to mail a message in an envelope, although it is desirable. A common penny postcard will do the trick. The A.R.R.L. furnishes this type of card already imprinted for mailing messages. The main thing to remember in mailing messages is to make them plainly readable. I have received numbers of messages which were quite indistinguishable, which meant I had to write the originating station to get the correct text. Never change the text of a message. Not even the spelling should be changed, nor should abbreviations be allowed or introduced.

The 48-hour rule of the A.R.R.L. says that unless a message is relayed before 48 hours after its receipt, it must be mailed. There is an exception, in favor of foreign traffic, the rule there being that the message may be held half of the time it would take to go by mail. Common sense should be employed when a message is to be mailed. If you have a schedule within a few minutes or an hour or so after your 48 are up, you would be foolish to mail the message, and not relay it by radio also. Do both, making sure of the earliest possible delivery. Also, if the last mail collection is an hour or so before your 48 are up, do not hold traffic another night before mailing. Again, if the traffic is for a nearby town, which has 12-hour mail service from your own station, and you have no sked that way, mail the message immediately, not waiting for the 48 hours to elapse.

Don't be afraid to mail messages. They do not discredit you in the least. And the message may be worth a great deal to the addressee. Always put the return address on mailed messages, that you may service them in the case of incorrect address, etc.

Counting totals at the end of the month takes a considerable length of time for a high-total station. Separate originated, delivered and relayed traffic. Count only the number of blanks, multiplying the relayed traffic by two, and add. Of course, a relayed message counts as two points relayed, unless you received it from another amateur by mail, or gave it to another amateur similarly. Another case is, if the message was received, and counted, in the last month's totals. A small scratch pad, with columns for originated, delivered, and relayed traffic may be kept on the desk with considerable profit to the operator, as he knows exactly how his traffic total stands at any time during the month. When a message is handled it is noted on the pad with a vertical line, and when five have been handled a line is drawn through them, and another series started.

Correct procedure for the operator is of great importance. Careful study of the Handbook, reference to the writer's article in April, 1929, *QST*, and intelligent listening, will solve any operating problems. Use correct abbreviations, both Q signals and fill signals.

And when the traffic operator watches his total mount up into the hundreds, and he takes his place in the BPL, gradually sliding toward the top, he will have the comfortable feeling which comes to every one as he realizes he has done a hard job well.

28 Mc.

In mid-August PY1AA heard NKF with good strength near noon. W2JN and W2ACN have resumed Sunday skeds with PY1AA again, the U. S. stations starting at 1500 Greenwich and calling for the first ten minutes, PY1AA sending the next ten minutes and so on until 1600. Sunday, June 30th, W4NH answered W2ACN's CQ, and, though a fuse blew at the wrong moment, W4JS heard both stations. W9EF worked W4NH the same day at 11 a.m. E.S.T. W2ACN couldn't hear W4NH then, although sigs were good at 10 a.m. E.S.T. W2TP and W2ACN visited NKF and came away with renewed interest for 28 mc. Dr. Taylor

stated that we are on the downhill side of the cycle of good high frequency transmission conditions. He explained that on 28 mc. the Englishmen hear us louder than we hear them due to magnetic conditions. He also expressed the opinion that for east coast stations the first skip distance ended about at Denver at about midday so that fairly consistent contacts should be possible. Unlike ham stations NKF gets few reports on 28 mc. tests, but we understand that such reports would be gratefully received and acknowledged at any time. Send 'em in gang, and let's have some tests arranged between Atlantic and Pacific Coast 28 mc. experimenters. What do you say?

1929 SIGNALS

3500-kc. band: W1AJB, W1BOD, W1CGR, W1MK***, W2AVG, W2BYO, W2CXL, W2LU, W2OP, W2SC, W3QV, W3UN, W4CL, W4WS (3529 c.c.), W8AQ, W8ARO, W8ARX, W8BKU, W8BRC, W8BRO, W8BSY, W8CUG**, W8DAQ*, W8DED, W8VD, W8ZZ*, W9AGX, W9BKJ, W9BNI, W9BWI, W9DLD, W9DSC, W9DXP, W9DXZ,

7000-kc. band: W1AAT, W1BJD, W1MK***, W2AUP, W2AWQ*, W2FN, W2IY*, W2NV, W3ANH*, W3AOA, W3CKL, W3EP, W3GQ, W3UX, W4ABV, W4AEW, W4AGR, W4AHA, W4AJH, W4CL*, W4KV, W4LM, W4OC, W4PF, W4PQ, W4WS (7058 c.c.), W4WZ, W5AFX, W5AUE, W5JV, W5QL*, W5RJ, W5ZK, W6ACL, W6AFU, W6AVQ, W6CNX, W6DUH, W6DLN, W6DPF, W6EOS, W6EPF*, W6JU, W6KD, W6PW**, W6WB, W6WN, W7NR, W7TS, W7TX, W8ACM, W8AGZ, W8AUQ, W8BDF*, W8BHJ, W8BIK, W8BLH, W8BOX, W8BTS, W8CCS, W8CI, W8CNO, W8COQ, W8CSS, W8CTJ**, W8DCE, W8EB, W8QF, W8QU, W8UK, W8XP, W8ZC, W9AEZ, W9AFN, W9ARA***, W9BEQ, W9BPB**, W9CAA, W9COS, W9CRD, W9CSG, W9CVN**, W9DBJ, W9DDY, W9DTR, W9DWU, W9DXD, W9DXP (7090 c.c.), W9EIY, W9EKK, W9FGB, W9GHW, W9GJR, W9GKT, W9HW, W9ZK, K7ABE, VE2CA, OM1TB, VK2KJ, VK3PP.

14,000-kc. band: W1AIN, W1BKF, W1CCZ, W1EZ, W1OM, W2BOA, W2RR, W3AQI, W3BQV, W4LT, W4WS (14,116 c.c.), W5QL*, W5ZAV, W6AQJ, W6AVQ, W6AYC, W6DCV, W6DLM, W8CCW, W8DDU, W8DLD, W8DPS, W8FZ, W9QF, PY1AH, ZL2AC, VE3BK, G5BY, G6WT, K4NI, F8JF, KFR5.

Well-operated stations: W2ALU, W6AD, W6AFU, W6AKW, W6AM, W6AMW, W6AYC, W6CGM, W6CHA, W6CIH, W6CIS, W6CNX, W6DBD, W6EIB, W6HM, W8FZ, W9CRD, W9ERU, K1CY, K1HR*, K1MC, K1PW, K6AVL.

NOTE.—The stars indicate the number of extra times stations were reported.

Traffic Briefs

When men are wanted to fill responsible radio positions the amateurs are usually called upon. VE5GT-VE5GU has been appointed Radio Inspector for his district by the Dominion Government of Canada. Congratulations, OM!

From W3A1A we learn that the yacht *Abocena*, WIDC, was completely destroyed by fire of unknown origin while anchored off Long Island. The yacht was valued at $60,000.

DX hounds may be interested in knowing that ZS2B at Port Elizabeth, South Africa, will be off the air until the middle of November, as he is taking a 3000-mile motor trip through Africa.

W6DBD reports the following activity in the Ninth Corps Area Army-Amateur Net: The area control station, W6DFR, has been working regular schedules with W6UO, W6ALX, W6EAF and W7GL. Schedule with W7MN has just been inaugurated. W6EDK is acting as alternate for W6ALX. W7HP, W6UO, W6BCO, W6DLI and W6DQO are all active. W7NV is busy lining up locals in his district. Because of skip distance on 7000-kc. the 3500-kc. band is being used exclusively in this area. Stations in Utah, Washington, Idaho, Montana and Oregon desiring to join the net should write to the Radio Aide, Art Kellogg, W6DBD.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W1MK	90	434	472	996
K1HR	165	200	280	645
W6EEO	117	204	220	541
W6SM	504	2	—	506
W2QU	206	236	32	474
W6AWF	37	84	348	469
W8DYH	74	53	334	461
W6BIP	59	81	294	434
K6DTG	58	104	260	422
W6AKW	32	31	302	365
W6ASH	55	54	252	361
W6ETJ	20	45	288	353
W6DTU	193	39	95	327
W4AEF	50	20	256	326
W6AFU	4	9	300	313
W6EPZ	45	126	135	306
W6CBW	51	69	186	306
W9FLG	62	212	25	299
K1AF	66	19	180	265
W8CUG	8	37	216	261
W2AVR	41	62	156	259
W8CMB	25	20	211	256
W8JD	9	37	200	246
W6EPT	14	5	220	239
W6ERK	23	58	152	233
W6ALX	11	4	216	231
W6DHM	2	13	208	223
W1UE	90	79	50	219
W1AOX	12	3	196	211
W8CAT	26	57	126	209
W6CGM	24	59	122	205
W3BWT	50	110	45	205
W6EGH	24	134	44	202
W2SC	94	85	23	202
W6EIB	21	30	150	201
W1LQ	49	94	49	192
W6EAU	2	53	73	146
W5HY	20	52	70	142
AC8RV	64	58	15	137
W6ATT	10	53	72	135
W6EQF	44	84	—	128
W1BIG	25	75	22	122
W9EF	24	56	28	108
W1AFB	3	100	2	105
W6AD	8	64	30	102
W1AJB	13	54	20	87
W9BEZ	8	50	12	70

The several amateur stations responsible for the best traffic work—the ones that are "setting the pace" in worthwhile traffic handling—are listed right up near the top of our B.P.L., the figures giving the exact standing of each station accurately.

All these stations appearing in the Brass Pounders' League are noted for their consistent schedule-keeping and dependable message-handling work in amateur radio. Special credit should be given to the following stations (in the order listed) responsible for *over one hundred deliveries* in the message month: W1MK, W2QU, W9FLG, W6EEO, K1HR, W6EGH, W6EPZ, W3BWT, K6DTG, W1AFB.

Deliveries count! A total of 200 or more bona fide messages handled and counted in accordance with A.R.R.L. practice, or just 50 or more *deliveries* will put you in line for a place in the B.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 also!

A good deal of enthusiasm is being shown toward checker games via amateur radio. On August 27, W1LQ of Wollaston, Mass., and W1TB at North Windham, Maine, juggled the checkers around for champs who were at their stations. The Maine player defended the honor of his state and won! Both stations were given good write-ups by their local newspapers. Drag in your favorite champ, OM, and have some fun!!

W1MK

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

Throughout the following schedules Eastern Standard Time will be used.

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

8:00 p.m.: Sun., Mon., Tues., Thurs., and Fri.

10:00 p.m.: Mon. and Fri.

12:00 p.m. (midnight): Sun., Tues., and Thurs.

GENERAL OPERATION periods have been arranged to allow every one a chance to communicate with A.R.R.L. Headquarters. These general periods have been arranged so that they usually follow an *official broadcast*. They are listed under the two headings of 3500 kc. and 7000 kc.; to indicate whether the watch is devoted to listening on the 80-meter band or to the 40-meter band.

3500 kc.

8:10 p.m. to 9:00 p.m. on Sun., Mon., Tues., Thurs., and Fri.

10:00 p.m. to 11:00 p.m. on Tues. and Thurs. (No OBC sent before these periods.)

12:00 p.m. to 1:00 a.m. (or later) on Sunday night (Monday morning).

7000 kc.

10:10 p.m. to 11:00 p.m. on Sun., Mon., and Fri.

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

SCHEDULES are kept with the following listed stations, through any of which traffic will travel expediently to A.R.R.L. Headquarters. The frequency included within parentheses indicates the band in which each individual station keeps the schedule with W1MK:

W1ACH, Brookline, Mass. (3500): Sun. and Thurs.

W1KY, Cambridge, Mass. (3500): Mon. and Fri.

W1VB, Newton, Conn. (3500): Tues. and Fri.

W2JF, Jersey City, N. J. (3500): Sun., Mon., Tues., Thurs., and Fri.

W3BWT, Washington, D. C. (3500): Sun., Mon., Tues., Thurs., and Fri.

W3SN, Ft. Howard, Md. (3500): Tues. and Thurs.

W3ZS, St. Davids, Pa. (3500): Mon. and Thurs.

W4AEF, Lakeland, Fla. (7000): Sun., Wed., and Fri.

W6AKW, Lancaster, Calif. (7000): Mon. and Thurs.

W6CIS, Sacramento, Calif. (7000): Mon. and Fri.

K6DTG, Wheeler Field, T. H. (7000): Mon., Tues., Wed., Fri., and Sat.

W6EEO, Williams, Calif. (7000): Sun. and Tues.

W8AAG, Oil City, Pa. (3500): Sun.

W8CUG, Pittsburgh, Pa. (3500): Sun.

W8DYH, Detroit, Mich. (3500): Mon., Thurs., and Fri.

W8ZZ, Detroit, Mich. (3500): Sun. and Thurs.

VE9AL, Toronto, Ont. (3500): Tues. and Fri.

W9APY, Berwyn, Ill. (3500): Tues.

W9ERU, Rockford, Ill. (7000): Sun. and Fri.

W9OX, Louisville, Ky. (3500): Sun. and Thurs.

Traffic Briefs

Do some of us need practise in sending? Well, we guess!! W9BAN, while QSO W9 — under perfect conditions — no QRM or QRN, a QSA4 signal, copied, verbatim:

"Cant remne that ht ra het a ol on y par t or that laert ht t4 bet jto omy high ehve any QHHH bt5 ow ehi the weather tiown there o6 a e3e ev pekt it ih d5ot?

. . . ."

We give up! Oscar, the smelling salts!

L. A. Jones, well known as operator of WSBS, the yacht *Carnegie*, while on his travels discovered two enthusiastic hams on the far-off island of Guam. They are members of the United States Marine Corps and operate under the calls OM1TB and OM2RC. OM1TB is on the 7000-kc. band from 0900 to 1300 GMT almost every night. These fellows are anxious to work more "W" stations. Watch for them, gang.

The August 31, 1929, issue of the *Radio Service Bulletin* contains an up-to-date list of Cuban amateur and experimental stations. Copies may be obtained from the Government Printing Office, Washington, D. C., for 5 cents (coin only — no stamps accepted).

Mr. T. R. Pugsley, W9BNR, contributes some good suggestions for the 'phone man which have been converted into the "did you know" form for convenience in presentation. Many of the points brought out are being overlooked, if we are to judge by some of the 'phones we hear on the air.

Did you know

That the range of a 'phone station depends altogether on the percentage (and the goodness) of the modulation?

That it is impossible to get effective modulation from a set tuned to the peak of the antenna current?

That it is just as bad to overmodulate as undermodulate?

That good modulation cannot happen when too high plate voltages (overloads) are placed on the tubes without proper grid biasing? Both grid and plate conditions must be correct to work the tube properly.

That a crystal detector and a pair of 'phones used with a short length of wire make an excellent monitor for checking modulation and any noise on the carrier?

