

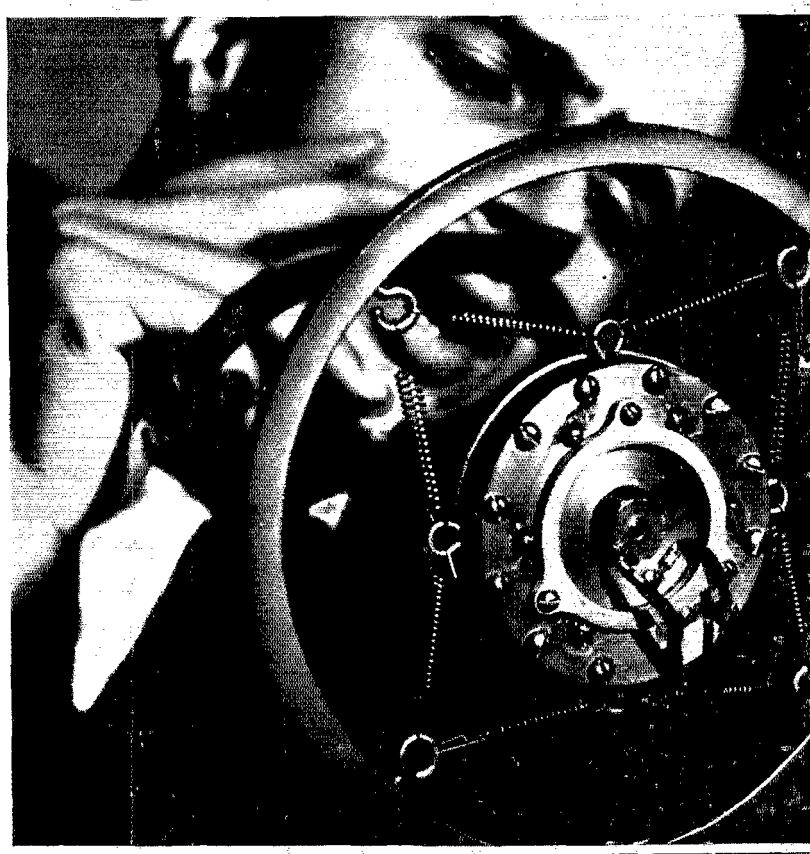
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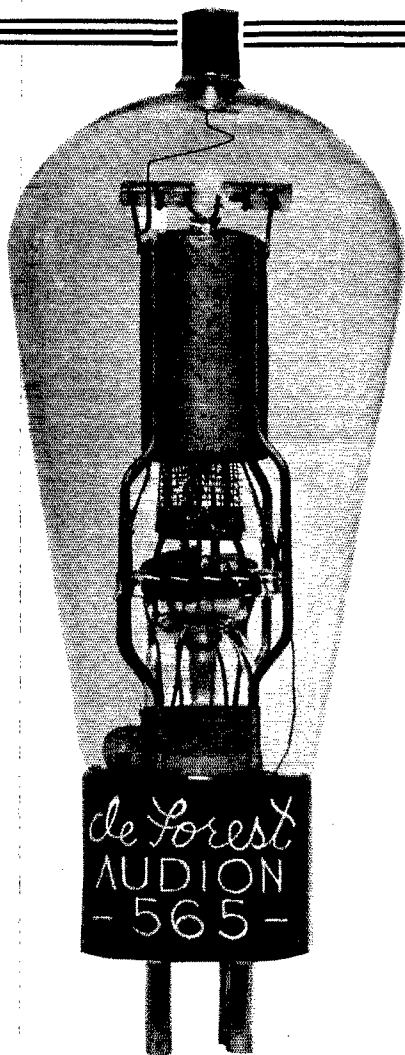
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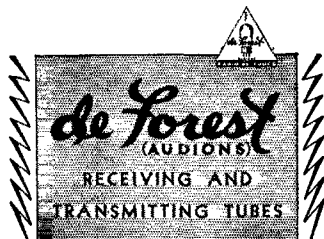
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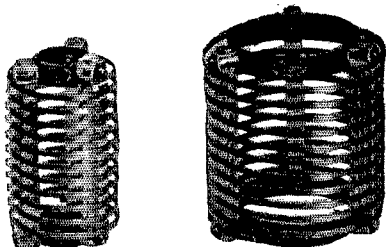
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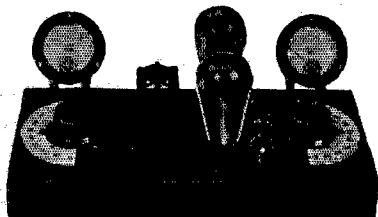
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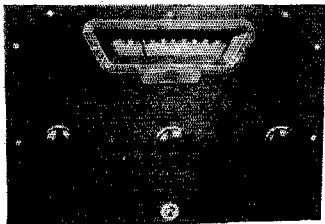
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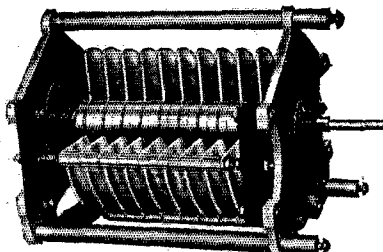
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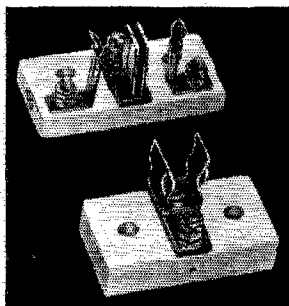
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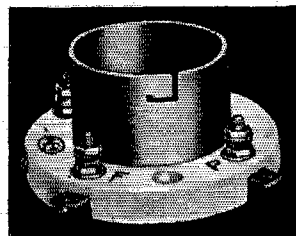


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QST

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devoted entirely to

AMATEUR RADIO

Contents

Editorials	7
The Class B Push-Pull Modulator <i>Loy E. Barton</i>	8
The Rocky Mountain Division Convention (Report)	13
Making the Power Transformer Do Double Duty <i>H. A. Wall, W9EIV</i>	14
Passing the Government Examinations for Amateur Operator's License <i>Part II</i>	15
More About Economical Crystal Control <i>George Grammer</i>	22
Amateur Radio in a New Field	32
Standard Frequency Schedules	33
Corrections	34
Experimenters' Section	35
ACCURATE CALIBRATION OF A RECEIVER — HOMEMADE TEMPERATURE CONTROL BOX — PROTECTING THE AMPLIFIER — AN ELECTRONIC CIRCUIT BREAKER — AN INEXPENSIVE CIRCUIT BREAKER	
Amateur Radio Stations <i>W9FQU, W3KW</i>	38
Communications Department	40
I.A.R.U. News	53
Calls Heard	55
Correspondence Department	56
The Midwest Division Convention (Report)	68
The Upper Missouri Valley Convention (Report)	70
Book Review	72
Statement of Ownership	74
Hamads and QRAs	91
QST's Index of Advertisers	94

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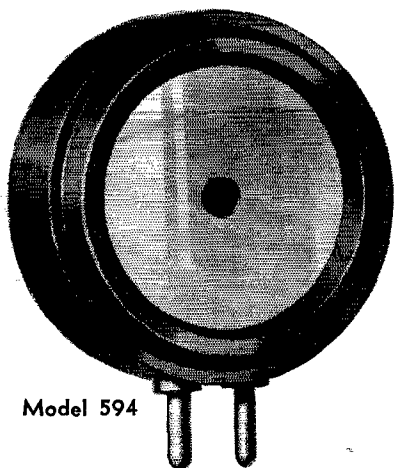
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors.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

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

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• EDITORIAL •

LOOMS now the merry month of November, marked by a decrease in electrical static but by a mounting volume of amateur electioneering static. For in the first week of this month ballots go out from the Headquarters to the A.R.R.L. members in six divisions of the United States, to elect new division directors, and to all the members in Canada, to select a Canadian general manager, who is also a director.

It has become a custom of ours to call attention, in this November number every year, to the responsible duty of members in this matter of elections. We have a system of government in our League designed to give the members free opportunity to select those who are to manage its affairs. If the members do not exercise that opportunity, if they do not regard it as a solemn duty towards their society, that system of government will eventually fail, just as surely as a tube will stop oscillating if the plate voltage is reduced too far, and for the identical reason. Indeed, there are those to-day who suggest that the whole idea of representative government is on the toboggan, not because it's wrong in theory but because as a matter of actual practice the electorate can't be made to take their part of the responsibility seriously. The past year has been a sorry one in world affairs. Many a government has folded up, been succeeded by a dictatorship. Many an industry, unable to resolve its difficulties, has submitted to a self-imposed dictatorship. Benign autocracy doubtless is most effective machinery for getting things done, but it runs against the American grain. Particularly in amateur radio, where no individual is under any compulsion to stay in the game, we require a system of determining our courses and managing our affairs that will give each of us an opportunity to participate.

The League constitution has been written to provide exactly that participation. A.R.R.L. government observes the well-recognized principles of democracy: majority rule, for the greatest good to the greatest number, with the consent of the governed, by directors chosen by the governed. The system has only one possible weakness: it presupposes that the members will actively interest themselves in exercising their constitutional right to appoint good governors.

For heaven's sake, let's do this thing conscientiously, fellows. A.R.R.L. needs good men. We have a battle ahead of us the next two years. We need leaders of good common sense, men with the intelligence to see what is right and the courage to stick to it, men who know their amateur radio. Select them seriously, so that you will be content to accept their leadership for two years. A vote for Crist L. Control, simply because he is a whale of a good fellow and asks for the office, is not a helpful vote. A vote for Mike Rofarad, just because he appeals to our emotions and stimulates our imagination, is not an intelligent vote. A vote for Plus A Battery, for no other reason than that he is already in office, is not a sound vote. Pick your men for ability, soundness, intelligence, experience, courage, mental honesty.

A.R.R.L. can go anywhere, do anything, with good directors. Let's have them!

K. B. W.

The Class B Push-Pull Modulator

An Efficient System for Complete Modulation in Amateur Radio Transmitters

By Loy E. Barton*

It is our conviction that Mr. Barton's article on the Class B modulator marks an advance in amateur 'phone technic just as significant as was QST's publication of the first practical information on 100% modulation in 1929. It means the realization of a modulation system that meets our present requirements in every respect, giving complete modulation with high quality and, best of all, placing these desirable features within easier reach of our pocketbooks. It offers us more — many more — 100% modulated watts for our dollars. — Editor.

THE amateur who starts with a c.w. transmitter and later changes to 'phone realizes the difficulty in getting 100 percent modulation without reducing the antenna power. The class C r.f. power amplifier with plate modulation is the simplest type of 'phone transmitter except for the fact that relatively high audio power is needed for complete modulation. This power usually is supplied from tubes operating as class A or ordinary amplifiers, as used in constant current modulation systems and output audio amplifiers in radio sets. Such a system requires tubes capable of supplying a large amount of audio power for complete modulation.

To eliminate some of the tubes required in the class C r.f. system, a class B r.f. system was introduced which permitted 100 percent modulation with relatively low power required to control the output tubes. However, the class B r.f. system limits the carrier power to about one fourth of the power output of a similar tube operating as a class C r.f. amplifier.

The purpose of this paper is to familiarize the amateur with the class B audio amplifier to replace the class A modulator as a source of audio power for complete modulation of the efficient class C r.f. power amplifier. This type of audio amplifier for modulation takes a minimum number of tubes for a given power output and requires much less average plate current than the class A audio amplifier.¹

PRINCIPLES OF MODULATION

To give a better understanding of the application of the class B audio amplifier for modulation of a radio carrier, some of the fundamental ideas of a modulated carrier will be discussed. It is apparent that the audible signal from a radio transmitting station is the result of the varying amplitude of its carrier being detected in the

receiver. The simplest way of varying the amplitude of a carrier at the transmitter is to start and stop the power output, as for code transmission. Such a signal will produce clicks or thumps if detected by the ordinary non-oscillating detector so that for satisfactory reception an oscillating detector is used. If the transmitter output or carrier is started and stopped at a high rate, such as 500 to 1000 times per second, the transmitter may be keyed and the signal received by the ordinary detector because the clicks occur at such a rate that a musical tone is produced. The first method of changing or modulating the carrier is known as c.w. and the latter as i.c.w. Both of these systems use a simple mechanical means of controlling the carrier and are limited to the use of code and more or less fixed tones.

The transmission of speech by a radio transmitter will not permit any simple mechanical system of varying or modulating the carrier because of the complicated nature of the voice wave. Therefore, the vacuum tube is used as a means of controlling the carrier output of a transmitter for speech transmission because the tube is capable of working at any audio frequency.

To cause an antenna current to vary at audio frequencies, that is to modulate the carrier, requires power. It can be shown that if the antenna current is caused to vary according to a sine wave, the power in the antenna increases according to the following formula:

$$P = (I_1^2 + \frac{1}{2}I_2^2)R \quad (1)$$

in which, P = power in watts for any degree of modulation.

I_1 = antenna current without modulation.

I_2 = maximum variation of antenna current.

R = effective antenna resistance in ohms.

If the carrier is not modulated the power in the antenna is:

$$P = I_1^2 R \text{ watts.}$$

With complete modulation, that is when I_2 equals I_1 , the antenna power from formula (1) is:

$$P = (I_1^2 + \frac{1}{2}I_1^2)R = 1.5 I_1^2 R.$$

*RCA Victor Co., Camden, N. J.

¹For definitions and explanations of A, B and C amplifier classifications, see Dart and Atwater, "Vacuum Tube Amplifier Definitions," *QST*, Sept., 1929; and the *Radio Amateur's Handbook*, Seventh and Eighth Editions, Chap. VIII. — Editor.

The 50 percent increase in antenna power, which corresponds to approximately 22 percent increase in antenna current for 100 percent modulation, is the additional power being radiated because of the forced variation of the antenna current. In the above case, the added or side-band power must be supplied by external sources or by a change in plate circuit efficiency resulting from suitable grid excitation of the r.f. amplifier.

The antenna current from a class C r.f. amplifier essentially is proportional to the plate current and voltage supplied to the plate of the amplifier tubes, so that if the plate current is caused to vary, the antenna current will vary in the same manner. This indirect way of causing a variation of antenna current requires considerable power to modulate the carrier 100 percent because of the losses in the output tube. The modulation of the plate supply to a class C r.f. amplifier is commonly called plate modulation and the power for modulation in this system must be supplied from an external source. Therefore, the greater the efficiency of the output tubes and coupling system, the greater will be the output power and the corresponding side-band power. To determine the modulation efficiently it is necessary to make a few calculations on the plate circuit to determine the power requirements.

The plate current when modulated is in reality an alternating current superimposed on the steady direct current supplied to the output tubes. This condition may be represented as in Fig. 1 in which I_b is the value of plate current without modulation and I_{max} is the maximum audio

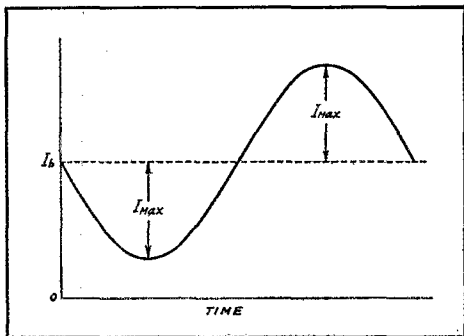


FIG. 1 — DIAGRAM OF INSTANTANEOUS VALUES OF MODULATED PLATE CURRENT

variation of plate current when modulated. The power represented by these two currents may be found by using formula (1) with the proper values assigned to the symbols:

$$P_1 = (I_b^2 + \frac{1}{2}I_{max}^2)R_1 \quad (2)$$

in which, R_1 = the resistance through which the pulsating current flows.

If there is no modulation, the power to the plate is

$$P_1 = I_b^2 R_1 \text{ watts.}$$

The plate voltage is known as well as the d.c. value of the plate current so that:

$$P_1 = I_b E_b \text{ watts}$$

in which, E_b = plate supply voltage

$$P_1 = \text{power input to output tubes.}$$

Therefore,

$$I_b E_b = I_b^2 R_1$$

$$R_1 = \frac{E_b}{I_b}$$

Since I_b and E_b are constant, the power required to modulate I_b is $\frac{I_{max}^2 R_1}{2}$ watts, which

modulates the plate current to $\frac{I_{max}}{I_b}$ percent. If the modulation is 100 percent I_{max} equals I_b and the power required to modulate in the plate circuit is 50 percent of the d.c. power to the plate.

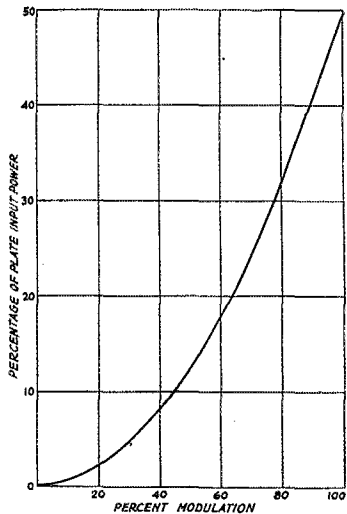


FIG. 2 — POWER REQUIRED FOR PLATE MODULATION

The above graph shows the modulator audio power output, expressed as a percentage of the class C amplifier plate input power, necessary for modulation percentages between 0 and 100.

It will be noted that the above power for modulation is the power represented by the superimposed alternating current through the calculated resistance R_1 .

The curve in Fig. 2 gives the required power for any percentage modulation in the terms of percentage of the d.c. power input to the plate circuit of the r.f. output tubes. This curve indicates that for 50 percent modulation the power required is only one fourth of the power required to modulate to 100 percent. Without further consideration, it would seem to be uneconomical to modulate to a high percentage. However, a

little consideration of the action of a linear detector indicates that the audio voltage output of the detector is proportional to the current variation of the transmitted antenna current. According to formulas (1) and (2), if the variation of the normal current is a definite amount (not a given percentage), the power in the side bands will be

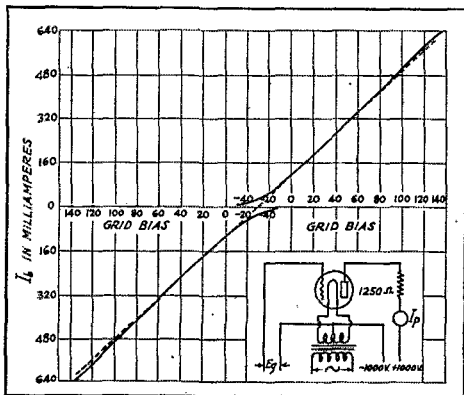


FIG. 3—LOAD CHARACTERISTIC OF THE TYPE '03-A AS A CLASS B AUDIO AMPLIFIER

the same regardless of the carrier power and the received audio signal will have approximately the same intensity for the low- or high-power station. For example, a 20-watt carrier modulated to 100 percent has 10 watts in its side bands. A 500-watt carrier with 10 watts of side-band power is modulated to 20 percent and the audio signal received is essentially the same as for the smaller station. The large carrier with low modulation also has the disadvantage in that the detector at the receiving station may overload and stray noises and heterodynes are much greater. Therefore, the most economical and desirable design of a 'phone transmitter is one in which the carrier can be modulated to 100 percent.