That frequency modulation is not desirable or permissible in 'phone transmitters — that this makes them broad and creates interference?

That proper adjustment in the speech amplifier is just as important as proper modulator adjustment?

That reducing power by lowering filament voltages results in the most awful quality due to making the tubes operate on the wrong portion of their characteristics — limiting emission, cutting off all modulation peaks, etc.?

That long tube life and best results can only be expected when precaution is taken to operate vacuum tubes at the loads specified by the manufacturers?

That you are wasting time by adjusting and asking for reports from nearby stations? Better results can be obtained by use of a monitor, suitable meters and, if necessary, a dummy antenna. Monitors have fewer human failings — they will usually tell the truth or something very close to it.

That adjustments are best made for quality — not quantity?

That you should use a stand for the "mike" and not move it around or handle it while talking?

That if you have a good two-button microphone you will neither whistle or blow into it, as this will ruin the adjustment?

That broadcast of music on amateur frequencies for entertainment of others is not lawful?

Traffic Briefs

W6TM tells us that AC8RV is one of the most active Chinese stations these days. It is owned and operated by two U. S. Marines, L. E. Cary and J. I. Wilson, of the 4th Regiment. Wilson, being a member of the band, has the most leisure, and therefore does most of the operating. AC8RV is usually on the air from 6:00 p.m. until 11:00 p.m., Chinese time (2:00 a.m. to 7:00 a.m., P.S.T.). The location of the station is 33-A Nanking Road, Shanghai, China. The transmitter is remotely controlled over a distance of about one city block. Occasionally the relay sticks, and at such times OM Wilson avails himself of the opportunity to keep himself in fine sprinting shape!

When Dallas (Texas) recently entertained delegates to the Rotary International Convention, W5RG handled a number of messages to various sections of the globe, thereby building up in Dallas and elsewhere more good will toward the radio amateur. FB, OM.

A new Naval Reserve radio circuit has been established between Milwaukee and Green Bay. Traffic for the 33d Fleet Reserve Division at Green Bay is handled by W9BIT directly with the Section Control Station. This now completes the radio circuits between all the Fleet Divisions in the 5th Naval Reserve Area.

RE: A.C. AND I.C.W.

Dear Brother Hams:

Something's gotta be done about ROTTEN A.C.!

May I first say, to the comfort of the boy with the 201A, who can't afford more than 200 volts A.C., that he is perfectly justified in letting us hear what he has, provided of course, that he possesses sufficient gray-matter to tell 'im how to produce a reasonably sharp note. But I say that the bloomin' hick who shoves 500 watts of rotten A.C. onto the air "in all stupidity and without fear of combustion" otta be lynched, and I'll do my share by heaving on the noose!

Everyone with an appreciable showing of horse-sense knows that D.C. "gets out" better than A.C. Likewise, enough has been spilled in *QST* to indicate the general repugnance to rotten signals. Why then does any right-minded (?) person allow his station to become such an object of abhorrence? Why indeed? Is it selfishness, ignorance, or plain orneriness?

All will agree that two 210s with good power supply cost much less than QRO with unfiltered A.C. and many agree that the signal is just as effective on the 7000 and 14,000 kc. bands where the local field strength is not as important as the choice of frequency and the time of operation.

If all amateurs were restricted to a power of 50 watts with *pure D.C.*, medium powered average amateur stations would easily work twice the number of DX stations now possible. There is nothing like pure, steady D.C. to work through QRN and noise background.

Some I.C.W. heard is a thousand times worse than A.C., too! The only kind of I.C.W. which should be allowed in amateur radio is the kind where the term I.C.W. can be correctly interpreted as "I CAN'T WOBBLE."

Other nuisances I might mention are *backwave* from MOPA, key chirps and careless sending. They alone would furnish cause for complaint. But something's simply *got* to be done about the QRI's.

It is suggested that regulations be enacted and strictly enforced, providing that all voltages over 500 must be pure D.C.; between 200 and 500, well filtered RAC or better; and below 200 that no restriction be made.

Let's hear what the rest of the gang has to say about it and see if some action cannot be taken. 73 to all.

— *Martin L. Croft, W8APQ*

VK5HG wishes to thank his many friends for the messages of sympathy that reached him during his recent illness.

G5BY is now working on 14,320 kc. between 9 and 11 p.m., and that he will welcome QSO with U. S. A. hams any night. W7AGB reports that G5BY and F8ER come in splendidly and frequently on the 14-m.c. band.

What is a tracer? A tracer is a communication sent to determine what has become of a message that has been transmitted and which, for some reason or other, the operator believes has not been delivered. A tracer usually takes the form of a sheet of paper with ruled lines on which each handling station's record is written by each operator. This kind of a tracer is sent by mail. Tracers may also be sent by radio, and in this form they are termed *service messages*. Comprenez-vous?

W4AEF wants to shout to the world that SU8RS is located in Cairo, Egypt, and may be heard in the middle of the 14-mc. band.

There is a rumor afloat that signals these days are weaker than they used to be; that the foreign signals of the present time roll in only at about 50% to 75% of the volume they had three or four years ago. Whazzamattuh? Are we wearing the Kennelly-Heaviside layer out? Perhaps there are so many signals on the air that they are punching holes into the invisible blanket, and therefore part of the signal strength is lost — like water through a sieve. Or, maybe our vacuum tubes need reactivating, or the antenna needs polishing, or the grid leaks too much, or the amplifiers are piqued too much by the poor signals on the air.

1750-KC. VOLUNTEERS' SCHEDULES

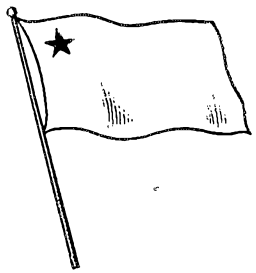
Station	*Location*	*Freq.*	*Days*	*Hours (Local Time)*	*Remarks*
W3MM	Allentown, Pa.	1875 kc.	T., W., Th.	7–8 p.m.	
W5BDT	Gouldbusk, Texas	1760 kc.	Fridays	9:30 p.m. on	iew and 'phone will be used.
W6BUZ	Reedley, Cal.	1875 kc.	Fridays	9–10 p.m.	'Phone and c.w.
			Sundays	9–10 a.m.	
W6EAF	Independence, Cal.	1750 kc.	Fridays	8–10 p.m.	
W6EEQ	San Leandro, Cal.	1910 kc.	Sundays	8–9 a.m.	
			M., W., F.	6:45–7 p.m.	
W6UJ	El Monte, Cal.	1765 kc.	Tues., Thurs.	9:30–10:30 p.m.	
W8DRG	Shenandoah, Pa.	1715 kc.	Daily except Sat. and Sun.	10:15 p.m.	'Phone and c.w.
W9AFP	Tabor, S. Dak.	1715 kc.	Tues., Thurs.	8–8:30 p.m.	If QRM is bad 1935 kc. is used.
			Saturdays	Midnight–12:30 a.m.	
			Sundays	9:30–10:30 a.m.	
W9BSP	Olathe, Kansas	1780 kc.	Every day	7:30–8 p.m.	
W9DHC	Dakota City, Nebr.	1950 kc.	Mon., Sat.	10:30–11 p.m.	Voice and buzzer.
W9EBD	Menasha, Wis.	1715 kc.	Sundays	12:30–1:30 p.m.	
			Mondays	6:15–6:45 p.m.	
W9FLS	Ava, Ill.	1715 kc.	Tues., Thurs.	10:30–11:15 p.m.	Ten word speed for first twenty minutes, and about 20 W.P.M. for last twenty. Five minutes devoted to explanation.
W5RJ	Ft. Worth, Texas.	1935 kc.	(No definite schedules given)		
WORC	Worcester, Mass.	1200 kc.	(249.9 meters) Saturdays 6:45 p.m.		

Traffic Summaries

AUGUST-SEPTEMBER

Pacific led by Los Angeles	10,898
Central led by Michigan	3489
New England led by Connecticut	3244
Atlantic led by Western Pennsylvania	1689
Midwest led by Kansas	1588
Hudson led by New York City and Long Island	1330
Southeastern led by Florida	1043
Roanoke led by North Carolina	784
West Gulf led by Northern Texas	423
Northwestern led by Oregon	418
Rocky Mountain led by Colorado	313
Dakota led by Northern Minnesota	172
Delta led by Mississippi	135
Prairie led by Manitoba	107
Vanalta led by British Columbia	55
Ontario	51

552 stations orginated 5605; delivered 5803; relayed 13,453; total 25,739 (96.6% deliveries). NOTE.—High deliveries due to HPM Relay.



The Los Angeles Section in the Pacific Division leads the country in traffic this month, and carries the *Traffic Banner*. This banner will go each month to the Section with the largest total of *real* messages. A traffic summary showing the standing of the various Divisions for the past month is printed above. What place does yours take? What Section will carry the banner next month and help their Division head the list?

Official Broadcasting Stations

CHANGES AND ADDITIONS

(Local Standard Time)

W1AUR (3980), Tues., Thurs., Sat., 7:30 p.m.; W5JD Tues., Fri., 9:30 p.m.; W6AMM (7305), Tues., Thurs., 7:00 p.m.; W6BRO (7100), Mon., Wed., Fri., 7:30 a.m.; W6CLS, Tues., Fri., 7:00 p.m.; W7HP (7000), Tues., Thurs., Sat., 4:00 p.m. and (3600), 10:00 p.m.; W8ATL (3703), daily except Sunday, 7:00 p.m., Sun., 6:30 p.m., (7300), 3:00 p.m.; W8DMX (3700), Tues., Thurs., Sat., 7:00 p.m. (Nov. 1st on 7000-kc. band at 10:30 p.m.); W8ZH (7500), Tues., Thurs., 6:30 p.m., (3665), Sun., Fri., 11:00 p.m.

WANTED, VOLUNTEERS

At the urgent request of numerous beginners, we are again devoting space in this Department to list the schedules of 1750-kc. amateur stations who will broadcast information and code instruction to beginning amateurs. The newcomers to the amateur ranks need code practice more than anything else, instruction in amateur operating practice, and two-way work with patient experienced operators as soon as they secure their licenses to increase their proficiency in using their stations. Thus it is, that a list of the stations that have already volunteered is published in this issue. An inspection of this list will show a shortage of stations in the eastern part of the country. We need many more volunteer transmitting stations both in that and other sections in the 1715–2000-kc. (150–175 meter) band.

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 by using *both* microphone and key instruction can be given most efficiently to the listeners. Last season those who took part in this work had gratifying results and built up large audiences and many friends, who listened regularly as soon as the schedules were announced. So if you have a 1750-kc. radiophone or telegraph transmitter and can engage in this most worthwhile work, please drop us a line at once, giving data on your exact frequency, hours of schedules, etc., and prepare to follow your schedule as soon as it is in print. We shall be glad to send you some mimeographed ideas and helps which will help you in putting this service over to those who copy your transmissions.

BEGINNERS, ATTENTION!

In the Radio Amateurs' Handbook you will find useful suggestions for memorizing and learning the code. Instructions on how to build a simple receiver for the 1750-kc. band for receiving code transmissions which have been arranged for your benefit appear elsewhere in this issue. A list of "volunteer stations" which will transmit code practice and other information for your especial benefit is also in this issue. We invite requests for any information you may need. Just drop a line to the Communications Department and we shall do our best to help you.

ELECTION NOTICES

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

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

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given herewith. In the absence of nominating petitions from Members of a Section, the present incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the dates specified, all of which are 1929.

Section	*Closing Date*	*Present SCM*	*Present Term of Office Ends*
Nevada	Nov. 15, 1929	C. B. Newcombe	Sept. 15, 1928
Virginia	Nov. 15, 1929	J. F. Wohlford	Dec. 2, 1928
Tennessee	Nov. 15, 1929	Polk Perdue (resigned)	Oct. 2, 1930
New Mexico	Nov. 15, 1929	L. E. Radka	Aug. 2, 1929
Washington	Nov. 15, 1929	Otto Johnson	Nov. 5, 1929
Montana	Nov. 15, 1929	O. W. Viers	Nov. 5, 1929
Southern N. J.	Nov. 15, 1929	M. J. Lotysh (resigned)	Mar. 7, 1930
Los Angeles	Oct. 17, 1929	D. C. Wallace (resigned)	Apr. 29, 1931

Due to the resignation of Mr. Polk Perdue, W4FI, in the Tennessee Section; and of Mr. M. J. Lotysh, W3CFG, in the Southern New Jersey Section, effective at once, nominating petitions are hereby solicited for the office of Section Communications Manager in these Sections, and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, November 15, 1929. Reports from ORS in Tennessee and Southern New Jersey should be sent to the Acting SCM, listed on page 3 of *QST*. Mr. D. C. Wallace, W6AM, also resigned due to business pressure, but will handle the work in his Section until Dec. 1, 1929. Notices soliciting nominations have been mailed to members of the Los Angeles Section.

CANADA

Nominating petitions for Section Managers in Canada should be addressed to Canadian General Manager A. H. K. Russell, VE9AL, 5 Mail Building, Toronto, Ontario. To be valid, petitions must be filed with him on or before the closing dates named.

Saskatchewan	Nov. 15, 1929	W. J. Pickering	Dec. 2, 1928
Maritime	Nov. 15, 1929		
Alberta	Nov. 15, 1929	E. J. Taylor (resigned)	Mar. 28, 1930

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

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

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

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

(Place and date)

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

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

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

The candidate and five or more signers *must* be League members in good standing and the candidate must be the qualified holder of a Communications Department, Official Relay Station appointment or the petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit on the number of petitions that may be filed, but no member shall sign more than one such petition.

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

—*F. E. Handy, Communications Manager.*

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections on or before the closing dates that had been announced for receipt of such petitions. As provided by our Constitution and By-laws, when but one candidate is named in one or more valid nominating petitions, this candidate shall be declared elected. Accordingly, election certificates have been mailed to the following officials:

Section	*Address*	*Two-Year Term Begins*
Eastern New York	Herbert J. Rosenthal, W2QU Box 740, New Rochelle, N. Y.	Sept. 16, 1929
Western New York	C. S Taylor, W8PJ 598 Masten St., Buffalo, N. Y.	Sept. 16, 1929
British Columbia	J. K. Cavalsky, VE5AL 4868 Blenheim St., Vancouver, B. C.	Sept. 16, 1929
Eastern Mass.	Miles W. Weeks, W1WV 40 Norfolk Rd., Chestnut Hill, Mass.	Sept. 16, 1929
San Diego	Harry A. Ambler, W6EOP 4101 Hamilton St., San Diego, Calif.	Sept. 16, 1929

In the Philippine Islands Section of the Pacific Division, Mr. S. M. Mathes, K1CY, Army-Navy Club, Manila, P. I., and Mr. M. I. Felizardo, K1AU, 252 Galicia St., Manila, P. I., were nominated. Mr. Mathes received 17 votes, and Mr. Felizardo 5. Mr. Mathes has, therefore, been declared elected, his term of office beginning September 28, 1929.

DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND-DELAWARE-DIST. OF COLUMBIA — SCM, *F. Calhoun, W3BBW* — Maryland: Activity is on the onward trail here, although traffic is still lacking. W3AJR leads this state. W3GF, a non-ORS, turned in a nice report. Sure wish other non-ORS would follow his example. W3NY is looking for skeds on 14 mc. W3DG is still rebuilding. W3BBW is ready now for the rush. Delaware: Once again Delaware is represented by one station, W3ALQ, who turned in a good total. What is wrong in that state? D. of C.: Our new RM, W3BWT, leads the entire section in traffic and made the BPL again. FB, OM. W3ASO is back with us again. Welcome, OM. W3ALF is looking for skeds.

Send in your report, fellows, whether you're an ORS or not. I am sorry to say I had to cancel a couple of ORS but added a few more. Remember, failure to report three times in a row means cancellation.

Traffic: W3BWT 205, W3AJR 50, W3GF 27, W3ASO 24, W3ALQ, 24, W3ALF 23, W3WY 1, W3DG 1, W3BBW 1.

SOUTHERN NEW JERSEY — SCM, M. J. Lotysh, W3CFG — Your SCM wishes to inform you that inasmuch as he is to be in New York City in Transatlantic Telephone service indefinitely, he feels that he cannot perform the duties of office as efficiently as while he was in the section. Therefore, arrangements have been made for W3BWJ to take over the duties of office as acting SCM until you have nominated and elected a successor. As a parting request, I would like to ask that you all give Mr. Weible your best co-operation and support and help put the section back among the leaders. W3BWJ leads the section again this month with a fair total. W3ASG fell down somewhat, due chiefly to rebuilding. W3AWL turns in his first report and wants schedules for traffic. W3ATJ is so busy mauling his 210 working everything he hears that he forgets to handle traffic. Reports from non-ORS and new stations are particularly desired, so don't be bashful. The SCM would be glad to hear from his old friends in the section occasionally, and again asks that you give W3BWJ your utmost support. 73 to all.

Traffic: W3BWJ 30, W3AWL 17, W3ASG 11, W3ATJ 3.

EASTERN PENNSYLVANIA — SCM, Don L. Lusk, W3ZF — Well, fellows, the big bit deep this time. The SCM has a permanent sked with Mrs. W3ZF for life now. Kindly address all communications for the SCM to his new QRA, 116 West Wyoming Ave., Germantown, Philadelphia, Pa. We welcome back home from the West W8AWO who has a nice total. W3NF is to be congratulated on the fine work of the Lehigh Valley Radio Club's station at the Allentown Radio Show. W8VD, due to his excellent manner in report and his real 1929 station, will receive his ORS certificate this month. ORS appointment will be issued to W3MC also. At least 10 messages per month are required of all ORS. W8DHT pounded brass at W2EC during the HPM relay, and had a visit from W1AJB. W3RO has another report to go for his ORS. Now that the radio season is here, let's have more active traffic stations.

Traffic: W3NF 155, W8AWO 66, W8VD 42, W8DHT 40, W3RO 28, W3MC 7, W3AUR 2.

WESTERN NEW YORK — SCM, C. S. Taylor, W8PJ — Notice is hereby given that stations holding ORS appointments failing to report by Nov. 1st will be cancelled. Reports of messages handled by radiofone are acceptable and deserve credit. Many new stations have sprung up in Jamestown, N. Y. Among them are W8AVM, W8BYD and W8AWM. W8AHC and W8BCM are handling traffic. W8AVM and W8BYD joined the U.S.N.R. force. W8BRH visited the hams in Jamestown. W8BFG is rebuilding. W8BGN states many of the hams are operating out of the band. W8BHK is going to N. Y. C. soon. W8BJO has a new TPTG transmitter. W8BLV is going to hook up with the U.S.N.R. soon. W8BUP has returned from vacationland. W8CPC worked over 100 foreign stations this past summer and handled many foreign messages. W8CNX has returned home after roaming around the country for the past four months. W8CSW has just received an extra first amateur license. W8DQP's QRA will soon be Glens Falls, P. O. Box

11. W8DSP attended the Auburn Convention. W8QL of Bergen, N. Y., a new ham, wants schedules with amateurs in Niagara Falls, N. Y., Ton wanda, N. Y., Lockport and Buffalo. W8PJ has just installed new generator for filament supply for 204's and reports are now PDC. W8CVJ is handling traffic on 2000 kc. W8DDL states the Rochester amateurs had a great time at the ham exhibit at the Rochester Radio Show. The transmitter was operated by W8MU and W8DDL and many messages were handled by both phone and code. W8AHK's 5 meter receiver was one of the exhibits W8DII is keeping many schedules. W8DME busted his pet 50-watter crystal set. The following old-timers are invited to report: W8QB, W8RV, W8TH, W8ALY, W8AHK, W8AYB, W8UL, W8SD, W8AGW, W8CAN.

Traffic: W8AHC 13, W8BCM 85, W8BGN 3, W8BHK 28, W8BJO 21, W8BLV 26, W8BUP 5, W8CPC 12, W8CVJ 4, W8DDL 34, W8DII 51, W8DME 7, W8BQP 9, W8DSP 37, W8QL 47.

WESTERN PENNSYLVANIA — SCM, A. W. McAuly, W8CEO — W8CUG is still maintaining his leadership of the section with a single 210. He handled a bunch of HPM messages. W8DLG, running a fine second, is rebuilding. He is now an ORS. W8CFR is going to invade the 3500-kc. band soon. W8BGW is getting fine results with a new MOPA set with a Zepp antenna on 3640 kc. W8DHW was QSO ZL2AC on 14.4 mc. with daylight four-fifths of the distance. W8CEO is moving his transmitter. W8DKS reports traffic scarce in the mornings. W8AGO is rebuilding for winter work. W8YA, formerly W8XE, will soon be on full strength. W8CNZ has a new job which does not allow him to operate as much as formerly, but he is still very active in club work. W8DNO has a scheme for quick transmitter QSY. Crafton has five stations on the 14000-kc. band. W8CQA is moving to a new location and will be on regularly this winter. W8CMP is back in State College again after having spent some months in Michigan at his station, W8CIK. W8AYH was QSO NN7C, reported to be the farthest south of any permanent station. W8BLM, better known to old-timers as W8ALF of Butler, Pa., now operates regularly on 7000 kc. W8AMA is using a Zepp on 3500 and 7000 kc. They expect to have a phone going on the 2000-kc. band. W8LS is experimenting with "talkies" on film for home use. W8DOB is issuing a challenge to anyone to race with him in building a transmitter. Robert Felton, 1355 West 19th St., Erie, is a new ham with the call W8AT. The Erie Amateur Radio Club held a banquet during September at which Mr. Hebert from Headquarters was a guest.

Traffic: W8CUG 261, W8DLG 81, W8CFR 56, W8BGW 12, W8DHW 11, W8DKS 7, W8AGO 4, W8DNO 48, W8CMP 22, W8AYH 10, W8BLM 16, W8CQA 23.

CENTRAL DIVISION

ILLINOIS — SCM, F. J. Hinds, W9APY — Traffic this month is very low, OMs. The good weather is here now so let's get busy for a big season. Wouldn't it be fine if the rest of the boys would do as W9BHW, who is purposely staying off the air until he gets a better note? W9AKA is doing nicely with his 210 and UX852 on 7000 kc. W9FUR and W9GBL were presented with a fine 10 kw. water-cooled rectifying tube and a 250 watter. Watch out on 14 mc. for them. Hi. W9GJJ is doing nicely and has promising traffic work ahead. There is a new 75 watt set at W9ANQ using hi C 1929 T.P.T.G. W9CKZ is using 860 tubes with a crystal now. W9ERU did good work in the HPM traffic relay. W9ETP is getting over to Europe in fine shape on 14 mc. The boys in Rockford now have a full unit of ten men f r the U.S.N.R. W9BRY is building a screen-grid receiver. W9AHI is a new man in Rushville, Ill. W9BRX says he had a very interesting summer on board WPCV. W9AFF blew up the filter again. W9FDJ has just finished rebuilding and is now ready for lots of QSP. W9DCK ruined his crystal so is going back to the old faithful Hartley. W9CCZ says he is going to blow off the lid and get in on the 1929 traffic situation. Hi. W9CGX is back on with 150 watts crystal. W9AFN has all but Asia for WAC. W9FO wants QRA's for the following: VQ2NK in Northern Rhodesia, OT1BV, ZW1AN, VE3AA, VE3CX, YS1AA and LU5BZ — hope you can help him, gang. The 210 at W9GIV went soft — too bad. Listen for W9BLL with his new Mercury arc. DX is reported from W9DGK as KDV5 and ZL2AC. W9APY was QSO KDV5 and NN1NIC. W9FDY is rebuilding the transmitter and wants schedules for the U.S.N.R. as he is an op at NDS. W9ECR reports traffic brisking up a bit. W9EJO has been in New York City all summer but is now back on with the 203A in full swing. W9EAI is selling out as he is going to California. W9BVP uses rectobulbs and Zepp antenna. Both ops at W9BKL were away this month — YL in camp and OM as Communications Officer on U.S.S. *Dubuque*. W9BZO is rebuilding his entire layout. Low power has been made the rule now at W9KB. W9BNR promises us some signals on 14,280 and 28,400 kc. in the near future. He wants to know if everyone has deserted our 1715 band. There is a brand new MOPA at W9COZ. W9GV is one of our new ORS in Illinois. He has worked VK5HG 251 times and VK3PP 103 times. Can anyone beat that record?

Traffic: W9AHK 107, W9EJO 66, W9ERU 62, W9AFN 55, W9ECR 34, W9GJJ 19, W9BNI 12, W9GIV 12, W9BKL 11, W9FDJ 11, W9BNR 9, W9DGK 8, W9AKA 7, W9BVP 7, W9CKZ 7, W9CUH 7, W9KB 7, W9ACU 6, W9APY 6, W9BEF 6, W9BRX 4, W9DCK 4, W9AAW 3, W9ALK 2, W9FCW 2, W9CNY 1.

INDIANA — SCM, D. J. Angus, W9CYQ — Amateur radio in Indiana is again picking up and the old timers as well as the new ones are preparing for a busy season. The Old Timers Radio Club at South Bend is getting under way after a sleep of two years. The Indianapolis Radio Club has started the season with a traffic prize of a club pin for the man handling the most traffic each month. They are also preparing a set of specification sheets for the new hams' transmitter. The Indianapolis Naval Reserve is now contracting the construction and installation of a 450-watt crystal controlled transmitter. Considerable activity has started at Seymour, a number of new hams starting up and thirteen enlisted in Naval Reserve in one evening. Valparaiso reports 23 enlisted in Naval Reserve there. W9EVB is getting out 1000 miles consistently on 7000 kc. with 150 volts B batts. W9DHJ is rebuilding for the season's rush. W9BZZ will be on soon with new set. W9CEY is installing two 866's. W9ASX visited South Bend and handled traffic from W9GGJ's shack. W9DOY has a new chemical rectifier. W9AKD is on the air after being off for several months. W9DFB is a new ham in South Bend. W9GGJ has a new remote control and zepp. W9FCX is still building and tearing down. W9RW is designing a new receiver. W9GGJ is going after ORS certificate. The Radio Inspector wrecked the gang at Fort Wayne with his exam last spring but they studied up and here is the new list: W9AXI, W9COI, W9GFJ, W9GGP, W9GGY, W9FJT. They are all on the air now. W9BWI is back but not causing any fone QRM yet. W9CVX is also with us again. W9MQ is trying out a new low power transmitter. W9GKI reports good work with a new set. W9AHB has skeds with WFRG and W9COS. W9BKJ is on 3970 kc. with xtal control. W9ARK won the traffic prize of the Indianapolis Radio Club for Sept. with only six messages. W9EMR is on 3500 kc. regularly. W9DSC again has his regular schedule going with Purdue. W9AIN is building a station at Indianapolis. W9DBJ has his outfit going again. W9EXW has a new MOPA outfit and reports fine results. W9EF, our star station this month, makes the BPL due to schedules with WDDE "Bowdoin." The Indianapolis Radio Club had a well attended radio picnic on the Ohio River Labor Day. A. A. Hebert visited the Indianapolis Radio Club Sept. 17th.

Traffic: W9EF 108, W9EXW 76, W9DBJ 23, W9GKI 21, W9RW 17, W9EVB 7, W9AXI 4, W9GFJ 6, W9AIN 3, W9DSC 8, W9CYQ 4, W9EMR 5, W9ARK 6, W9BKJ 8, W9AHB 2, W9GGJ 11.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — The coming of cooler weather resulted in a stampede to get on the air. All indications point to a bumper-crop of Kentucky brasspounders. W9CHL finally overcame the OW and now sports a 1870 kc. fone and a 7000 kc. C.W. W9ACS has been appointed OBS in place of W9KZ. We are sorry to lose W9KZ. W9ARU has installed 2S1's. W9EYW spent a month in Detroit but liked Ole Kaintuck better. W9GGB returned from his travels and reports school QRM. W9BAN has a tree which "grows a foot every night." Better hook your antenna on to it quick, George. W9OX is a Godsend to the BCL's. He fixes their sets. W9CRD worked 18 countries first half of Sept. W9BEW sends in his first report. W9RXK has new QRA which is a whang. W9AZY likes VK and ZL; he QSO'd 23 during August. W9ETD has some fine groceries. You fellows should visit Covington. W9AUH works anywhere on 14 and 7 mc. W9BWJ is still away from home, but reports regularly. W9ELL has a new loudspeaker — semi-automatic. YL type, weight 8-lbs. Congrats, Bob. W9GAL, W9FZL and W9ATV visited radio show in Louisville. W9GJG is on his way to New Mexico. W9GBX has a real punch on 7 mc. W9BAZ greatly enjoyed seeing all the bunch in Covington and Ashland and even got to W1MK.

Traffic: W9CRD 44, W9AZY 42, W9BXK 27, W9GGB 27, W9BAZ 18, W9AUH 16, W9ETD 14, W9ACS 12, W9ELL 11, W9OX 11, W9BAN 8, W9GBX 5, W9BGA 3.