As indicated above, low modulator power can be used for the class B r.f. amplifier for complete modulation but the output tubes can only operate at one fourth of the class C r.f. amplifier rating.² It is also noted that the modulator power for plate modulation of a class C r.f. amplifier is quite high and if supplied by the usual method of constant current modulation several tubes as modulators would be necessary. For example, a 225-watt carrier would require about 400 watts input to the plates of the class C r.f. amplifier tubes. The modulator output power necessary for 100 percent modulation of the 400-watt r.f.

² Despite prevalent impressions to the contrary, the same restriction applies to so-called "grid" and "screen-grid" modulation schemes. The carrier power output for 100% modulation cannot be greater than one quarter the maximum power obtainable from the modulated stage, excitation, plate voltage and tube ratings considered.—Editor.

amplifier plate input is 200 watts of audio power. If 845's as class A amplifiers with 1000 volts on the plate were used to supply this audio power, a bank of about 10 modulator tubes would be necessary. A coupling transformer also would be required to load the tubes efficiently for optimum output and the modulator plate supply requirement would be approximately 800 ma.

CLASS "B" AUDIO AMPLIFIER MODULATION

The class C r.f. amplifier with plate modulation is most desirable from an economic standpoint but low-power modulation is used extensively because of the difficulty in supplying the modulator power to the class C system. Fortunately, the class B audio amplifier can be used to supply the modulator power for the class C system. In the above case, two Type '03-A tubes operating as a class B audio amplifier may be used to take the place of the ten 845 tubes.

The proper operation of the class B audio amplifier using '03-A tubes requires a special input and output transformer, negative grid bias to limit the plate current with no excitation to about 20 to 30 ma., and a plate supply with good regulation. The operation of the tubes as a class B audio amplifier may be explained by referring to Figs. 3 and 4. A Type '03-A tube was connected as shown in Fig. 3 to obtain experimental data for power output and plate loss calculations and to determine the load resistance for maximum output.

The upper curve in Fig. 3 was plotted from data obtained by varying the grid voltage, E_{g1} , and reading the corresponding plate current, I_p . The lower curve is the same as the upper curve except that it is reversed and shifted along the bias line until the curves coincide as nearly as possible to a line drawn through the straight portion of the upper curve. The bias at which the straight line crosses the zero plate current line is the proper bias to use for two tubes having the characteristic curve as shown. If the tubes are not similar or if the plate voltage is slightly different from the value used for these curves, the bias should be adjusted until the same plate current is obtained as indicated by the curves in Fig. 3. A bias adjustment for a plate current of 20 to 30 milliamperes is approximately correct.

The circuit for the amplifier shown in Fig. 4 is a typical push-pull circuit with special input transformer, T_1 and output transformer, T_2 . If the input voltage swings about the 30-volt line in Fig. 3 and the output transformer is such that the load resistance per tube is 1250 ohms, the plate current for the upper tube will increase as the grid voltage swings in a positive direction. The peak plate current is approximately 575 ma. The grid voltage swing on the other tube is in the negative direction so that the plate current is zero soon after the grid swing starts from the 30-volt bias line. As the grid swings from maxi-

num on the upper tube toward the starting point, the plate current drops until the 30-volt bias line is reached. This half-cycle swing permits the upper tube to supply the load with a half cycle of voltage. The next half cycle of voltage to the load is supplied by the tube represented by the lower curve. It will be noted that the plate current increases in the lower tube in the same manner as for the upper tube, but is reversed by the primary of the output transformer. This reversal of voltage to the load completes the voltage wave to the load with little distortion of the input signal.

The power output of the two tubes may be calculated from the curves in Fig. 3 by using the following formula:

$$\frac{I_p \text{ max}^2 R_p}{2} = \text{power in watts.}$$

in which, $I_p \text{ max}$ = peak plate current.

R_p = load resistance per tube.

The above formula is quite accurate for maximum conditions, but decreases in accuracy as the peak plate current approaches the no-signal value. The plate loss for the two tubes is the difference in plate power input and power output. A more complete discussion of the calculations of power output and plate loss may be found in the July, 1931, issue of the *Proceedings of the Institute of Radio Engineers*.³ The output power and plate loss for various peak grid swings are plotted in Fig. 5 for two values of load resistance. A peak

mately 150 watts and the peak grid swing is about 85 volts positive. The plate loss per tube for the

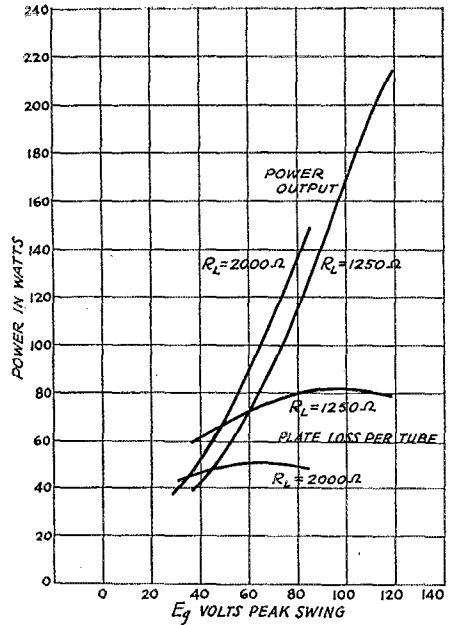


FIG. 5—POWER CHARACTERISTICS OF THE '03-A AS A CLASS B AUDIO AMPLIFIER

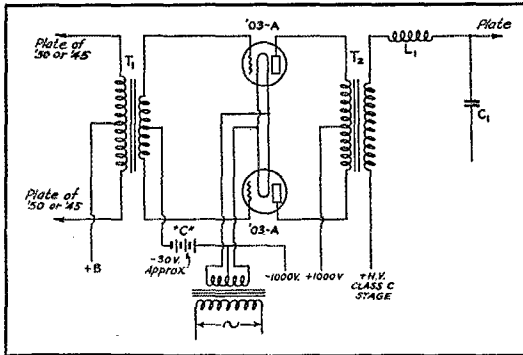


FIG. 4—CIRCUIT OF TYPE '03-A CLASS B PUSH-PULL AUDIO AMPLIFIER FOR MODULATION

T_1 and T_2 are special input and output transformers suited to the circuit conditions. The tubes are biased nearly to cut-off. This tube combination is capable of fully modulating a class C r.f. amplifier using two Type '03-A, '52 or '60 tubes with a plate input of 400 watts.

grid swing of 118 volts positive will give a maximum audio output of about 200 watts from two Type '03-A tubes when a 1250-ohm load is used. The plate loss per tube for this output is about 80 watts. If the load resistance is raised to 2000 ohms the maximum output is approxi-

higher resistance at maximum output is about 50 watts. The plate power input for the 1250-ohm load at maximum audio output of about 200 watts is about 360 watts while at about 80 watts output the plate power input is approximately 230 watts. The higher resistance load of 2000 ohms requires an input plate power of about 250 watts for 150 watts output and at about 60 watts output the input power is approximately 160 watts. Without signal the plate input power is about 40 to 70 watts regardless of the load resistance. The change in required plate input power for the various outputs indicates the variable load on the plate supply source. The variable plate input power requirements also means that only sufficient input is used to meet the signal conditions which results in very economical operation.

The high output as calculated above is very closely approximated in practice if the grids are properly excited and the plate supply has good regulation. It will be noted that the high positive swing of the grid causes more or less grid current to flow which must be supplied by the driver without distortion. The distortion can be kept within practical limits by using power tubes such as the 842 or '50 connected in push-pull through a special input

³ Barton, "High Audio Power from Relatively Small Tubes," *Proc. I. R. E.*, July, 1931.

transformer. The bias must be fixed and the source should have low resistance. The use of mercury hot cathode rectifiers together with a liberally designed plate power transformer and a special reactor will maintain a practically constant plate voltage supply.⁴

APPLICATION TO AMATEUR 'PHONE TRANSMITTERS

The method of calculating the audio power required for plate modulation of a class C r.f. power amplifier system has been given and also the

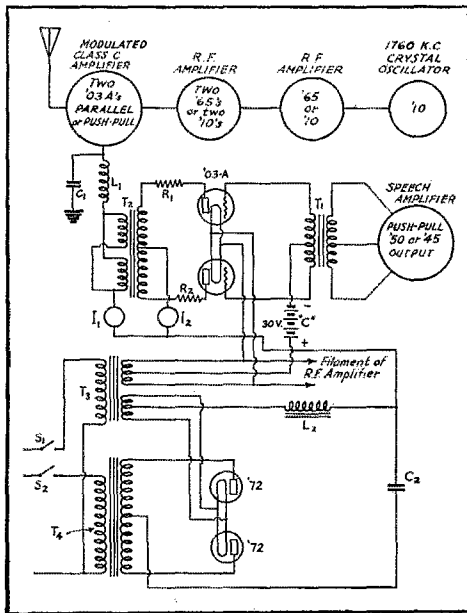


FIG. 6—SCHEMATIC ARRANGEMENT OF THE CLASS B AUDIO AMPLIFIER ADAPTED TO MODULATE A 200-WATT 'PHONE TRANSMITTER

- L_1 —Radio-frequency choke.
- L_2 —Low-resistance filter reactor.
- C_1 —Radio-frequency by-pass condenser, .001 μ fd. or so.
- C_2 —4- μ fd. filter condenser, 1500-volt.
- I_1 and I_2 —Plate current milliammeters.
- R_1 and R_2 —40-ohm surge-suppressor resistors.
- S_1 and S_2 —Filament- and plate-transformer primary switches.
- T_1 —Special input audio transformer.
- T_2 —Special modulator output transformer, double secondary.
- T_3 —Filament transformer for rectifier and transmitter tubes.
- T_4 —Plate supply transformer.

method of calculating the effective resistance into which the audio power is supplied. With this information and a method to determine the output power of the modulation system, a 'phone transmitter may be designed with the minimum cost of equipment for any particular power output.

A sample modulation system for a 200-watt

⁴The voltage-regulating methods described in October *QST* would be applicable. See Glaser, "Improving the Voltage Regulation of Rectifier-Filter Systems," *QST*, Oct., 1931.—Editor.

transmitter is given in Fig. 6. The radio frequency system consists of a 1760 kc. crystal oscillator, one r.f. amplifier stage and another r.f. amplifier to drive the class C output power amplifier. The plate current for the output r.f. amplifier indicated by the meter, I_1 , is supplied through the secondary of the special modulation transformer, T_2 . This transformer should be designed to couple the two '03-A tubes as class B audio amplifiers to the class C amplifier plates for a maximum current of about 400 ma. at 1000 volts. Such loading will permit approximately maximum output of the class B amplifier. Higher currents to the class C amplifier will result in an overload on the class B audio tubes. It should be remembered that during a peak modulation of 100 percent the input power to the plates of the class C tubes increases 50 percent so that the plate dissipation increases by the same percentage. However, the plate current to the class C tubes as indicated by the meter, I_1 , will remain steady so that care should be taken not to exceed the tube rating. Lower current to the r.f. amplifier results in a higher load resistance on the class B tubes and a correspondingly decreased plate dissipation.

If the maximum output is desired from the modulator, 842 or '50 tubes should be used in the output stage of the speech amplifier to excite the class B tubes through the special coupling transformer, T_1 . If the maximum modulator output needed is about 150 watts, 245 tubes may be used in the output stage of the speech amplifier. The resistors, R_1 and R_2 , are about 40 ohms each and help prevent any high voltages due to oscillations or to surges in the plate circuits of the class B tubes. The r.f. choke, L_1 , and condenser, C_1 , prevent r.f. from entering the transformer, T_2 . The C battery for the class B tubes should be such that each tube takes about 20 to 30 ma. plate current with no excitation and should be the medium or heavy duty type of B battery. A tapped C battery may be placed in either grid lead to equalize the plate current to the class B tubes. As indicated above, the maximum plate current to the class B audio modulator depends upon the power output so that the variation of the meter, I_2 , is a fair and simple indication of the percentage modulation.

The plate supply circuit is the usual type of full-wave rectifier except that L_2 is a special filter reactor designed to improve regulation. The filament transformer is separate from the plate transformer so that the hot-cathode mercury tubes can be heated before the plate supply switch is thrown. The filaments of all tubes may be left on during silent intervals, thereby requiring a minimum time to start.

The secondary of T_2 is arranged for either series connection of the two secondary windings or parallel connection as shown. The series connection permits the use of Type '52 or '60 tubes

in the class C r.f. amplifier with 2000 volts supplied to the plate through the transformer secondary. The current to these tubes should be limited to 200 ma. or 400 watts input to the class C amplifier. This is the same power permitted to the class C tubes operating at 1000 volts to the plate. The 2000-volt tubes require a plate supply separate or different from that shown in Fig. 6. If the 2000-volt supply is separate, the Type '72 rectifier tubes may be replaced with Type '66 tubes. The '66 tubes also may be used for the system as shown if the total output of the rectifier does not exceed about 400 ma. on peak signals.

The class B audio amplifier may be adapted to low-power transmitters for modulation by using 841 tubes. The output of two 841 tubes as class B amplifiers will supply enough power to completely modulate an input of about 40 watts to the class C output amplifier. The low power equipment also will require audio transformers especially designed for the power requirements.

Any change in plate voltage and current to the r.f. output tubes, or change in plate voltage on the class B tubes, from the values recommended should first be studied to make sure that the modulators and class C tubes will not be overloaded. Under normal operation, when transmitting speech, the modulator tubes will probably not show any color on the plates. If the transmitter is tested by whistling into the microphone to supply a continuous note, the modulator plates will become red if the full output is obtained.

The above system of modulation of a class C output amplifier is perhaps the cheapest and simplest transmitter to build for a given r.f. power output with 100 percent modulation. Another feature which should appeal to the amateur is that when he speaks into the microphone he can see things "happening"; that is, the modulator current jumps and if the antenna meter is not too sluggish it will also show signs of life. These variations of the meters assure the operator that he is modulating to a high percentage and that his signal range is the maximum for his particular power output.

Complete constructional details of a low-power 'phone transmitter using class B modulation will be presented in QST in a forthcoming issue. It won't be a flea-power transmitter, either. It will deliver a 40-watt carrier completely modulated even though it contains no tube larger than a Type '10. — Editor.

The Rocky Mountain Division Convention

THE sun was blazing forth in all its glory when the delegates to the Fifth Annual Rocky Mountain Division Convention assembled in Denver on August 21st and 22nd. Such splendid weather did its part to make the attendance the greatest ever. The convention officially opened with a word of welcome by E. C. Stockman,

W9ESA, SCM, Colorado. Following his remarks a visit to KOA enabled every one to see the latest in BC station design. Upon returning to the Hotel Argonaut, where all convention sessions were held, the gang convened for the Traffic Meeting. Talks were given by E. L. Battey, Asst. Communications Manager, A.R.R.L., SCM Stockman, and J. A. Slusser, W9BCW, who spoke on behalf of the U.S.N.R. The evening of the 21st was taken up by a technical meeting under the supervision of P. G. Veatch, W9CJJ-KFEL, "The Colorado 'Phone." Mr. G. W. Earnhart, U. S. Radio Inspector, covered the subject of "Frequency Measurement and Stability," and impressed the assembly with the importance of observing regulations relative to "staying within the amateur bands." Mr. V. J. Duke of KOA explained and demonstrated some of the uses of photo-electric cells. Veatch himself next took the floor and discussed modern receiver design. At the conclusion of his fine talk the meeting was opened to "round table" discussion and every one had an opportunity to tell about his problems and ask for aid. "Eddie" Heyer, W9GBQ, Colorado's Route Manager, interrupted the technical meeting long enough to put in a few words and tell the gang that "Colorado was going to do things this winter."

A trip to the new building of the Mountain States Telephone and Telegraph Company started the second day off right, and much was learned of what happens when we use the land 'phone. For those who had never before made the trip, an afternoon ride through Denver Mountain Parks was an exceptional "treat," and the ride down Lookout Mountain from "Buffalo Bill's" grave was a thriller. Refreshed by the afternoon outdoors, and with no small appetites, the gang met at the hotel at 6:30 for the banquet. "Eddie" Heyer did nobly as toastmaster and made the affair enjoyably informal. The long list of speakers included Fred Schirk, W9APR, for the Army-Amateur System; J. A. Slusser, U.S.N.R.- W9BCW, who wouldn't let the Army Mule get the better of the Navy Goat; Radio Inspector Earnhart; SCM Stockman; E. L. Battey, A.R.R.L.; W. D. Pyle, W9QZ; Dr. Van Slyke, W7HX; and many others.

Six delegates were present from Wyoming (W7HX, Mr. and Mrs. W7AAH, Mr. and Mrs. W7ALL, and W7NY), one from South Dakota (W9CJC), and one from Illinois (W9AWA). The youngest delegate (age 13) came from Greeley, Colo., and is known as the "Hamlet." Becker, W9BTO, was unanimously chosen as the "best liar." Following the awarding of prizes the convention was brought to a close. To the committee, composed of W9BQO, W9BTO and W9CJJ, we extend our heartiest congratulations and thanks for the excellent program afforded all who attended this, "the biggest and best Rocky Mountain Convention yet held."

— E. L. B.

Making the Power Transformer Do Double Duty

A Power Supply for the Oscillator-Amplifier Transmitter

By H. A. Wall, W9EIV*

OSCILLATOR-amplifier transmitters, both with self-controlled and crystal-controlled oscillators, are becoming more and more the thing in amateur radio, and the single-tube oscillator directly feeding the antenna system is and ought to be becoming an extinct species. However, some amateurs have tried m.o.p.a.'s with little better results than with self-

there is still the problem of having the same supply for both oscillator and amplifier unless a separate power supply is built up for the oscillator.

These were some of the problems faced at W9EIV a little while ago when the old t.p.t.g. was scrapped and the m.o.p.a. was started. And here is how the problems were solved.

Referring to Fig. 1, T_1 is a 75-watt transformer designed to furnish power to a '45 type amplifier tube. It will furnish power sufficient to operate the transmitter, and is rated at 325 volts each side of center tap, under load. T_2 is a step-down transformer with three 5-volt windings on the secondary. (In this case an old transformer was obtained from a junk shop, the secondary winding removed and the necessary windings put on.) Some transformers have filament windings in addition to the high voltage secondary and they can be used also. Let us look at the high voltage part of the supply first; that part to the right of T_1 in Fig. 1. It will be recognized as the usual bridge rectifier, the output voltage being approximately twice that which may be obtained by the usual full-wave arrangement using the center tap for the negative return. The resultant wave form is the same, since both arrangements are full-wave rectifiers.