OHIO — SCM, H. C. Storck, W8BYN — Well, gang, the good radio weather is coming fast. The reports this month show it. W8CMB starts the ball rolling by making the BPL with 256 messages. W8CRI comes next, but missed the BPL by two points. W8GZ kicks in with 99 for the third place. W8AVB comes back with a bang, and says he is going to keep going from now on. W8BBR threatens to give up the ham game unless conditions get better. Buck up, Ed, you don't know what QRM is. Come to Columbus and find out. Hi. W8CFT blew all his filter. W8BAC was heard by SP3BA in Poland, on 3500 kc. FB. W8CNO got on the air at last, but is off again with blown filter condensers, rectifier tubes, etc. W8DDF goes off the air until Xmas. W8CSS is having trouble with xtal and is using T.P.T.G. now. W8IF reports that he is building a shack with intention of forming a radio club. FB. W8BOR almost forgot to report again. W8CFL has been on 7000 and 14,000 kc. where traffic is not so plentiful. W8BEA, a newcomer, sends in a nice total with his first report. W8COQ is on with two good ops. W8ARW has flopped for fone, but is still going to work C.W. also. W8ADS says a new 3500 fone will be on the air at his place soon, also a 700-kc. C.W. outfit. W8LI will be active this winter. W8PL has a new 50 watt xtal set going. W8OQ and W8DBK and W8DDK report. First report was received from W8NP. W8BSR will be on soon with a pair of 852's. W8RN underwent an operation but is well again and pounding brass on KFNN. W8APC reported via radio. W8ATL says he is always ready for traffic. W8CNU promises more activity. W8DSY is in the R.C.A. school. Sorry to lose such a good ORS and the gang wish you well, OM. W8DPF reports his messages have been a hook, a line and a sinker. Hi. W8DMX's ill health keeps him from doing much, but he reports that he is slowly rebuilding and hopes to be on the air soon. The SCM has his antenna up again, and as soon as a little spare time comes along, will have a new T.P.T.G. outfit going, with the old 204A. All ORS should have received a card from either W8CRI, W8BBR or W8CMB by this time and should all take advantage of what these hams are trying to do for you in lining up schedules. Here's another call for reports on 1929 signals, and also, send in your kicks against off-wavers, ICW's, A.C., rotten operating, ether hogs, interfering commercials, and all things rotten on the air. Here goes another call for more active ORS. Each season a lot of the old ones drop off, or are kicked off, and there is always room for more. Great interest is being shown in AA work in Ohio and all who are interested should drop a line to W8GZ stating their willingness to participate. The U.S.N.R. is going good also. It is with regret that the announcement is made that there will be no convention for Ohio this year. But it will be bigger and better next year, especially if Cleveland gets it. Wish that more secretaries of clubs would make it their business to send in a report of club activities each reporting date, so that mention can be made in this report. Now get going, you ether busters, and let's make things look up around Ohio this winter.

Traffic: W8CMB 256, W8CRI 198, W8GZ 99, W8AVB 64, W8BBR 43, W8CFT 40, W8BAC 32, W8CNO 31, W8DDF 19, W8BYN 19, W8CSS 18, W8IF 11, W8BOR 11, W8CFL 10, W8BEA 10, W8COQ 8, W8ARW 8, W8ADS 6, W8LI 5, W8PL 4, W8DDK 2, W8NP 3.

MICHIGAN — SCM, Dallas Wise, W8CEP — W8QN, W8DSF, W8CAT, W8SS. W8PP reported via radio through W8DYH, the East Michigan RM. W8CAT, W8JD and W8DYH have fine totals this month. W8JD of Lincoln Park wins the 1875 kc. xtal offered by the SCM for the most bona fide messages handled from Aug. 16th to Sept. 15th. The Eastern High School Radio Club expects to have W8KN on the air soon. W8AX is fussing around trying to get something decent out of 30 cycle juice. W8PP handled some DX traffic for Detroit and vicinity. W8BKD reports most of the Grand Rapids gang working on xtal control outfits. W9BTQ is leaving for the Coast and expects to locate in Los Angeles. Good luck, OM. W8BWR is doing quite a bit of Army work. W8ASO is having his troubles in trying to get a transmitter going in his apartment. W8BGY handled seventy-five messages in the H.P.M. relay. W8ACB is now using 201A's with B batts. W8AUB will attend M.S.C. this fall. He dropped in on the SCM for a visit recently. W8CKZ is pretty QRW work. W9EGF in Laurium is a new ORS. W9CE has a schedule with W8BRS for Army traffic. W8DYH says the 281's went pretty well and that if the signals would go along he might be able to work a few 6's and 7's. W8AUT has QRM from school. W8BRS reports the Chair Warmers Club as getting on first rate. W8DSF and W8CUX went on a ham tour through western and northern Michigan and report a dandy trip. W8BRO has a chemical rectifier and has a nice traffic total for this month. W8CU has at last got back on the air after all those threats. Hi. W8CEP has the new outfit on the air. As soon as he gets caught up in his work we will have another contest of some kind, a "Around the Rim of Michigan Relay" or something like that. W8ZZ uses the low power set most of the time now. W8WO has a nice fone on the air now and then. W8HL sure has a nice xtal controlled signal.

Traffic: W8CU 15, W8BRO 146, W8JD 246, W8DSF 2, W8BRS 31, W8AUT 3, W8DYH 461, W9CE 13, W9EGF 9, W8CKZ 4, W8AUB 2, W8ACB 3, W8AX 1, W8BGY 97, W8BWR 57, W8QN 11, W8DSF 10, W8CAT 209, W8SS 16, W8PP 28, W8BKD 11, W8HL 17.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9DLD has resumed schedule operation with three contacts at present. W9EFX has schedule with W9DLD and recently joined the Naval Reserve. W9FHU reported via amateur radio. W9DLQ has moved his station back to Hartford. W9BGT put up a new antenna and is experimenting. W9FSS is in both the Naval Reserve and the Army Amateur Net. W9DTK will have a 1 kw. crystal controlled set on the air soon for the section control station of the Naval Reserve. W9VD expects to borrow a plate transformer from the Navy and will then be heard regularly on several frequencies. W9DEK is back again on 3775 kc. W9BSS handles quite a lot of Army traffic. W9BWZ is training an 852 to do her stuff. W9DJK reported direct to HQ's.

Traffic: W9DLD 48, W9EFX 30, W9FHU 24, W9DLQ 20, W9BGT 15, W9FSS 14, W9DTK 6, W9VD 4, W9DEK 2, W9BSS 2, W9BWZ 1.

DAKOTA DIVISION

NORTHERN MINNESOTA — SCM, Carl L. Jabs, W9BVH — Most of the ORS still report inactivity and it is hoped that all will have their rebuilding done soon. W9ADS handled ten HPM messages. W9CIY will have a crystal controlled set with two 204A's as power amplifiers. W9DOQ tried the Hertz antenna described in October *QST* and reports fine results. W9EGU was on the training cruise and had a fine time. W9AV is a new ORS at Clearwater. W9GIL is a new prospect for ORS and reports the Duluth gang busy at their station at the radio show. They got lots of traffic. FB. The SCM visited several stations at Duluth Labor Day, and had the pleasure of meeting W9EHI, W9GIL and W9DOQ. W9DOQ is an invalid and deserves credit for building such a fine station. W9BBT, W9CTW and W9BVH will be active soon. W9BCT is moving home from Fort Snelling. Let's have more news and don't forget to send in your reports on 1929 signals.

Traffic: W9ADS 57, W9CIY 9, W9GIL 7, W9DOQ 5, W9AV 3, W9CTW 2.

SOUTHERN MINNESOTA — SCM, J. C. Pehoushek, W9EFK — W9DBW is leaving for the U. of Iowa soon. W9COS says the old P. I. sked will be going full blast soon. FB. W9DHP and W9CRW are still on the lakes and pining for amateur news. Write em, fellows. W9EYL had the worst month of radio he ever put in. W9DMA promises to be going with a bang this winter. W9DBC also has visions of an active winter. W9DGE is on the river and won't open up at home until the thing freezes over. W9AIR bobs up with a sunny letter saying W9BNF and W9BKX are back on and going strong. W9AIR is all hot and bothered about a convention next spring. How many will come if there is one? W9FLE's flivver had traffic QRM (that's a good one) with somebody's Chevvie. W9DRG is now an ORS. He has a 1929 Hartley going good and wants Twin City sked. W9DGH is planning on xtal control. W9EAH has been pounding brass through the summer but the U. starts soon. W9AMK spent a month at Snelling and says a 5:00 a.m. sked is easier to make than reveille. W9EFK expects to be on xtal controlled about the time this report reaches you. Now that Minnesota's vacation time is over, let's get going again and put more of our stations in the BPL than ever before.

Traffic: W9DBW 56, W9COS 4.

SOUTH DAKOTA — SCM, D. M. Pasek. W9DGR — W9DLY has two transmitters (7 and 14 mc.) and a WAC. He paid the SCM a visit as did Merten M. Hasse of Warner, S. D., who plans to get on the air this winter. W9NM will have some new equipment and be going strong in a short time. W9DWN has gone to Wisconsin U. Come on, gang! Come thru with those reports!

Traffic: W9DLY 29.

NORTH DAKOTA — SCM, B. S. Warner. W9DYV — W9DYA is trying very hard to QSO the Corps Area Army Amateur station at Fort Omaha, Nebr. W9FCA is away from home doing farm work and expects to return soon. W9DYV was on the sick list for a few days. No traffic reported this month. Isn't *anyone* handling messages?

DELTA DIVISION

ARKANSAS — SCM, H. E. Velte, W5ABI — The report this month is certainly slim due to the fact that only several stations reported. The ORS have been falling down on the job. Remember, fellows, that you are to report every month. W5JK of DeQueen reports that he is using a new chemical rectifier and is getting out well with it. He hands in a nice traffic total to prove it. W5IQ is setting up his station in Little Rock and expects to be on the air soon. W5HN is operator at KGHI. W5ABI uses a pair of 210's on 7000 and 14,000 kc. Remember the reports next month.

Traffic: W5ABI 18, W5IK 15.

LOUISIANA — SCM, M. M. Hill, W5EB — Activity for the Section is on the increase. FB, fellows, let's make this state famous for its fine sigs and good operators. W5BHV has just installed a couple of 210s in high C Hartley at the Louisiana Training Institute and is conducting regular classes in code and theory. W5BDJ helped in the installation and deserves credit for his share of the work. W5ANQ of Alexandria sends in his first report. W5FC, W5AUG, W5BEE, and W5ADJ are all new stations in Alexandria. W5AFE has dusted the old junk and is warming the boys' earfones regularly. Professional baseball almost took W5BDY from our ranks but he chose to continue to sell and repair RCL sets. W5PG has a new 203A going almost as strong as the certain YL of his acquaintance. W5EB is back in Oakdale and is holding down the fort. W5NS has been bitten again and has his 15 watt xtal xmitter punching the air.

Traffic: W5ANQ 16, W5BHV 9, W5PG 5, W5BDJ 2.

MISSISSIPPI — SCM, J. W. Gullett, W5AKP — W5AJJ will have both a CW and a phone set going soon. W5AED has just returned from his vacation and is rigging up his big transmitter for the fall and winter nights. W5BBX keeps schedules with W8BUA, W9AMK and W5AAR. W5AWP has a 50 watter going on 3520 kc. W5AQU has a UV-202 going in 7000-kc. band and says he can work 2nd, 3rd, 4th, 5th, 8th and 9th U. S. districts at will any time of the day. W5BEV works schedules with W4WZ, W4AKM, W5WW, W4VK and W4TI on 7160 kc. W5AS, a newcomer in Columbus, is using a UX-210 in Hartley circuit. W5AZV reports lots of QRM from business. W5ANE has moved from Vicksburg to Jackson and will be on the air soon. W5LV has also moved his station to Jackson from Drew. W5AAP is operating in 7000-kc. band. He is on regularly every night about 10:00 p.m. W5ARO is using a voltage feed Hertz in 7000-kc. band with UX-210 in TPTG circuit. W5GQ is going strong now and works rafts of stations in the 7000-kc. band. W5GQ is rebuilding his receiver and monitor. W5AKP has just finished a new receiver which is right there when it comes to scattering the stations all over the dial and working a loud speaker to death. Hi.

Traffic: W5BEV 28, W5AWP 14, W5BBX 13, W5AZV 1.

TENNESSEE — Acting SCM, James B. Witt, W4SP — W4RP has skeds with W4APS, W5ARK, W5RG. We have a new amateur at Ripley, Tenn., and hope to have a report from him next month. W9FCE is chief op at WSIX, Springfield, Tenn. W4FD has MOPA set using 210s. W4EB is a new station at Cleveland, Tenn. W4FX says he will be back with a good report as soon as good weather sets in. The gang is sorry that Mr. Perdue had to leave us but wish him the best of luck in his new job. W4SP will be on the air regularly. Anyone wanting a sked should drop him a line. W4IB and W4LU in Chattanooga showed W2PT and W2ACN the town in great style. W4IB is the manager of the Airport there and took them for a ride over Chattanooga and the surrounding mountains in his Curtiss Robin.

Traffic: W4RP 16, W4SP 2.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Herbert Rosenthal, W2QU — Three stations handled a total of 531 messages. W2ACY is on 14 mc. getting DX and listening at times on 28 mc. W2LU is handling lots of traffic and has applied for an ORS. W2BKN is all set and ready to handle traffic in his new QRA. W2UO has applied for his ORS. W2BAE writes that he is settling in E.N.Y. and wants an ORS. W2AYK has just returned from the country and will be on the air regularly. W2LA will have a phone and CW set going shortly. The Larchmont Radio Club held its first meeting of the year and is considering joining the Naval Amateur Communications Service. ORS who wish reappointment should apply to the SCM immediately. All others who want to become ORS are invited to send the SCM their request together with a report of traffic on the sixteenth of the month. A traffic contest is being held in this section. If you haven't heard about it, write the SCM for information.

Traffic: W2QU 474, W2LU 55, W2ACY 2.

NEW YORK CITY AND LONG ISLAND — Acting SCM, V. T. Kenney, W2BGO — All stations are requested to forward all future reports to the Acting SCM at his new QRA, 1836 Hone Ave. Bronx, N. Y., and to keep in mind that the 16th of every month should find traffic reports in the mail. Manhattan: W2SC is again heard from with a good traffic total that leads the section. W2BDJ is still complaining about being unable to form skeds; can't anybody help him? W2BCB is remodeling his entire station. W2AVK is a new ORS in our section, having recently moved from New Jersey. W2BNL and W2AJP have returned to brass-pounding after spending their vacations quietly. W2BGO is now a Bronxite. Bronx: W2FF–W2BBX has been using a temporary antenna, six feet above the ground, but is keeping up his reputation for handling traffic just the same. W2BPQ did not go to China or Siberia as reported, but reports that he is back in step again. W2AET has installed a new MG. W2AFT is ready for traffic. W2AII and W2BBC promise a good total for next month. Brooklyn: W2CRB reports a visit from W1CH, the DX man. W2AVR leads in traffic. W2BIV still keeps a daily sked with NJ2PA. W2PF has rebuilt the entire layout at his station for more and better Army work. W2CCD tells of his inability to break through the QRM to work any DX. W2AJX will soon have fone on 3500 kc. NJ2PA and his wife were the guests of W2APV during the month. Long Island: W2AFU represented our gang at the Mineola Fair with a portable transmitter. W2AVP is home from sea reports W2AEE, and both of them will get down to law and books, including the usual amount of traffic handling. W2RO reports his traffic.

Traffic: Manhattan: W2SC 202, W2BDJ 9, W2BCB 7, W2AVK 7. Bronx: W2FF 42, W2BPQ 14, W2AET 6, W2AFT 5, Brooklyn: W2AVR 259, W2CRB 42, W2BIV 23, W2PF 2. Long Island: W2AFU 47, W2AVP 10, W2RO 4.

NORTHERN NEW JERSEY — SCM, A. G. Wester, W2WR — W2WR has had excellent contacts on 7000 kc. W2CP is back on the air and here is where Jersey traffic totals take a big jump. W2JC has been stepping out in all directions. W2BY attended the Passaic County Radio Banquets. W2AOS will keep Army skeds working this fall. W2CJX is a good station to clear foreign traffic. W2JF can clear traffic to W1MK. W2BDF is still very QRW with everything but ham radio. W2AOP is back from vacation. W2AEC is also back in the state after vacationing all summer. W2IS and W2AEC are attending Columbia Univ. in N. Y. W2IS has been placed on the inactive list until next year. W2CRO is sending broadcasts on 7150 kc. Tues. and Thurs. nights at 8:00 p.m. EST.

Traffic: W2CP 21, W2JC 7, W2BY 2, W2AOS 5, W2CJX 26, W2JF 45, W2BDF 5, W2AOP 2.

MIDWEST DIVISION

IOWA — SCM, H. W. Kerr, W9DZW — Thanks to the gang for the response to the questionnaire regarding traffic and skeds. W9FFD on 7160 and 3870 kc. tops the list and wants Monday and Friday evening skeds. W9FZO is doing his best with a makeshift till his new transmitter arrives. W9FQG handles west bound traffic for the 6th district. W9FWG sends in a nice report. W9BCA keeps his daily schedule with NNFX and NNCAB. W9DWU handles traffic and plays golf, too. W9DXP uses a 1785 kc. xtal in his new set for operation on 3570 kc. The Iowa AA Net is coming to life. W9ESP reports three skeds working FB. W9ELV and W9CCE send in their first reports. Come again, OMs. With summer work closing down, W9EJQ will be on regularly. W9FDL says traffic is picking up. W9DNC is now located at Muscatine, Iowa and will have a 210 on the air soon. W9GKL is using 210s in push-pull TPTG on 14 and 3.5 mc. bands. W9EIA and W9EIT are installing CC. W9DTI will be active when school starts. W9ENT is back from USNR training cruise. W9DDX goes to Ames and will join the Campus Club there. C. E.

Holstrom, Hornick, Iowa, will be on with 210s in push-pull circuit as soon as his call arrives. The Tri-State Club promises big traffic next month. The SCM attended a fine meeting of the Tri-State Club in Sept. when Mr. Hebert was their guest. W9ASM took on a commercial 2nd at Chicago while on a vacation trip to Muskegon. W9FAR wants five point skeds. W9EIV became an OMM on Aug. 21st but she says he can "go on the air." FB, and congrats. W9EDW is going to work at KWCR. Our thanks to the Kaw Valley Radio Club for the fine time they showed us at the Topeka Convention.

Traffic: W9FFD 73, W9FZO 53, W9FQG 49, W9FWG 41, W9BCA 39, W9DWU 35, W9DXP 25, W9DZW 19, W9ESP 15, W9ELV 14, W9EJQ 10, W9FDL 7, W9CCE 5.

NEBRASKA — SCM, C. B. DIEHL, W9BYG — W9ANZ is back from vacation and with us again. W9QY is still busy with his farm. W9EEW is very busy on his railroad. W9DFR has two crystals. W9DTH is not doing much on account of losing one of his eyes. W9BYG is still standing by. W9DVR is getting ready for action. W9FAM has not broken out yet but watch him later. W9DI has gone back to school. W9BOQ reports new station, W9EOF, at Aurora. W9BLW is getting ready for a big season. W9CHB is back from radio school. W9BBS is now a conductor. W9CHB has not yet finished rebuilding. W9BQR is on fourteen MC and steps out nicely.

Traffic: W9ANZ 5, W9DFR 6, W9DTH 2, W9DVR 2, W9DI 13, W9BOQ 4, W9BLW 2, W9BBS 4, W9BQR 1.

KANSAS — SCM, J. H. Amis, W9CET — W9FLG, the RM, leads the state with a nice total. W9BEZ has put in xtal and makes the BPL with 50 deliveries. Both W9FLG and W9BEZ make the BPL with traffic from the National Guard Camp at Ft. Riley. W9CET has been experimenting with keying systems on his xtal rig. W9FZU worked seven VE's and six districts in four hours and 42 minutes. W9ESL is busy installing an xtal on his fone rig. W9BTG reports a new ham at Oneida, W9RWV. W9GFO received his blue ticket and is building a brute force filter. W9FIG has a portable call now. W9CYI. W9SS works in a book store. W9CJK is planning five or six skeds and has joined the Naval Reserve V-3. W9CKV has been learning to fly. W9HL is on 3500 and 7000 kc. W9GHI has 3500-kc. fone using a 210 oscillator and a 250 mod. W9BHR has been very busy writing his funny paper. The third annual Kans. Convention held at Topeka was a huge success and the SCM was glad to see so many ORS there. Fall is here, gang, so let's all get behind the wheel for a grand and glorious traffic session. The Naval Reserve has 21 members in Kansas, so let's have a lot of naval traffic this winter.

Traffic: W9FLG 299, W9CET 127, W9FZU 87, W9BEZ 72, W9ESL 52, W9BTG 49, W9GFO 23, W9FIG 21, W9SS 20, W9CJK 18, W9CKV 9, W9HL 9, W9GHI 7.

MISSOURI — SCM, L. B. Laizure, W9RR — The SCM has several announcements this month. Please mail reports to 8010 Mercier St., Kansas City, Mo., hereafter. Reports are now due on the 15th of the month and not the 1st and 25th as some seem to think. Now is the time to come to the aid of ole Mizzou and show up some of our competitors in traffic handling. Director Quinby announces his non-candidacy for another term. We understand W9DOA and W9CET will be in the race. If the Missouri gang wish to insert a Missouri candidate, get busy with those petitions. W9DAE had to resign as RM on account of leaving for Houston to enter Rice Institute. W9AMR just barely made this report. W9FTA handled the most messages for St. Louis and applied for ORS. W9GDU was second. Treasurer Hebert was in St. Louis Sept. 16th enroute east from the Topeka Convention and a meeting of St. Louis men was arranged. W9DOE is operating on S.S. *Clemens*, A. Reiss, WADE, out of Detroit. He has just received his commission as ensign in the U.S.N.R. W9DZN is operator on the S.S. *Wynoka* of the Federal Barge Line out of St. Louis. W9BAO who is a RM1c in the U.S.N.R. is active in pushing up the membership of the St. Louis unit. W9BEU is back for the season with xtal on 7 and 14 mc. W9FUN and W9GHG report "MK" for traffic on 7 mc. W9PW is coming back on 3.5 mc. after three years' absence. W9BJA keeps three skeds daily with W9AES in Kansas City, Kansas, for air mail reports. W9EPX is in Chicago operating at W9EPY. Nevada, No., has come on the air with five stations since W9CZI moved there from Sikeston — W9CZI, W9CDU, W9EOG, W9EFR and W9GKJ. W9CDU is an ORS and is out for skeds. W9GKJ and W9CDU are boosting the U.S.N.R. in the Nevada Section. W9EFR also reports he is going to help in this work. W9GCL has bad luck and blew a transformer on an unformed rectifier. W9ECS visited in K.C. on the way from his old job with the W.U. at Larned, Kansas to his new one at Marshall, Mo. W9FVM is ready for 7 mc. traffic, and would like to be the middle station on a K.C.—St. Louis line. W9DHN is boosting for more 3.5 mc. operation in this section for traffic handling. W9DKG is putting the 204A on 7 mc. and the 852 on 14 mc. W9GBT is keeping a daily sked with W4VK. W9DQN had considerable help from W9ALC in operating this month. W9ALC expects to sign a 6-call signal again this winter. W9CFL and W9GHV are ready for any 7-mc. traffic. W9ZD applied for membership in the U.S.N.R. W9BKK joined the U.S.N.R. as RM1c. Ex-W9FM is again on with a station on 7 and 3.5 mc. W9FIO is an A-A station. W9FKD, W9DQN, W9ZD, W9RR, W9CFL, W9BKK and others attended the Topeka Convention. W9CFL won a filter choke to help along the transmitter for *NDP* which he is building, by coming out first in the code contest. Let's have more reports next month, gang. W9CJR's 852 is perking on 7000 kc.

Traffic: W9FTA 35, W9DGU 16, W9GHG 6, W9FUN 9, W9BEU 10, W9BJA 154, W9DHN 12, W9DKG 7, W9GBT 3, W9CDU 17, W9EFR 4, W9DQN 30, W9ALC 7, W9AMR 14, W9CJB 49.

NEW ENGLAND DIVISION

MAINE — SCM, G. C. Brown, W1AQL — Well, gang, the second annual Maine A.R.R.L. Convention has become a matter of history. A full account is given elsewhere in this issue. Next year the Convention will be held in Portland, so let's get behind the Elm City gang and help put over one of the best "Ham" get-togethers ever staged in the old Pine Tree State. H. B. Morris and Carl Ericson of W1ALE are to leave Maine to take up their duties with the R.C.A. We regret very much this loss of two of Maine's best workers, but wish them the best of luck. The SCM had the pleasure of issuing two ORS tickets since last report, one to Benner of W1QH, the other to Crandall of W1MP. W1KQ just passed the exam for an extra first grade license. FB, OM. W1AHY says that the painters and paper hangers have raised havoc with his outfit. W1BIG reports being on the sick list for a while this month. He is, nevertheless, top liner and makes the BPL. W1QH is second with a good total. W1MP reports that he is on the night shift, at the A. T. & T. Co. Transatlantic Radiophone station. He also states that Mrs. W1MP expects to have a license soon. Clark of W1BKN, who was in a serious auto accident a few months ago, expects to be out around again in October. W1ATO is installing a "ham" station at the Radio Show in Portland, and W1AJC will be ready to handle traffic on the 7000-kc. band. W1BFZ is on a business trip in Northern Maine. W1TB has found a new line of amusement, playing checkers over the air. Who moves next? Hi. The SCM suggests that, even if there is no traffic handled, each ORS send in their report so we may know what the *gang* is doing.

Traffic: W1QH 54, W1ATO 39, W1TB 32, W1AFA 20, W1KQ 20, W1AUR 11, W1CDX 11, W1AQL 7, W1BIG 122.

EASTERN MASSACHUSETTS — SCM, Miles W. Weeks, W1WV — Well, gang, the ballot was favorable and I shall endeavor to serve you well. The peak of summer inactivity seems to have passed and both traffic and DX are on the up-grade. Leading the way is getting to be an old story for W1LQ who makes the BPL on deliveries this month. FB, OM. Our newest ORS, W1BOB, relayed a bunch of HPM messages and had a fine total. W1CMZ has two 210s in action now and reports traffic in plenty on both 3500- and 7000-kc. bands. W1KY, W1RF and W1ACH attended the Maine Convention in Bangor and reported a fine party. W1ABA has been on the high seas with KUDF and WFCL and has resigned his ORS due to lack of time on land. W1WU reports some QRM from the OW which we hope won't mean QRT. W1ASI is brushing the cobwebs off the xmitter and wants skeds on 3500. W1NK and W1NV have both resigned their ORS, the former due to Naval Reserve work and the latter on account of inactivity. W1BLD will only be on the air over week-ends due to being at Northeastern again this winter. College work is creating some QRM at W1CRA but he expects to carry on in any case. W1KH had a fine QSO recently with VK3AX on 7000 kc. He has resumed his sked with the well-known XYL, W8CNO. W1AZE finds DX on 14,000 good and is building an additional xmitter for quick QSV. W1AEX also reports this month. Some of us may remember him as W8CNT. Any

stations in this section who are handling traffic are urged to report their traffic to the SCM on the 16th of each month, even though they may not be ORS.

W1LQ 192, W1BOB 120, W1CMZ 116, W1ACH 73, W1WV 42, W1CRA 38, W1BLD 34, W1WU 17, W1ASI 17, W1KH 16, W1AEX 13, W1AGS 11, W1AZE 9, W1KY 8, W1LM 1.

WESTERN MASSACHUSETTS — SCM, Dr. J. A. Tessmer, W1UM — It is with deepest regret that this section learns that the key of Clyde C. Cunningham of Westfield, one of its potential ORS, is forever silent. W1AEW died on Sept. 12th as a result of a head-on collision between an auto and his motorcycle on Sept. 11th. He was secretary-treasurer of the Springfield Radio Association. W1AMZ is back from Everett, Wash. W1AKZ reports that he QSO'd WFA. W1BVR expects to put up a Zepp during the month and will rebuild his transmitter. W1BNL and W1UM were visited by W3BQ and OWL's fat was boiled over the tubes at W1UM. W1ADO is getting ready for a bunch of traffic this fall. Vacation time and fall house cleaning has interfered with W1BNL's traffic. W1BSJ says his xmitter will soon be on the air. W1ASU is on the air using crystal control. The Worcester Radio Club, Room 301, 274 Main St., will hold meetings every Thursday evening.

Traffic: W1BVR 2, W1AMZ 9, W1BWY 1, W1BNL 3, W1ASU 4.

VERMONT — SCM, Clayton Paulette, W1IT — The SCM was in camp all summer and did not receive more than one or two report cards per month, which explains lack of reports in *QST*. W1AOO claims high honors for traffic this month with a total of 33. W1BJP reports a total of 12 messages. He and the SCM enjoyed a visit from the Quebec SCM who is also the Radio Inspector for Quebec. Well, boys, here's hoping that things wake up for the coming traffic season.

Traffic: W1AOO 33, W1BJP 12.

CONNECTICUT — SCM, C. A. Weidenhammer, W1ZL — W1BVW has a fifty going. W1VB has three schedules. Plate supply passed out at W1OS. W1RP has a new stick. W1BOD took Chile's HPM message from W6DCA. FB. A UX-852 has been ordered by W1CTI. W1TD is on 3500 kc. for winter. W1AMQ handled HPM traffic. W1AFB is looking for more DX. W1BDI was busy. W1AMG has new super. W1AJB helped in HPM relay. W1UE is going strong. W1MK ran four short of a thousand. W1AOI is back for the winter. W1ZL has returned from Pennsylvania.