In selecting the rectifier tubes, cost was the first consideration, so the Type '80 was decided

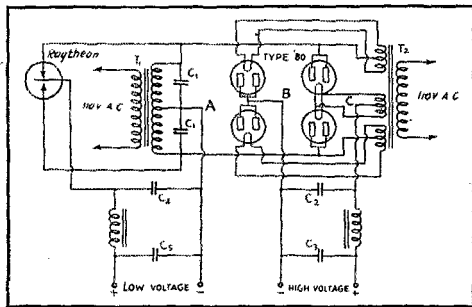


FIG. 1 -- BRIDGE AND CENTER-TAP RECTIFIERS ON ONE TRANSFORMER

This arrangement makes it possible to obtain both low and high voltages from the same transformer, using separate rectifier and filter systems. The two negatives must not be connected.

excited sets, and there are at present transmitters of the power amplifier type on the air just as terribly afflicted with "wobulation" as any TNT, Hartley or what have you. Nine times out of ten the trouble is traced to one thing — the same power supply for both oscillator and amplifier — with a voltage change of as much as a hundred to three hundred volts every time the amplifier is keyed — a corresponding drop across the oscillator, and the inevitable "tweet," "whoo-ee" to the note.

This has kept many fellows from attempting to use the m.o.p.a. Many times the amateur has only a transformer which will deliver 300 to 400 volts after rectification, and naturally feels that this is insufficient. Center-tapped transformers which will deliver a rectified voltage of 550 to 600 volts or more are expensive, and bridge type rectifiers which do not require the center tap have until recently been little known or used among amateurs except in chemical jar versions. Even if the higher voltage transformer is available,

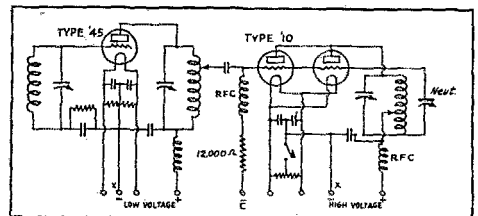


FIG. 2 — TYPICAL OSCILLATOR-AMPLIFIER CIRCUIT FOR USE WITH DOUBLE RECTIFIER

The constants are the same as those in circuits published many times in QST. There must be no d.c. connection between the two points marked with an X, and separate filament transformers must be used for the oscillator and amplifier.

upon. Four of these are used, and the plates of each tube are hooked together making a half-wave rectifier out of each tube. This also decreases the rectifier resistance by half with

(Continued on page 84)

*3811 Seventh Avenue, Sioux City, Iowa.

Passing the Government Examinations for Amateur Operator's License

In Two Parts—Part II

THE last issue of *QST* contained a list of questions and answers concerning the rules and regulations, governing radio communication, which should be useful to prospective amateurs. The second part of this article deals with questions and answers concerning the operation and construction of the amateur station. Although the list of questions given here includes practically all of those asked on the amateur examination, the reader may desire to study the subject more fully. The *Radio Amateur's Handbook* or any other good text will be an invaluable aid in preparation for the examination for amateur operator's license.

Q. Draw a neat wiring diagram of the transmitter and receiver you intend to operate, using standard schematic symbols to represent the various parts. The diagram should show the source of power, antenna and ground, and the name or purpose of each part should be indicated.

A. The applicant for an operator's license is expected to draw diagrams of the apparatus he intends to operate. Any diagrams that *QST* presents can only be considered as examples of what is required. Figs. 1 and 2 are diagrams of simple amateur receivers, while Figs. 3 and 4 are transmitter diagrams. Explanatory legends are given in the cut labels of these figures.

The applicant should prepare and thoroughly understand similar drawings of his own equipment. Diagrams such as are given in Figs. 1, 2, 3 and 4, *should not be memorized*. The purpose of the examination is to test the applicant's knowledge of the circuit arrangement and the function of the parts. Therefore it is essential that diagrams prepared for the examination be thoroughly understood, not merely memorized.

Q. Draw a diagram of a simple filter system suitable for use on the plate supply system of a vacuum-tube transmitter.

A. A "brute force" filter, consisting of a 2- μ f. condenser, a 30-henry choke coil, and another 2- μ f. condenser, is shown in Figs. 3 and 4. The *rated working voltage* of the condensers should be at least equal to the *peak voltage* of the power supply. (The peak voltage is approximately 1.4 times the rated voltage of the power transformer.)

Q. Explain the operation of a vacuum-tube oscillator.

A. Suppose we have a regenerative circuit as shown in Fig. 5 tuned by the coil L_1 and the condenser C_1 in the grid circuit.

The battery A heats the filament of the tube, causing it to emit electrons. The battery B is arranged to put the plate of the tube at a positive potential with respect to the filament. Regeneration or feed-back is provided by the coil L_2 . Because of the amplifying properties of three-element vacuum tubes, the power in the plate or

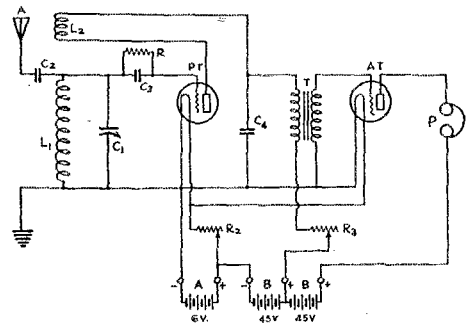


FIG. 1. — A SIMPLE RECEIVER WITH RESISTANCE CONTROL OF REGENERATION

- A — Antenna.
- DT — Detector tube.
- AT — Amplifier tube.
- T — Audio frequency amplifying transformer.
- P — Phones.
- L_1 — Grid or tuning coil.
- L_2 — Regeneration coil or tickler.
- C_1 — Grid tuning condenser.
- C_2 — Antenna coupling condenser.
- C_3 — Grid condenser.
- C_4 — Radio frequency by-pass condenser.
- R — Grid leak.
- R_2 — Filament rheostat.
- R_3 — Regeneration control resistor.

output circuit is greater than that in its input or grid circuit, the additional power being obtained from the B battery. Some of the power in the output circuit will be fed back into the grid circuit. If any disturbance now occurs in the grid circuit L_1C_1 and changes the potential of the grid, this effect will be amplified and will be observed as a considerable change in the plate current of the tube. Since the plate current flows through the coil L_2 , this change in plate current will induce further changes in the grid voltage of the tube. If this induced voltage is in the same direction as the initial disturbance (i.e., if L_2 is correctly poled with respect to L_1) the same effect is repeated in greater amplitude. If the power fed back from the plate circuit to the grid circuit is sufficient to overcome the losses in the grid circuit, the process builds up to one of continuous oscillation, the amplitude of oscillation being

limited only by the tube characteristics. The frequency of the generated oscillations is, to a very close approximation, determined entirely by L_1C_1 .

Q. Name some conditions which might prevent a vacuum tube from oscillating.

A. There are several reasons why a vacuum tube may not oscillate. The most common ones are listed below:

- (1) Insufficient grid excitation or feed-back.
- (2) Insufficient precautions to keep the radio frequency and direct current in their proper circuits.
- (3) Incorrect or insufficient filament, grid or plate voltage.
- (4) Reversed plate-battery polarity.
- (5) Defective vacuum tube.
- (6) Unusually high losses in the oscillating circuit.

Q. What is a spark transmitter?

A. A spark transmitter is one which utilizes the oscillatory discharge of a condenser through

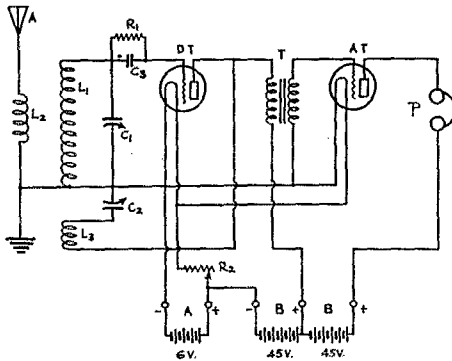


FIG. 2.— ANOTHER TWO-TUBE AMATEUR RECEIVER

- A — Antenna.
- DT — Detector tube.
- AT — Amplifier tube.
- T — Audio frequency amplifying transformer.
- P — Phones.
- L_1 — Grid tuning coil.
- L_2 — Antenna coupling coil.
- L_3 — Tickler or regeneration coil.
- C_1 — Grid tuning condenser.
- C_2 — Regeneration or throttle condenser.
- C_3 — Grid condenser.
- R_1 — Grid leak.
- R_2 — Filament rheostat.

an inductance and a spark gap as a source of its radio-frequency power.

Q. Why are not amateurs permitted to use spark transmitters?

A. Amateurs are refused permission to use spark transmitters because such transmitters, emitting damped waves, generate an unnecessarily broad and interfering signal.

Q. Explain fully the operation of the transmitter you intend to use.

A. Here again it should be remembered that the equipment used by the applicant should be

described in detail. The following examples are given to indicate what the answers may be like.

In the transmitting circuit of Fig. 3, the secondary winding, S_1 , of the power transformer T supplies current to heat the filament of the oscillator tube, OT . Secondary S_2 similarly supplies filament power for the rectifier tube filaments, and S_3 supplies the plate voltage. The rectifier tubes connected to the outside terminals of S_2 can pass current in only one direction, from plate to filament. Therefore as the alternating voltage in the secondary reverses, first one tube passes current and then the other, producing a rectified current, or one which flows only in one direction. This current is continually varying in amplitude, however, and to produce a true continuous current an electric filter is used to smooth out the pulsations. The filter consists of the condensers C_6 , usually of $2\mu\text{fd.}$ or more capacity each, and the choke coil L_4 , which ordinarily has an inductance of about 30 henrys.