Traffic: W1AOI 23, W1MK 996, W1UE 219, W1AOX 211, W1AJB 87, W1AMG 34, W1BDI 15, W1AFB 105, W1AMQ 40, W1TD 12, W1CTI 39, W1BOD 39, W1RP 50, W1OS 1, W1VB 70, W1BVW 7.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — A larger number of reports were received this month. W1IP starts the season with a big total. FB, LJ. W1AOQ has rebuilt and is now ready for traffic. W1APK is looking for skeds, as is W1BFT at Durham. W1CDT had tough luck and blew his generator. W1AEF is all set with a new screen-grid receiver and is already keeping skeds. W1AUY's receiver went west when OM lightning paid him a call! W1BST took in the Maine Convention. W1AUE wants a sked on 7000 at 4:30 a.m. Anyone else who gets up that early? Hi. W1AVJ has been DXing on 14,000 handling some traffic for Byrd. W1MB has moved to Concord. W1BIS is experimenting with screen-grid detectors. Reports would be appreciated from other N. H. stations not mentioned.

Traffic: W1IP 82, W1AOQ 26, W1AEF 11, W1APK 10, W1BFT 3, W1AUY 2, W1CDT 2.

RHODE ISLAND — SCM, C. N. Kraus, W1BCR — W1BLV reports being heard in Europe on 28 mc. FB, OM. He also moved his station to 263 Diamond Hill Rd., Woonsocket. W1MO, who blew his 866 tubes, is now using a mercury arc. W1BCR is still on the 14-mc. band and is waiting for pending A.R.R.L. results in Washington to open up with a 14-mc. fone. W1AWE QSO'd Australia, Mexico, Porto Rico and Hawaii last month. In about another month the club will inaugurate a new technical program. Groups of fellows will devote their time to television, five meter work, directional antennas, and fone work.

Traffic: W1BLV 43, W1MO 14, W1BCR 11, W1AWE 5.

NORTHWESTERN DIVISION

OREGON — SCM, W. S. Claypool, W7UN — August 30th and 31st found the city of Portland filled with visiting hams who woke the ole burg up with much blowing of whistles, etc. Everyone attending reports the best time in a blue moon. Next year's jamboree will be held in Spokane and they can expect good support from this section. W7WP, the boy who entertains all visiting YL operators, also pounds brass, as he is high man this month. W7ABH is next with FB total and says 7 mc. better than 14 mc. W7PE attended the convention and has a good report. W7WL, a new ORS, has much to be proud of, as he won a big prize at the convention which we understand the Coos Bay boys will use to equip their new club shack. Further info should be asked the owner. An xtal will soon be in use at W7AMQ. W7EO wishes for rain so he can go hunting. In connection with the present fire hazard in this section, the Portland gang are prepared to use portable stations for the Forestry Dept. in communicating with the fire areas. W7IF is now ORS. W7PL, W7AJX and W7AIG report. The BCLs in Roseburg have W7JC so scared that he doesn't even report. Hi. W7PP finds little time to pound brass, as he works much overtime in local machine shop. Hereafter all reports should be sent to 1059 Greenwood Ave., Portland, which is the new QRA of the SCM. He wants to thank the gang who made it possible with their vote for him to admire the silver loving cup given him at the convention. W7MV asks for better coöperation in his new RM work. By the looks of this report everyone is ready for an active season so let's not forget to mail the reports on time.

Traffic: W7WP 101, W7ABH 81, W7PE 77, W7UN 67, W7WL 38, W7AMQ 12, W7MV 12, W7EO 4, W7IF 7.

ALASKA — SCM, W. D. Wilson, WWDN — K7AIF is again the lone reporter. He reports via radio direct to HQs. Where are you other Alaskans?

Traffic: K7AIF 19.

PACIFIC DIVISION

LOS ANGELES — SCM, Don C. Wallace, W6AM — The totals for this month were excellent — 3186. During the past two years there have been many times that the L. A. Section had the greatest number of messages reported in the country and many times the greatest number of reporting stations. Several times we have had more stations reporting than there were ORS. The pep, interest and activity of the section is on the decided increase.

The A.R.R.C. again meets weekly at 5428 S. Broadway, Los Angeles, and are booming the convention coming Nov. 29th and 30th in L. A. Their A.R.R.L. booth at the Radio Show Beautiful, week of Labor Day, was a peach. 1600 messages were taken in, and 365 actually transmitted right from the booth on the W6PS transmitter (75 watt). The balance of the messages were passed around among section members, increasing the grand total. The Pasadena Short Wave Club steps right along with regular meetings and we also know the rest of the eight clubs in the section are doing well but they don't all write in to the SCM concerning their activities each month.

Seven make the BPL: W6AKW, W6ETJ, W6CBW, W6DHM, W6EGH, W6EAU and W6EQF. W6AKW is QSO PMZ. W6ETJ used show traffic to boost his totals. W6CBW says DX is best he ever saw — 7 countries in five hours one night with a total of 17 stations. Whew! W6DHM and ex-W6AQP have combined. W6EGH's large total was handled mostly with Philippines and HU. W6EKE starts to UCLA. W6EAU, W6BPM, W6EHX, W6DJW and W6SJ formed a chain from the radio show and relayed 77 messages in two hours and forty minutes, 69 of the messages landing in remote districts during that time.

W6EQF owes his BPL position to a daily sked with K1CM. W6CUH has a 500-watt input crystal control push pull outfit. W6ESA operated W6PS at the radio show and helped W6EKE get his rectobulbs going. W6FT has one schedule and a nice report. W6AM has weekly Byrd, Carnegie and PMZ schedules. W6EOG reports 42 at the PSW Club banquet Sept. 12th. W6ANN "Anne" is back with a rousing report. W6CRC has his set perking well. W6ZBJ is working on club formation plans for Santa Barbara and vicinity. W6DKV and his crystal set boom out the DX these days. W6EPC phoned in a last minute report, via the Secretary of the A.R.A. — W6ELZ. W6BZR has a new 852 perking. W6ERF also sent in a last minute report. W6AXM wishes to thank all the gang that helped with the A.R.R.L.-A.R.R.C. booth at the Radio Show in L. A. W9FPY, W6EPD, W6EPM visited W6ACL. W6UJ is broadcasting code from 9:30 to 10:30 p.m. Tues. and Thurs. each week on 1715 kc. His portable was QSO K6BRA while on vacation.

W6COT is back with a good total after 3 months off. W6AKD is using soup rectifier. W6EFA has conquered the

noises in his receiver. W6HT is thinking of becoming a commercial ticket holder. W6EJ–W6CBZ sends in a report for his double-call station. W6DLI says "we're in the Army (net) now." W6DLN, W6CUH and W6ACL are organizing the "South Bay Amateur Association." Horray! another club for the L. A. section. W6ACL worked Alaska and Mexico in the middle of the daylight morning. W6AXE sends in a report. W6BFI is becoming an ORS. W6EPH reports traffic. W6QL offers a reward for the finding of his power leak. W6EAF reports he landed his Army gang at last. W6AWY just returned from his honeymoon and is on the air strong, too. Congratulations! W6ELZ takes personal pride in seeing that the entire ARA report to the SCM each month. W6HS has moved to Inglewood. W6ABK is trying phone. W6AGR is still on. W6EVA, our honest to goodness (and pretty) YL ham, turns in five messages.

W6CZT is on 7200. W6TK, W6EJF, W6DZI. W6DYJ, W6DPY, W6OF and W6BRO all report. W6ZZA reports that after traveling 1½ years in baggage cars, the set is quite wiggly. W6MA reports that the rope fell from her antenna and was fixed by W6ELZ without loss of a schedule. W6EQV is building MOPA as described in Sept. *QST*. W6RSL will be active from now on. W6PS was the L. A. Radio Show station. W6DZK leaves for Stanford. W6CAG is on 7207 kc.

Traffic: W6AKW 365, W6ETJ 353, W6CBW 306, W6DHM 223, W6EGH 202, W6EKE 148, W6EAU 146, W6EQF 128, W6CUH 84, W6ESA 70, W6FT 68, W6AM 56, W6EOG 54, W6ANN 53, W6CRC 52, W6ZBJ 42, W6DKV 32, W6EPC 30, W6BZR 29, W6ERF 28, W6ASM 28, W6ACL 24, W6UJ 24, W6COT 24, W6AKD 14, W6EFA 24, W6HT 23, W6EJ–W6CBZ 23, W6DLI 17, W6DLN 17, W6AXE 12, W6BFI 15, W6EPH 8, W6QL 14, W6EAF 14, W6AWY 10, W6ELZ 9, W6HS, W6ABK 7, W6AGR 6, W6EVA 5, W6CZT 3, W6DZI 3, W6BRO 4, W6ZZA 3, W6MA 3, W6DYJ 2, W6EJF 1, W6EQV 1, W6PS 356.

EAST BAY — SCM, J. Walter Frates, W6CZR — W6AWF came hammering up among the leading traffic handlers and came out in top position. He ran up a magnificent total from inter-section traffic and messages from the station maintained by the Sacramento section at the Calif. State Fair. In addition he maintained schedules with K6CYC and ZL3AS. W6ASH was second man. Some of the W6ASH traffic was from the Los Angeles Radio Show and the station operated by the Southern Calif. fellows. W6EIB at Vallejo also speared a good total. He maintained schedules with K6DTG in the Hawaiians, K7ALQ in Alaska, and K1HR in the Philippines. W6ALX is carrying on his Army Net work on Monday evenings. He also has a large and enthusiastic class in code and theory. W6CGM and his pet power leak are still having a private war. He says that the doublet antenna and the new peaked receiver brings them in boiling when the buzz lets him alone. W6BIW just missed the BPL by three messages. He has been listening on 28 mc. but can't hear anything. W6ATT, a new ORS, landed up among the traffic leaders this month. He announces that his High C Hartley is still QRMing the Aussies. Hi. W6BI is maintaining regular ham skeds and those connected with the USNR, in which he is an ensign. W6BMS wails that his nice big MOPA is delayed on account of finances. W6RJ has his six shooter all oiled and ready for the Los Angeles convention. Hi. W6ASJ–W6CRE is back in town after acting as the president of the Salinas Radio Club. W6BZU wants to know where W6RJ got the portrait of him he sketched in the last section meeting announcement. W6EDR has forsaken the YLs with the passing of summer and is back at the key. W6EDO threatens dire things as soon as the summer travel is over. W6EY has left summer baseball and is getting his outfit going for the winter campaign. W6EJA at Point Richmond has been using a 201A since his power transformer went west but will shift to the 210 soon. W6EDK is back with a UX-852 and rectobulbs and is working in the Army net with W6ALX. W6AUT has his MOPA mopping at last. W6BYS is back on the air. W6CZN threatens to build a new shield grid receiver. W6ETA of Grass Valley has joined the section and is pumping much soup into the antennas of W6GQ and W6CFD, 50 feet away. Houston of W6SR is no longer with the National Guard and is oping his station under the call of W6AQ. W6IP, the CRM, is back on the air with many plans for the season. W6CZR and W6ARU will be on as soon as they get back from their vacations.

Traffic: W6AWF 469, W6ASH 361, W6EIB 351, W6ALX 231, W6CGM 205, W6BIW 197, W6ATT 135, W6BI 66, W6BMS 25, W6RJ 16, W6CRE 12, W6BZU 11, W6EDR 10, W6EDO 9, W6EY 8, W6EJA 4, W6BYS 3, W6AUT 2, W6EDK 1.

SANTA CLARA VALLEY — SCM, F. J. Quemente W6NX — From Potts of W6AME we learn of renewed radio activity in Modesto and the formation of the Modesto Amateur Radio Club. The following Modesto hams are active: W6BRV, W6DCI, W6DCG, W6BRW, W6DQH, W6EUJ, W6CRT, W6BZZ and W6AQV. FB — now watch the traffic roll up. W6AMM is again active with daily skeds with K1CE and K6BRA. W6ESW and W6DCG are also active. W6DQH gets xtal reports from a 201A and B eliminator. W6ALW had transformer trouble. W6NH is student pilot and member of MARC. W6AME's second op got married. He is looking for another. W6BAX had sked with SM6TM and was QSO 43 Europeans in 8 countries. W6MP's new xmitter is about ready. W6AZS was heard by ETA (Latvia) and 0626 (Germany). Although a good percentage of the ORS reported this month, message handling activities were poor. Let's show a big increase next month.

Traffic: W6AMM 26, W6ESW 14, W6DCG 15, W6DQH 13, W6ALW 11, W6NX 12, W6BNH 1, W6AME 1.

SAN FRANCISCO — SCM, C. Bane, W6WR — W6BIP finally got the lead on W6ERK and edged him out in the traffic this month. W6EPT sends in very nice total and also edges out W6ERK. The latter, however, makes the BPL both ways. Our old friend, W6AD, is back again. W6DSN took the final step recently. Lots of luck, Hal. W6DBD reports things going along in fine shape. W6AMP and W6DFR report as usual. The SCM had the pleasure of visiting W6CIS and says he has a splendid layout. Our former RM, W6WN, finally cuts loose and handles quite a mess of messages this month. He says his xtal is perking FB and he is ready to resume his duties as OFS. W6AC is also going strong. W6DFS has his xtal on the air and we expect nice totals so on. W6PW has been busy with work on the Tri-Section meet and xtal grinding. W6FK has had trouble with his eyes but is getting along great now. W6CZM handled some fine traffic last month but due to an error, his report was omitted. The S. F. Radio Club is holding a traffic contest and the competition is sure keen with W6BIP taking the edge at this time. W6ATI is building a MOPA outfit. W6EEG is still struggling to get settled in his new location. W6DYB is very busy with school work. W6AC worked. PMZ and the op, Wells, sends his 73 to the S. F. gang. W6WB handles a few this month. W6DSS says traffic is very low. W6QC, the Poly. High station, is again on the air after a long absence. W6DPF finally reports. W6AVQ is stepping out in fine shape. The Associated Radio Amateurs o n Francisco sponsored the big Tri-Section smoker held Sept. 15th in S. F. Movies, lectures, speeches and plenty of cigars went to make the meeting a good one. Mr. Babcock and Mr. Linden were present and both gave fine talks. About 120 men were present from all over the Bay district.

Traffic: W6BIP 434, W6EPT 238, W6ERK 233, W6AD 102, W6DBD 81, W6DFR 42, W6CIS 41, W6WN 38, W6AC 28, W6WB 27, W6PW 22, W6FK 20, W6DPF 20, W6CZM 18, W6AMP 8, W6DSS 2.

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6EPZ leads in traffic this month with a very fine total and makes the BPL with 126 deliveries. FB, OM. W6ACJ sends in a nice total with 43 deliveries. W6EOS is getting skeds lined up. W6EPF now has five skeds and says DX is coming in good. W6DGW says resistance coupling for the last stage in his receiver is FB. W6EOP is very QRL with street cards. W6EOM is back on 3500 kc. and arranging skeds between football periods. W6BAM expects to be back on the 3500 kc. band soon with MG and a 210. W6BFE is arranging skeds. W6CTR expects to be an ORS soon and is learning to be a police officer.