In the tuned-plate tuned-grid circuit of Fig. 3 the two tuned circuits formed by L_1C_1 and L_2C_2 are adjusted to approximately the same frequency, and under these conditions sufficient energy will be fed back from the plate circuit to the grid circuit through the grid-plate capacity of the tube to maintain continuous oscillations. The frequency of oscillation is determined principally by the constants of L_2C_2 and L_3C_3 . The plate blocking condenser, C_5 , and filament by-pass condensers, C , serve to confine the radio-frequency currents to the proper paths. Grid condenser C_4 and grid leak R_1 provide the proper grid bias when the tube is oscillating. The filament center-tap resistors, R_2 , provide a direct-current return to the filament for the plate and grid circuits, the center-tap being used instead of a simple connection to one side of the filament so that hum from the alternating-current filament supply will be balanced out. The key K is used to make and break the circuit to form the characters of the International Code for signalling purposes.

The oscillations are transferred to the antenna coupling coil, L_1 , from the plate tank coil, L_2 , by means of inductive coupling. The condensers C_1 are used to tune the feeders, F , to the frequency of oscillation, and also to obtain proper current distribution in the feeders as indicated by the ammeters, A . Both ammeters will indicate the same amount of current when the feeders are properly tuned. The feeders do not radiate energy, but serve simply to transfer it from the transmitter to the antenna Z , which does the actual radiating.

A somewhat different arrangement is illustrated in the Hartley circuit of Fig. 4. Most of the parts have the same functions as in Fig. 3, however. In this case a chemical rectifier is used instead of tubes. These jars usually contain lead and aluminum electrodes in a solution of borax or ammonium phosphate, and possess the property

of passing current in only one direction much the same as vacuum tube rectifiers. This diagram also shows the use of a center-tap on the filament-heating winding of the transformer instead of the resistors in Fig. 3. Since the circuit is shunt-fed a radio-frequency choke, L_3 , must be connected between the plate of the tube and the power supply to prevent radio-frequency current from leaking off through the filter system, because such leakage might prevent the tube from oscillating. The blocking condenser, C_5 , passes the radio frequency but prevents short-circuiting the high voltage through the tank inductance, L_2 . The frequency of oscillation is determined by L_2 and C_2 , and the feed-back or excitation is adjusted by means of the tap on the coil. Radio-frequency energy is transferred to the antenna coupling coil, L_1 , in the same way as in Fig. 3, but in this case the coupling coil is placed directly in the radiating system (antenna and ground or antenna and counterpoise), which is tuned to same frequency as that of the oscillator by the antenna condenser, C_1 .

Q. What is the principal advantage of a direct-current plate supply over a plate supply of alternating current?

A. When direct current is supplied to the plate of an oscillator tube, the tube oscillates continuously and steadily at one frequency. The signal from such an oscillator is musical, when an autodyne receiver is used and tuned to within a few hundred cycles of the frequency of the transmitter. When the plate supply is alternating current, the tube oscillates intermittently and only when the plate is at a positive potential with respect to the filament. The frequency of oscillation depends to some extent upon the plate voltage, with the result that the circuit does not oscillate at a single frequency, but oscillates over a band of frequencies as the alternating plate voltage varies from zero to its peak positive value. The result is a "broader" and more interfering signal.

Q. What are the requirements with respect to plate supplies for amateur transmitters as set forth by the Federal Radio Commission?

A. Amateur stations are required to use adequately filtered plate supplies or arrangements which produce equivalent effects to minimize frequency modulation and prevent emission of broad signals caused as explained in the preceding paragraph.

Q. What are the restrictions upon methods of antenna coupling?

A. Amateur transmitters must be loosely coupled to the antenna. (Figs. 3 and 4 show loose coupling.) Direct or conductive coupling, in which the antenna system is physically connected to the tank circuit of the oscillator, is not permitted. It is permissible, however, to couple a non-radiating feeder to the oscillator conductively.

Q. Explain how you would tune a regenerative receiver to a weak continuous-wave signal.

A. The tuning circuit of the receiver should be adjusted as closely to the desired frequency as can be judged from previous experience with

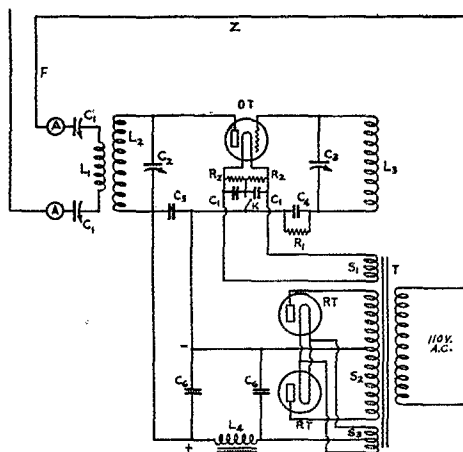


FIG. 3. — AN AMATEUR TUNED-GRID TUNED-PLATE TRANSMITTER

- F — Feeders for Zeppelin antenna.
- Z — Zeppelin antenna.
- A — Antenna ammeters.
- OT — Oscillator tube.
- RT — Rectifier tubes.
- T — Power supply transformer.
- L₁ — Antenna coupling coil.
- L₂ — Plate coil.
- L₃ — Grid coil.
- L₄ — Filter choke coil.
- C — Filament by-pass condensers.
- C₁ — Feeder tuning condensers.
- C₂ — Plate circuit tuning condenser.
- C₃ — Grid circuit tuning condenser.
- C₄ — Grid condenser.
- C₅ — Plate blocking condenser.
- C₆ — Filter condensers.
- T — Power supply transformer.
- S₁ — Oscillator filament heating secondary of T.
- S₂ — Plate supply secondary of T.
- S₃ — Rectifier filament heating secondary of T.
- R₁ — Grid leak.
- R₂ — Filament center tap resistors.
- K — Key.

the receiver. The tickler or regeneration control should be advanced until a click or thud is heard, which indicates that the detector circuit is oscillating. With the tube oscillating, tuning of the grid or input circuit is varied until the desired signal is heard. The circuit should then be retuned slightly to produce a beat note of pleasing pitch, after which the regeneration control should be retarded until the tube is just oscillating, at which time it is in its most sensitive condition for the reception on weak continuous-wave signals.

Q. Explain in detail the operation of the receiving equipment you intend to use.

A. In Figs. 1 and 2, signals are intercepted by the antenna-ground system and are transferred to the grid circuit. In the case of Fig. 1 coupling is through a small coupling condenser C_2 , whereas in the case of Fig. 2, inductive coupling between

L_1 and L_2 is used to transfer the voltage from the antenna circuit to the grid circuit. In both circuits the condenser C_3 and leak R_1 determine the normal grid bias of the detector tube, DT. The filament temperature is adjusted by the rheostat

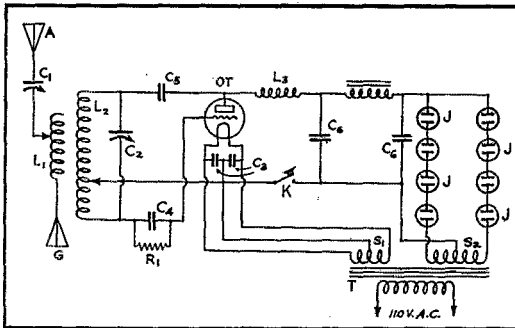


FIG. 4.—SIMPLE HARTLEY TRANSMITTER

- A' — Antenna.
- G — Ground (or counterpoise if one is used).
- OT — Oscillator tube.
- K — Key.
- L₁ — Antenna coupling coil.
- L₂ — Tank circuit inductance.
- L₃ — Radio frequency choke coil.
- L₄ — Filter choke coil.
- C₁ — Antenna tuning condenser.
- C₂ — Tank circuit tuning condenser.
- C₃ — Filament by-pass condensers.
- C₄ — Grid condenser.
- C₅ — Plate circuit blocking condenser.
- C₆ — Filter condensers.
- R₁ — Grid leak.
- J — Jars for chemical rectifier.
- T — Power supply transformer.
- S₁ — Filament heating secondary of T.
- S₂ — Plate supply secondary of T.

R_2 . The output of the detector tube is coupled to the audio frequency amplifier through the audio transformer T , while the 'phones are used to make plate current variations of the audio amplifier audible.

In Fig. 1 regeneration is controlled by varying the plate voltage of the detector tube through the series resistance R_2 . A condenser C_4 is used as a by-pass to provide a low impedance circuit back to the filament for the radio frequency component of the rectified signal.

In Fig. 2 the detector plate voltage is kept constant. Coupling between L_1 and L_3 is fixed, and regeneration is controlled by varying the capacitance of the "throttle" condenser C_2 .

Q. What should you do on hearing a ship making a distress signal?

A. All transmission capable of interfering with the signals of the distressed ship, or of stations communicating with it must be stopped immediately. The operator should continue to listen until it is apparent that the ship is receiving assistance. If no one seems to answer the ship, full particulars should immediately be transmitted by land line to the nearest commercial or government station. Everything possible should be done to bring assistance to the distressed ship

without risking radio interference to those in a position to aid.

Q. What is regeneration?

A. Regeneration is the process by which a part of the output power of a vacuum tube reacts upon its input circuit in such a manner as to reinforce the initial power or input signal and thereby increase amplification.

Q. What effects would result if the polarity of the A battery were reversed in a receiver?

A. Although the signals might be weaker, it is quite possible that the effects of a reversed A battery would not be noticed.

Q. What would happen if the B battery connections were reversed?

A. If the B battery polarity was reversed the receiver would become "dead" and be totally inoperative.

Q. Draw a diagram of a frequency-meter using a thermo-galvanometer.

A. Diagram of an absorption type frequency meter using a galvanometer as a resonance indicator is given in Fig. 6.

Q. Explain briefly vacuum-tube detector action.

A. In a detector circuit using a grid leak and condenser, the grid condenser is connected between the grid of the tube and the tuning circuit. The side of the condenser connected to the tuning circuit becomes alternately positive and negative as the signal is received. At a given instant, let us say that this plate of the grid condenser is positive.