Traffic: W6EPZ 306, W6ACJ 157, W6EOS 93, W6EPF 46, W6DGW 40, W6EOP 16, W6EOM 8, W6BAM 5.

ARIZONA — SCM, H. R. Shortman, W6BWS — Only two ORS reports were received this month, so I am making up this report from what I know of the gang myself. Stations that have failed to report for three months will be cancelled if no report is received next month. W6BJF reports nineteen foreign QSOs this month. He also reports ex-6CSO is to come on the air at an early date using a fifty watter. W6DTU would like some schedules on 14 mc. for the winter. W6EH is still operating KGTL in Kingman, Ariz. W6CDU is doing BCL service work and has purchased apparatus for a UX852 transmitter. W6CWI has just returned from Camp Perry, Ohio, where he was a member of the Arizona Rifle Team. W6BWS is back in Phoenix Junior College and is giving code instruction in the radio class there. W6ANO is

still at KFXY in Flagstaff, Ariz. W6CCL writes from Honolulu that he is operating on the S.S. *Ventura*, running from San Francisco to Sidney, Australia, via Honolulu, Hawaii; Pago Pago, Samoa. He says hello to everyone. W6DIE is a freshman in Phoenix Junior College and says he would like it fine if he didn't get paddled so often. Hi. W6EAA told the SCM at school that he made the BPL this month and would send a report but alas — none received. W6DIB has not been heard from since he went to Mormon Lake to QSO the bass and trout. W6BJF reports working WSBS and taking four messages. FB! He also says that Dale Hammersley (ex-W9EH) and W6BLP operate at his station frequently. Ex-W6CXW has opened a battery station in Phoenix. W6AUI has been changed to the traffic dept. of the Phoenix Police force and is riding a "put put" around passing out free tickets. W6EKY just returned from Salem, Oregon, where he spent the summer. W6EFC is working in a "Brewery" (Cocacola). W6DGY is on a short visit to San Diego. W6EOF is coming along fine in the Army Aviation School at March Field. W6BWS received his long-looked-for QSL from Africa, and will be all set for WAC as soon as he gets a card from Asia. W6DCQ has his shack and new station completed. W6ASA lost over $800 worth of apparatus in a fire which completely destroyed his shack and station. He has now gone back to the University of Arizona for his last year there. W6CWG is working at KFAD.

Traffic: W6DTU 327, W6BJF 78, W6BWS 19.

HAWAII — SCM, F. L. Fullaway, K6CFQ — With vacation over more fellows should be reporting but it seems as if few have any ambition. K6DTG is again the high traffic man and star station of the section. He reports working Byrd several times besides keeping skeds with W1MK, WSBS, and many others. K6AVL handled a few but is not up to par. K6ALM reports again and says that he is getting xtal reports without any xtal. K6CFQ is quitting the U.S.S. *Guide* and will be on the air again Nov. 1st. exK6DCU is at West Point learning how to be an officer. K6EST is in Honolulu attending the Univ. of Hawaii. K6CIB, a new station in Honolulu, sends in his report for his first month on the air.

Traffic: K6CIB 25, K6DTG 422, K6AVL 98, K6ALM 12.

PHILIPPINES — SCM, M. I. Felizardo, K1AU — This report was sent in by K1CY. K1AC is on with a new 50 watter. K1AF handled 265 messages containing a word total of approximately 5000. K1CM is still knocking them out and across center field. K1CE is reported to be the loudest P. I. station heard on the west coast. K1CY is in touch with the gang nightly. K1DL proposes to reorganize the Philippines Radio Club. What say, gang? K1EL is developing a good fist. K1HC keeps schedules with the coast. K1HR is keeping the same bunch of schedules and reports the usual high total. K1MC reports local QRM from a new 7½ lb. op with over 100% modulation. Congrats, OM. K1PW is starting for home soon. K1RC handled a nice bunch. K1HR reported direct to HQs by radio. AC8RV again reports on Chinese activities by radio via W6FEO. AC8AG is off the air, as his motehr is very ill. AC5GO is going strong with amateur radio. AC8RV is only station reporting traffic. K1AB invites the gang to be his guests at station K8AA on the Island of Palawau some time after the rainy season. K1AW reports that his transmitter is nearing completion. K1CM is on every night with a good clean-cut signal. K1JR is on irregularly with a 250 in TPTG circuit. K1XA is back on after a pleasant vacation. K1SC, the Army Net control station under Capt. Tom Rives, has shown good work under test. K1AF, our future Route Manager, has circulated a questionnaire for the purpose of carding the amateur logistics of this section.

Traffic: K1HR 645, K1AF 265, K1RC 87, AC8RV 137.

SACRAMENTO VALLEY — SCM, Everett Davies, W6DON — W6EEO again comes to the top with over five hundred messages with daily schedules with AC8RV, K1HR and KFR6. "An American Army officer, recently returned from China, reported to W6EPF that our traffic circuit, W6EPF-W6EEO-K1HR-AC8AG-AC8RV, between San Diego and Shanghai consistently was faster and more accurate than either the Navy or Commercial services." (Taken from one of W6EEO's letters.) The Sacramento Valley Amateur Radio Club put up a station in the Calif. State Fair operating under the call W6SM, W6DON-ER and W6DPR's transmitters were used. About five hundred messages were originated. W6AFU was appointed OBS. W6AYI is waiting for a boat. W6CDK is back from sea for school. W6BSN reports hearing F8EX and F8DA at noon PST on 14 mc. Our YL, W6ETA, has moved out of the section. W6DGQ is late to work every morning waiting to see if the postman has his African card so he can get his WAC. W6DON is QRL with KFBK and YL. W6ER announced his engagement to a radio star.

Traffic: W6EEO 541, W6AFU 313, W6BSQ 112, W6AIM 24, W6DYF 21, W6SM 508.

PRAIRIE DIVISION

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — VE4IH — has started the season with a good message total and will go up when he gets skeds north, east and west. Help him out, fellows, and boost your own traffic total. VE4BX, a new station at Indian Head, is getting out in good style with his 5 watter. Another comparatively new ham, VE4AT, has come on the air with a 171A in a Hartley circuit. His QRA is Govan, Sask. VE4AI is operated by VE4AI and ex-VE4FV as second operator.

Traffic: VE4IH 20, VE4AI 19.

MANITOBA — SCM, A. V. Chase, VE4HR — Traffic activities have picked up with the arrival of cool weather. VE4JB, VE4BD and VE4DK are back with us again. VE4FV built a low-powered transmitter using a 201A in an ultraudion circuit with but 1½ watts input and worked all U. S. districts except the 3rd within a week with it. VE4BQ has been QSO ZL, VK, G, D, and the Canal Zone. VE4DI has left the section to take up a post in China. VE4BU is very consistent in reporting. The SCM would appreciate reports from other country points. VE4HR has built a S. W. superhet receiver.

Traffic: VE4FV 18, VE4BQ 18, VE4GQ 14, VE4HR 13, VE4BU 5.

ROANOKE DIVISION

NORTH CAROLINA — SCM, Hal S. Justice, W4TS — Activity is on the increase with the coming of better radio weather. All stations in the state are requested to send in reports of traffic and activity in order that we may get our full share of space in *QST*, and credit for our work. There are openings for an official broadcasting station and two official observers. W4AEW, of High Point, has been appointed route manager. He is mailing out a questionnaire soon to traffic-handling stations, and everyone is requested to give him any assistance he may ask for. W4AB leads the section in traffic handling many messages for the Tri-City Airport, near Winston-Salem. He is leaving for V. P. I. soon, and asks to have his ORS put on "cold storage" until Christmas. W4AA-W4ACA, ex-W3EC, is now on the air in Greensboro, with a transmitter for three bands and is building a 3500-kc. C. C. fone. W4OC reports everything quiet around Durham. W4TO is building a 50-watt C. C. transmitter. He recently worked China, getting R8 PDC with a UX210. W4JR is on occasionally. W4AFW has been away from home all summer, but is back now and will be on the air regularly. W4ABV sends in his first report. He is lining up some 3500-kc. skeds. W4TN now boasts an ORS certificate. W4UB has been rejuvenating his tubes, petting the "A" battery and shooting condensers, but still managed to get in a few messages. W4TS is getting quite a bit of traffic from South America. W4ACI hooked it down into Georgia and came back with an 852. He keeps several Army-Amateur skeds and handles some cross-state traffic. W4PP is on the air consistently and handles some good traffic. W4VZ is a new station in Asheville, with an 852-tube.

Traffic: W4AB 101, W4AEW 64, W4TS 62, W4ACI 61, W4ABV 38, W4TN 30, W4PP 32, W4TO 14, W4AA 13, W4UB 8, W4JR 6, W4OC 1, W4AFW 1.

VIRGINIA — SCM, J. F. Wohlford, W3CA — W3EC has cancelled all schedules temporarily on account of the 61st C. A. going on a trip to carry on a test for the Army. W3KU is at sea at present but will be back on the air about Dec. 15th. W3WD is on with a 210. W3WM has moved his station. W3II also moved and will be on shortly with a better station. W3AER is still getting out FB with B battery supply. W3TN is on the sea as operator. W3FL got his commercial license and is junior operator on S.S. *Allegheny*. W3FJ is studying law. W3HO moved into a new location and got R-6 from Cuba at noon. W3AMB has rebuilt his station. W3ASA is on quite regularly now. W3IB is also back on the air. W3BGS succeeded in getting his old call back. W3CKL was not dead as we had thought. W3HZ has been on vacation. W3BDZ is tinkering with that pesky critter, otherwise known as "xtal." W3ZA still sticks by the phone and seems to be getting out in fine shape.

Traffic: W3EC 97, W3FJ 21, W3CKL 138.

WEST VIRGINIA — SCM, F. D. Reynolds, W8VZ —

Now that the weather has finally changed for the better, it is only natural that radio should be on the up and up. W8BOK is now in our midst. He hails from Clarksburg and sports a couple of 852's. W8DNN has separate transmitters on 14 and 7 mc. W8DPO is still clicking off the DX on 14 mc. W8HD started 7 HPM messages on their way. He reports W8BTV as a new Wheeling ham. Welcome, OM. W8CSR and W8BPU made a trip to Cincinnati and inspected WLW. W8AWM is now in Calif. Good luck to you, OM. W8SV paid the SCM a visit before he returned to Calif. to attend Stanford Univ. W8OK clears his usual evening skeds and then retires. School opened in Fairmont and proved to be the proverbial wet blanket. W8ACZ has everything to work with but lacks ambition. W8JM is building another transmitter to be more successful this year than last.

Traffic: W8DPO 14, W8HD 11, W8VZ 19, W8ACZ 32, W8OK 21.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, C. R. Stedman, W9CAA — The fall season is evidently starting out right in this section if the number of stations reporting can be taken as an indication. W9GEZ and W9GGW have both gone on the gulf for the winter. W9DQD is leaving for college but will be on there as W9CLJ. W9CSR has been spending all summer building a new super het for short waves. W9EUR expects to have a schedule working soon. W9EBF now has a commercial ticket. W9CDE says traffic conditions are very unsatisfactory on account of excessive QRM. W9CAA has had gobs of traffic. W9EAM is doing a lot of fishing but turns in a good report. W9DQV is going to college and will be W9EGG there. W9ECP will soon be on at Limo, Colo. W9FXW has been on 14,000 kc. and reports DX good. W9CVE has a nice signal. W9BQO has his new transmitter all finished. W9BTO is building a 75-watt outfit. W9CCM is using a 50 instead of the 75 watter. W9DXW is closed until next summer. W9CWX is getting a 250 watt xtal control outfit installed. W9CJC is on again. W9EDM is still having grief with tubes sparking over in the base. W9DTY is unsuccessfully trying to work DX with a 210. W9EFD will soon be trying his luck with a new set. W9CHK has his set still in the "hatching" stage. W9CND is on regularly on 7000 kc. A successful radio show in Denver will probably boost traffic for many Denver stations for next month.

Traffic: W9EDM 4, W9CAA 71, W9CVE 63, W9FXW 1, W9DQV 5, W9EAM 48, W9CDE 18, W9EUR 2, W9DQD 1.

UTAH-WYOMING — SCM, Parley N. James, W6BAJ — W6EKF kept a few schedules and has the best total this month. W6CNX says traffic was slow this month because W6CUH was sick and their sked went haywire. W6BAJ took a trip to Denver to attend the Rocky Mountain Division Convention. W6BTX is "rarin' to go" with a pair of new 866's. W6ATU has been working on 14,000 kc. W6DPJ has a hard time finding time to work hams. W6DYE has quit the game and sold everything.

Traffic: W6EKF 47, W6CNX 36, W6BAJ 10 W6BTX 5, W6ATU 1, W6DPJ 1.

SOUTHEASTERN DIVISION

ALABAMA — SCM, S. J. Bayne, W4AAQ — W4AX is contemplating the use of 3500 kc. for Army-Amateur schedules. W4WS has ordered a crystal and should be using it before this reaches you in print. W4PH has left for Lehigh Univ., where he will operate at W3AUQ. W4AHZ has fallen heir to $1000 to be used in a little experimental work. W4LM has purchased a lot of new equipment with an increase of power in view. W4AAH is hoping for a let-up in business QRM soon. We are glad to learn that W4VC is back at the key in Birmingham, after having spent some time in Gadsden. W4AHX will assist W4AHZ with his experiments. We all regret to hear that W4UV has taken a position with WQAM at Miami, Fla., and will be off the air. Reporter Cohen of the Auburn Radio Society advises that W4AQ will be on and active as soon as the motor-generator can be reset. W4AKM is proving to be a real asset as the latest addition to the Army Amateur Net. He recently received an ORS appointment. W4AIG is putting 430 watts into his 852 and it doesn't even blush. W4AKZ is having trouble with his push-pull TPTG. W4PC, our fone op at Boaz, is building a new 7000-kc. xmitter. W4AKX, another of our fone friends, will increase power for winter work. W4AID has a nightly fone schedule with W4AKX. W4AKS is entering the retail radio business. W4HP has increased power to 100 watts and steps out accordingly. W4RC has also increased power now using 500 watts. W4PAR, W4RC's portable, was taken to CMTC and daily contact made with W4RC, while Joe's sister handled the Gadsden end. Nice work! We have a fine bunch of hams in North Alabama and the SCM would like to hear from each one personally each month. W4TJ was visited by several of the Montgomery bunch recently, accompanied by W4KV of Atlanta, Ga. W4LT has worked consistently on 7000 kc. this month but has his eye set on the 1750 kc. fone band as soon as the weather is suitable. W4JQ advises that Florida traffic may be routed through this station. We are pleased to learn that W4FY has received his license and will be active at Troy. W4QM is another to emerge from the embryo stage at Troy. W4VY is building a screen-grid receiver and hopes to increase his traffic total with it. W4EW has relocated at Newville. W4ZI is working some fine DX on 14 mc. W4GN has filed his application with the USNR. W4IA is back at Union Springs for the winter with a 100% modulated fone outfit. W4AHP has moved into winter quarters in the attic where he'll have the steam pipe close by. W4AJR is getting out well with a new High C Hartley. W4AHR received his first card from New Zealand with a QSA4 report. W4AKB has been busy this month but hopes to frequent the air more in the future. W4AHO gets on when business and OW can spare the time. W4HB has rebuilt his receiver and modified the xmitter for fall. W4AP is rapidly getting used to modern practices after having been silent since 1922. W4KV of Atlanta visited the Montgomery gang and bunked with W4AAQ, with whom he has kept a schedule nearly two years. Now, fellows, it looks like business is picking up, so let's get our heads together and show some real stuff. And don't forget that the SCM wants to hear from you all. We have a number of berths open for ORS.