The other side of the condenser will take on a negative charge of equal amount by robbing the grid of some of its electrons. This leaves the grid itself relatively positive with respect to the filament, permitting a momentary increase in plate current. During this instant the positive grid attracts more electrons from the filament. As soon as the negative half of the cycle occurs, the plate of the grid condenser which was negative before, now becomes positive, repelling its electrons and forcing them on to the grid so that it becomes negative. The negative grid repels additional electrons but holds all that it has received. It continues to gain electrons during each positive half of the radio-frequency cycle. The result of a continued damped or modulated group of oscillations is to make the grid more negative. This causes audio frequency dips in the plate current in accordance with the modulation of the incoming signal. Between every group of oscillations the negative charge has time to leak off through the grid leak, allowing the plate current to return to normal.

Q. Explain how you would determine if the frequency of your transmitter was within the legal requirements.

A. This is a very important question, the answer to which depends upon the measuring

equipment available. One desirable method of measurement is explained briefly:

An oscillating vacuum-tube circuit which is mechanically rugged may be used as a heterodyne frequency-meter provided it has been calibrated against some standard and is frequently checked to insure retention of accuracy. To use it, the phones are connected in the plate circuit of the oscillator and the tube circuit tuned to zero-beat with the transmitter. Reference to the calibration curve will indicate the frequency of the transmitting station.

Q. How would you determine whether or not your transmitter causes interference to other services?

A. Interference to other radio services may be caused in two ways: by operation outside the frequency bands assigned to amateurs, thus occupying a frequency upon which government, commercial or other stations are working and causing direct interference, or by indirect interference with nearby receiving apparatus resulting from the close proximity of transmitter and receiver, but not a result of off-frequency operation. The latter case is nearly always evidenced by key thumps or other forms of interference with broadcast receivers.

The first type of interference is inexcusable, and can be cured only by operating within the amateur frequency assignments, using measuring methods such as are described in the *Handbook*. If the transmitter frequency is well inside the amateur bands such interference will not result. To determine whether or not interference is caused by neighboring broadcast receivers it is necessary to carry out tests during which the transmitter is placed in operation and another person

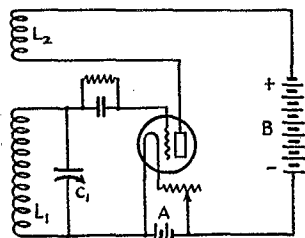


FIG. 5.—SIMPLE OSCILLATOR CIRCUIT

listens on such receivers for evidence of interference.

Q. What would be the effect of applying excess voltage to the filaments of vacuum tubes?

A. The useful life of the tube would be greatly decreased.

Q. What would be the effect if the filaments were operated below their normal voltage?

A. If the voltage applied to the filament is too low, there will be insufficient electron emission. In a receiver this would result in weakened

signals. In a transmitter whose tubes are operated at normal plate voltage, low filament voltage would result in decreased output and shortened tube life.

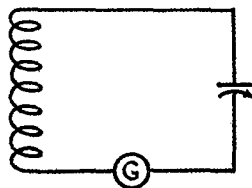


FIG. 6.—FREQUENCY METER WITH GALVANOMETER INDICATOR

Q. Why is it necessary to have all connections in good condition?

A. All connections should be made well to prevent high resistance contacts, and to prevent noise in receivers.

Q. Of what use is the plate milliammeter in a vacuum-tube transmitter?

A. The plate circuit milliammeter shows the amount of plate current taken by the tube. Thus it indicates whether or not the vacuum tube is drawing normal plate current as recommended by the manufacturer. It also may be used to indicate whether the circuit is oscillating or not, and whether or not the tube is overloaded.

Q. What effect does a swinging antenna have on emitted signals?

A. With a self-excited transmitter, a swinging antenna will change the frequency and strength of the emitted signals. In oscillator-amplifier transmitters or in crystal controlled transmitters the only effect will be to change the strength of the signals, not the frequency.

Q. Can a modulated wave be received on a receiver employing a crystal detector?

A. Yes.

Q. State what you would do if the detector tube oscillated too freely.

A. The tickler or regeneration control should be retarded if the receiver oscillates too freely. If a throttle condenser is used, its capacitance should be reduced; if resistance control of regeneration is used, increasing the resistance will in most cases reduce regeneration; if a movable tickler coil is used, the coupling between the grid and plate coils should be loosened.

Q. Explain why an antenna should be rigidly constructed.

A. The antenna should be constructed in a strong and rigid manner primarily for safety reasons. The antenna should be kept clear of trees, buildings, or structures, if possible, and should not be constructed so that any portion of it can at any time come in contact with electric wires or transmission lines. The antenna which is rigidly constructed will also help to radiate better

(Continued on page 68)

Television—What About It?

By Ross A. Hull, Associate Editor

WHYY, we wonder, must so many people say so often that television is just around the corner? It may be, for all we know, but the statement annoys us. Corners in any field of scientific development are so rare anyway. And when we do find them they are always blunt corners with a bold wide sweep, and a stiff head wind on the far side. Unhappily, many television interests have endeavored to avoid the corner altogether. But in crossing the vacant lot they have found themselves tangled in the heavy underbrush of unsound principles and faulty methods. If we must talk corners when we talk of television let us chant in unison with the rest of them, "Television, nebulous objective of mighty minds, is indeed around the corner." But let us continue, double fortissimo, "But, boy, oh boy, what a corner it be!"

QST in all the years has had very little to say about television. That art has been and still is well removed from amateur radio as we know it. As a field for contributory experiment it has had an appeal to some amateurs (particularly those well equipped financially) but as something to play with for the fun of playing it has hardly been capable of a return commensurate with the outlay for equipment. The very fundamentals of the old methods prevented it.

In recent months, however, there has been much smoke around the television camps. So much, indeed, that it was easy to visualize a fine big stew on the fire. Our curiosity and our appetite were stimulated. We just had to go and see what it was all about. We did.

The present television interests, it now seems, are divided into two camps: those anxious to talk and those anxious to avoid talking. For this reason it is not really possible to gain an accurate idea of the status of the art. The most voluble, unfortunately, have the least information to impart. Read a prospectus of almost any one of the television companies engaged in stock promotion and you will know what we mean. With rabid dogmatism on the one hand and profound secrecy on the other, the formation of a few opinions is extremely difficult. The disclosing of facts is impossible. Nevertheless, it is permissible to set down some observations of television as at present available to "lookers-in" for the possible benefit of those habitually inquisitive amateurs whose interest extends beyond the limits of telegraphic or telephonic communication.

To such amateurs it is unnecessary to explain the fundamentals of the television systems in present operation. It might be well, though, to mention that, as far as we have been able to

determine, all existing television "services" employ for both transmission and reception some form of the scanning disk invented in 1884 by Nipkow. This disk, so important a feature of all television equipment of the past, is retained chiefly because its advantages and weaknesses are so closely interlocked. It is much less expensive than any equipment yet produced to displace it; but it is, in essence, a mechanical expedient—a crudity. It is simple in operation but it is limited in performance. It still probably provides the most accessible road to television, but it is a rutted detour strewn with many progress-limiting boulders. For the amateur experimenter the scanning disk unlocks all the fun it ever did. But to the engineer intent on developing commercial television the disk is widely considered to have most of its future behind it. Time alone will tell.

Because of the ever-present limitation of available channels on the frequency bands now exploited by these same "services," and because the width of the transmitted frequency band so definitely limits the picture detail, commercial television images are still almost as unsatisfactory as they were in the first public demonstrations of 1927. Sixty-line pictures continue to provide a momentary thrill for the uninitiated, they still reward the amateur experimenter for his efforts, they still point a finger at real television around the corner; but, as at first, they still fail to keep the family at home engrossed in a television program.

This does not mean, however, that progress has not been made in the instances just mentioned. Many creditable contributions have served to improve the effectiveness of transmitter pick-up devices; to enlarge images at the receiving end; to increase their brilliancy. Then, minor improvements in the mechanical and electrical apparatus have simplified the problems of synchronizing and "framing," improved the operation of receiving amplifiers, and increased the reliability of the apparatus in general. It is just a pity that all these developments have been so restricted in their usefulness by the fundamental limitations imposed on any image transmitted electrically with a strictly limited band of frequencies.

Long before television had started out on its premature and eventful jaunt from the laboratory it had been realized in some technical circles that any conceivable improvements and refinements in the then known systems could not possibly lead the way to truly successful television until two fundamental problems had been solved.

It was seen at once that, barring miracles, the detail available in a television image must have a very close relationship to the band of frequencies occupied in its transmission. Since even three or four ten-kilocycle channels (let alone one) proved insufficient for the transmission of well-detailed pictures, it became evident that successful television called either for the opening of some territory where many stations could all have a big slice of frequencies for their own, or for the curtain to be rung up on a scientific near-miracle. Behind all that is Problem I — not insolvable but not solved.

Problem II is concerned with scanning — the process of resolving images into thousands of units and their reassembly at the receiving end in the right sequence and original light values. It is concerned particularly with the displacement of mechanical methods by another more suited to the work.

At least some of the concerns now attempting to commercialize television appear to believe that the public, so long dieted on plain broadcasting, will eagerly swallow present-day television as a new and absorbing entertainment. Quite possibly they are right. There are other interests, however, desperately eager to delay the arrival announcement of the new entertainment — determined at least to glimpse a solution of these basic problems beforehand. Those concerns are the non-talkers. Anxious to prevent a continuance of the premature and pitifully misleading publicity which has so characterized television development, they have crawled into their shells. They have work to do. They have inventions to protect. They have nothing to say.