Traffic: W4AHR 58, W4ALG 48, W4JQ 33, W4AAQ 22, W4TI 21, W4AHP 19, W4AKM 18, W4AJR 10, W4LM 8, W4LT 7, W4VY 2, W4AKB 1, W4EW 1.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES — SCM, J. G. Cobble, W4RM — Georgia: W4RN has been operating the BC station at Memphis. W4SI has moved to new QRA. W4PM and W4SI are both in the USDA net. YLs have stopped W4VP. W4PD is at radio school in New York. The DX honors go to W4CL with PXR, KFU5, WAYC, F8JF, PY5AF, Cuba, PR and Costa Rica worked. W4AV, the station of the Ga. Tech. Radio Club, is now active for the winter and open for all southern traffic, on 7100 kc. W4ACV, who is ex-5AOM, is op at WPTF, Raleigh, N. C. W4KV is control station and W4RZ is alternate control station of the Fourth Corps Area Army Amateur Net. W4PM is state control station and W4KA alternate for Georgia. W4BO and W4WQ are new hams in Atlanta. W4QQ-W4AJH-W4DV-W4AAY and W4IS are heard often and we would sure like to have a report on their activities. W4KU, W4RM and W4VP spent a lot of time at the radio show in Atlanta. South Carolina: Wanted—ORS that means business. No reports from any station in this state this month. Cuba: We take pleasure in giving report received from CM2JM, Justo Mahia, Box 299, Habana, Cuba. He reports QSO all U. S. districts except seventh, Bahamas, Costa Rica, Nicaragua. All on a lonesome UX201-A tube, using a Zepp antenna.

Traffic: W4RM 11, W4AV 5, W4SI 3, W4RN 7, W4KV 77, W4RZ 55, W4AHM 12, W4KA 4, W4PM 17.

PORTO RICO-VIRGIN ISLANDS — SCM, E. W. Mayer, K4KD — K4AKV kept schedule with NJ2PA during recent tropical disturbances. K4AAN is rebuilding again. He expects QSO with Lindbergh plane as does K4KD. K4ACF reports for first time. He is getting into shape for the winter season. K4KD is still pounding commercial brass in daytime and ham at night. Apparently the San Juan gang is among the has beens.

FLORIDA — SCM, Harvey Chafin, W4AII-W4PAW — W1AKF has been appointed operator at NDD. W4HY is working on 14 mc. and 7 mc. W4CK will start his OWLS schedule with W6AM soon. The Miami Radio Club hold their meetings in the American Legion Building and expect to have a transmitter on the air. W4WT is on the air again after a vacation in Georgia. W4QL keeps two schedules. W4AKA has been on the air but one month and has worked all except the sixth and seventh districts. W4NB reports for the first time. W4TK reports that everything has gone to the dogs. W4QV took four messages from Honolulu in one morning. W4AEQ is having trouble with his new Hertz. W4HO is a new ham in Miami. W4OZ is

working with the Fla. Light and Power Company. W4AKW expects to be on the air soon. W4AGY sends out a QST every Thursday at 6 p.m. for members of the MAR club. W4NN, a new ham in Jacksonville, is handling traffic like an old timer. W4MF expects to win a few prizes this fall on the St. John River with his hydroplane. W4HZ, W4AKL, W4SY, W4OZ, W4MS, W4PB, W4UY and W4AJD also report. Due to the absence of W4MS, an appointment of two route managers for Florida should be made promptly. What do you say, OM's?

Traffic: W4AEF 326, W4QL 50, W4AII 48, W4QV 44, W4NB 28, W4AGR 17, W4AKA 15, W4HY 11, W4MF 10, W4PB 8, W4CK 7, W4SY 7, W4TK 4, W4AGY 6.

WEST GULF DIVISION

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5CB is a new ORS and is high man. FB, OB. W5ALP is second and is going to Pittsburgh to school. Sorry to lose him. W5IH worked a Frenchman. W5ASQ and W5AYF should go fishing and bring their total up again. Hi. W5AAV reported for once. Hi. W5MM is building a 250 watt xtal set. W5QL is building a new screen grid receiver. W5VH has moved to Enid. W5AIR reports. W5GF will have two xmitters on soon. W5BHW is a new station in Shawnee. May I ask you to be kind enough to get your reports in, gang?

Traffic: W5CB 29, W5ALP 26, W5ASQ 13, W5GF 9, W5AAV 10, W5AYF 3, W5BEE 2.

SOUTHERN TEXAS — SCM, Robert E. Franklin, W5OX — Cool weather will soon be here and radio conditions should be more pleasant for us. Vir James ex-W5RR is back in San Antonio after a year in China, where he made quite a few amateur radio acquaintances. Welcome home, OM. W5TD is cutting a wide slice in the ether with a xtal controlled 250 watter. W5LP has cut some of his skeds on account of going to Rice Institute. W5AHB is keeping skeds with W5AJD and W5ANA. W5AJD turns in a nice report and is keeping skeds with W5EV, W5FC, W5AUV and W5BBH. He also has new portable call, W5BIS. W5ABQ, the San Antonio Route Manager, is back in the harness again and reports that San Antonio has set the date for the West Gulf Division Convention as Nov. 22nd and 23rd. Everybody is invited to attend! Houston has two new hams, Richard Mathias, W5BIW, and Mr. Barker. The latter has recently been seeing service with the Survey Dept. of the British Govt. in China for the past two years. W5MS promises to be active again by next reporting date.

Traffic: W5AJD 43, W5LP 37, W5AHB 28, W5TD 10.

NORTHERN TEXAS — SCM, J. H. Robinson, W5BG — The total traffic handled this month was surely good. Don't forget the West Gulf Convention in San Antonio, fellows. We'll have a big time. W5HY is again on the air and seems to be hitting on all six. W5RJ is also on his toes with amateur radio as well as BCL work. He reports the YL said "Yes." The date is set for May 30, 1930, and we wish to have the gang present. He won't forget the event if we do. Hi. W5BAM has moved his QRA in Dallas but is on the air and enjoying many QSOs. W5BG is service manager for a local radio store so not much time for the transmitter. W5BBF blew most of the set but will be on by the time this sees print. W5DF reported direct to Hqs. The BPL has been made by several of the fellows in the district lately. It surely looks good to all of us.

Traffic: W5HY 142, W5RJ 49, W5BAM 16, W5BG 2.

CANADA

ONTARIO DIVISION

ONTARIO — SCM, E. C. Thompson, VE3FC — VE3ET has been banging away on the 7000-kc. band and did very well in the recent HPM Relay. VE3CB is keeping a schedule and handling traffic. VE3AR reports that the weather is terrible but that he is on the air daily anyhow. VE3CL is going through trials and tribulations, but is emerging with a good rectifier, even if the filter has gone up in smoke. VE3BP is due for a move in QRA. VE3BC is back home and hard at it again. Southern Dist.: VE3AQ sure did some wonderful work before going North on forestry work, working four continents in three days with only 45 watts input. VE3DD is the junior op at VE3CB. VE3CS is combining bands simultaneously. An old timer has come back to his first love under the call VE3FD and is busy getting on the air again. VE3DG has made a big stride and been heard in Australia. We wish that the Border Cities gang would wake up to the fact that we cannot read their minds.

Traffic: VE3ET 22, VE3CB 9, VE3AR 8, VE9AL 12.

QUEBEC DIVISION

QUEBEC — SCM, Alex Reid, VE2BE — The summer lull is just beginning to fade away as the holiday season is over. Many of the stations never heard during the summer are now removing dust from the set. The harder boiled type, such as VE2BB, VE2BE, VE2CA and few others who manage to keep up through hot weather and sports are as usual piling up records of good signal reports and DX. VE2HV is back on 7 and 14 mc. with a new outfit. VE2BC has just gone through a moving season and should be heard shortly. VE2BD wants to add another 852 and get QSA-5 from ZL! VE2BG should soon fire up his station since things are getting quiet across the river. VE2AL is often heard on 3500-kc. band. VE2AX seems to be taking his time about building his cc. transmitter. The RM, VE2AC, has five transmitters, one for each band. VE2BH has a new and very neat little transmitter on 14 mc. There is a great commotion going on with the fone hams, and there should be quite a few low power sets built within the next month. VE2AP is busy with his 50 watt fone set as well as a new CW transmitter. The other hams who are not mentioned are invited to report on the 16th of the month.

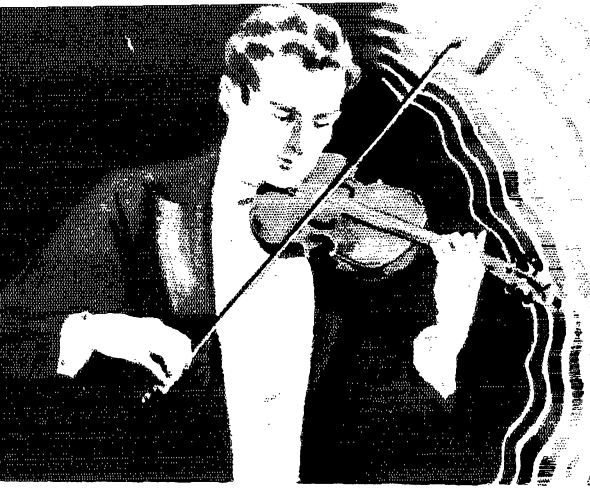
VANALTA DIVISION

BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — The B.C.A.R.A. has again opened up for the winter session and holds its meetings every Tuesday at 8 p.m. All hams are always welcome. VE9AJ, the station of the club, is expected on the air very shortly. VE5AM has moved to a new location, and is going to try some fone work. VE5AN has been neglecting his xmitter for his motorboat. VE5CP has been working on a new set. VE5CW is a new station which boasts two ops. VE5CD is still steamboating. W6HM spent the summer at Sproat Lake and called in to see some of the gang. VE5BC reports a new mast under construction. Jack Holmes, radiotrician for VE9AJ, is out of the hospital and busy at school getting up code speed. VE5GF is about to be married — good luck, Bill. VE5BF is heard occasionally but seldom seen. VE5AL is settled in his new home and has a set perking. VE5BR seems to have been lost since he quit his sked with VE5AL. VE5AV is off the air preparing to go to school in San Francisco. VE5AK has set up a push-pull xmitter with mercury arc rectifier. VE5CN says he can't hear anything but W6's, VK's and ZL's and can work but few of them. VE5CR tried his luck at push-pull and now that he has burned up nearly everything is off it for life. Hi. VE5JS, our R.I., is heard on quite frequently. VE5BM is working sked with VE5GT. VE5CL would like to get in touch with anyone interested in an "all-Canada" route east. Good suggestion, OM. VE5CF reports.

Traffic: VE5CL 5, VE5AL 11, VE5CF 6, VE5AK 7.

ALBERTA — SCM, E. J. Taylor, VE4HA — Good old DX weather is here and some of our gang are making real mileage. VE4EA has his papers and is going FB with low power. VE4EC is our message leader for this period. VE4HM has a new zepp antenna and says best yet. We regret the loss of VE4EY from Edmonton, although he will continue to be in our district. VE4GT is going good on week ends. VE4IO is off the air temporarily. VE4GM is building Sept. 1929 push-pull xmitter. VE4CC is back on the job. VE4GD returned from holidays and is going strong again.

Traffic: VE4EC 17, VE4HM 6, VE4EY 3.



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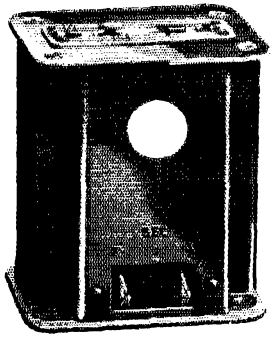

Sangamo "A" Line Transformers are built for the custom set maker or manufacturer who wants a "tone" advantage against competition and who is willing to make production economies anywhere but on the "audio end."

The cost is slightly higher but is more than offset by the increased salability of the receiver.

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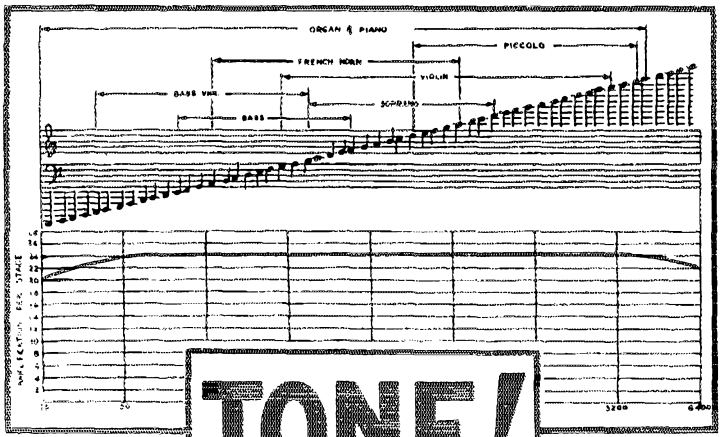

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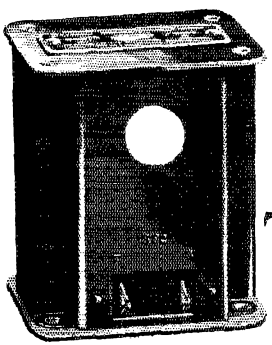
Curve of Type "A" Sangamo Straight Audio Transformer showing uniformity of amplification at all audible frequencies.



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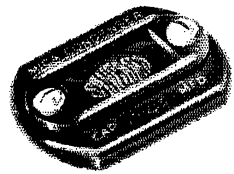

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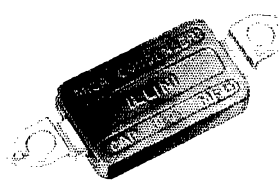

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