It is no secret that vigorous laboratory work has resulted in what are probable solutions to both basic problems. The cathode-ray tube has been shown to promise an effective means for scanning. It has every indication of being one logical successor to the scanning disk, free from the inaccuracies, the inconvenience and the speed limitations of any mechanical device. Then, as a way out of the frequency-band limitation problem, it is proposed to operate in the relatively extensive and almost unoccupied territory above about 40,000 kc., near the 5-meter region. Several powerful transmitters already have been built for the express purpose of transmitting television images in this portion of the frequency spectrum and there seems to be no

particular reason why they should not be successful.

But even with these developments it is obvious that television — the entertainment — is not yet here. The cathode-ray tube has been put to work with striking success. It is, though, quite expensive; it is relatively untamed; it has yet to emerge from the tube production plant with a clean card of conduct. From the transmitting angle, it is not certain that the ultra-high frequencies are capable of good service. We know that they afford some elbow room; that they will allow simultaneous operation of transmitters in different cities on the same channels; that they will be free from most of the troubles of selective fading and atmospheric. It is far from certain, however, that even powerful transmitters will provide good signals throughout a city such as New York; that automobile ignition racket will not play havoc with much reception; that the effects of elevator motors and steel-frame buildings will not ruin the rest.

In two or three months it is probable that important conclusions will be reached concerning these particular problems. At that time it should be much less difficult to make a prediction of television's future. Should everything go smoothly it seems likely that within two years many cities will have their ultra-high frequency television transmitters raining programs from high and centrally located buildings. Spectators able to afford the receiving equipment and willing to give their full attention to a small green and black image will be able to follow programs originating in studios attached to the transmitting stations. Wire linkage of many stations throughout the country (even the transmission of events outside the station) probably will still be impractical because of the limitations of wire lines in carrying high frequency currents. Images, however, will be beautifully detailed. With perhaps 240 lines to the picture there will be little danger of mistaking the soprano for her poodle. Of course, something may come along to upset all this. Television may be quite thoroughly commercialized in twelve months and it may be nothing like the thing we have visualized. Our guess is only based on a glance into the stew-pot. Though there was a big fire in the stove the cooks were still without a recipe book.

To get back to earth we might

(Continued on page 31)



More About Economical Crystal Control

Efficient Frequency Doubling—Clearing Up Neutralization—Isolating Sources of Trouble

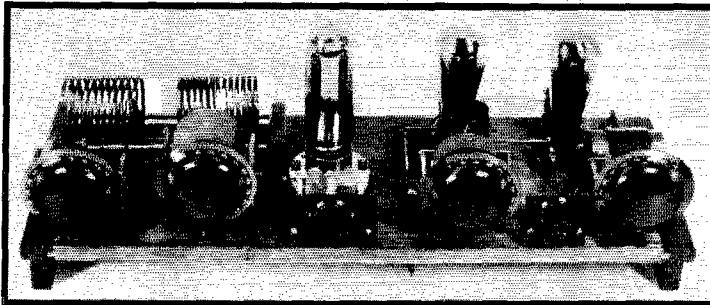
By George Grammer, Assistant Technical Editor

IT IS noteworthy that each year finds an increasing number of crystal-controlled transmitters on the air, indicating a growing appreciation on the part of amateurs of the advantages of high-quality signals. A striking feature of this trend is that every crystal-controlled signal, and particularly those in the higher frequency bands such as 14 mc., represents an appreciable investment of both time and money in equipment which in the final analysis contributes nothing to the transmitter but frequency stability, since in itself the addition of crystal control to a transmitter adds nothing to the power output obtainable. In spite of the higher cost, more and more amateurs are changing over to crystal control because it helps so much to make the kind of signal most of us consider ideal. It's something like the comparison between the fiver and the three-thousand-dollar car — it costs

diagram. The problem is naturally colored by individual considerations such, for instance, as the kind and amount of equipment already in the possession of the prospective builder. It is, therefore, difficult to set up any rules to cover all situations, except possibly to say that in general it is a good idea to use the smallest number of stages compatible with the output required, and to give serious consideration to the question of power supply in relation to the tube line-up. Each stage justifiably omitted means the elimination of about ten chances for trouble — usually there are about that many elements in each stage that can blow out or otherwise cause difficulties — and the power supply equipment often is the major item of expense in a transmitter.

LAYING OUT THE SET

We doubt that there is any one question in the



THREE TUBES FOR THREE-BAND CRYSTAL CONTROL

A front view of the breadboard transmitter. The crystal oscillator is at the right, followed by the Type '10 buffer-doubler and the '03-A output tube. The variable condensers, going from right to left, are the oscillator tank condenser, buffer neutralizing condenser, buffer tank condenser, '03-A neutralizing condenser, '03-A tank condenser, and antenna tuning condenser. The two neutralizing condensers are mounted on small bakelite panels to insulate them from the baseboard. The '03-A tank condenser is mounted on a strip of bakelite for insulation purposes, since both ends are at high r.f. potential. The longer leads in the transmitter are one-eighth inch copper tubing, used for the sake of rigidity, while the short leads are ordinary bus wire. The coils rest on glass rods.

a lot more to own and run the latter, but it's worth it if one can afford it.

It seems to us that for every desired power output there should be some one layout which will be the most economical solution of the problem of getting that output. Not that there is some infallible formula in which one can substitute the power desired for x and by multiplying twice and dividing once obtain a complete circuit

design of amateur oscillator-amplifier transmitters upon which more divergence of opinion exists than that of excitation. In looking over tube line-ups used by amateurs everywhere one finds all kinds of schemes to excite the same type of tube in the final stage. It may be said safely that one cannot err on the side of too much excitation, although when the number of amplifier stages becomes numerous there is every chance of complicating things to such an extent that the problematically greater output may be offset by operating difficulties.

Fundamentally, much depends upon the crystal itself and the voltage at which the oscillator is operated. We must, therefore, base such conclusions as we may reach upon the assumption that a reasonably active crystal, such as those commonly available at ordinary prices to-day, is to be used and that the plate voltage will be of the order of 250. Many crystals will stand much more voltage than this and the design of the set may

be changed accordingly, but 250 volts probably represents general amateur practice.

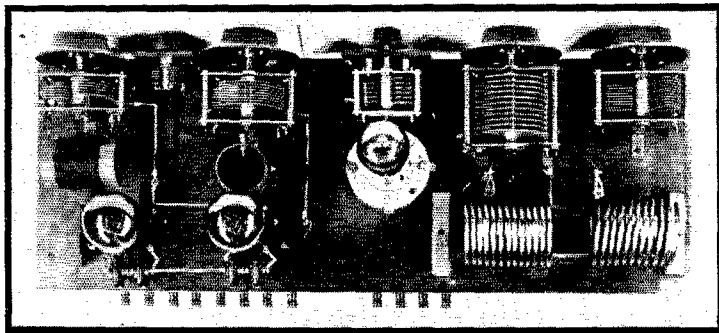
With this order of voltage the input to a Type '10 or '45 oscillator will be between 8 and 10 watts when the oscillator is loaded, and experience has shown that the output will be ample for exciting a following Type '10 amplifier on the same frequency. With good efficiency the input to the amplifier will run between 30 and 50 watts. The output of the second tube can in turn be used to excite one or even two tubes of the 75-watt variety such as the '03-A or '52 for c.w. work. We say c.w. because it is doubtful whether a single Type '10 tube would excite adequately a pair of '52's at normal plate voltage as modulated class C amplifiers in a 'phone set. But for c.w. the particular classification into which the amplifier falls is of little moment, except that we want reasonably high efficiency. The simplest plan is to give the amplifier all the excitation available and make the other adjustments to obtain maximum output. Getting down to the economics of the thing, it may be cheaper in the long run to tolerate some deficiency in excitation and thus sacrifice some efficiency for the sake of eliminating a stage of amplification, and run the plate input somewhat above normal to get as much output as possible. The frequency stability should not be affected by this practice, and since the amplifier is being keyed there is no harm done to the tube, the average power dissipated on the plate being much less than it would be if the tube ran continuously as in a 'phone set.

If one wants more power than one or two 75-watt tubes will give, a different method of attack may be necessary. For instance, we know that a single Type '10 amplifier tube will successfully excite a pair of '52's; we have used just that combination on 14 mc. and could put 400 watts on the plates without making them show more than a faint pink blush. On the lower frequencies the input will run as high as 500 watts and some times more with apparently the same plate dissipation. Even if the efficiency is as low as 50% a quite respectable output is represented. On this basis it does not seem that much would be gained by adding a Type '04-A to such a transmitter. On the other hand, a Type '10 does not seem big enough to excite a 250-watt tube properly. The rated output power of a tube is not

always a good indication of the amount of excitation it requires for full output. Such things as the input capacity, dielectric losses, tendency of the tube toward parasitic oscillations, as well as the more commonly considered characteristics as shown by the curves all have their influence upon the driving power required. It is unfortunate that the '04-A is perhaps one of the hardest tubes to excite properly, especially at high frequencies. If the '04-A is to be used a good combination would be a Type '10 crystal oscillator, a 75-watt intermediate amplifier, and then the '04-A. There would be little point in using the extra '10 stage.

Another point is involved here. If a Type '10 amplifier following a crystal oscillator will give a maximum output of say 20 watts with 500 volts on its plate, it does not follow that a bigger tube with higher plate voltage will not give more than 20 watts. It will, almost invariably. If an '03-A at 1000 volts is substituted for the '10 the output is likely to jump to 50 watts or more. The efficiency of the amplifier may drop off somewhat, but usually the output will be near the rated output of the tube. We repeat again, however, that it may not work for 'phone.

So far we have been talking principally about "straight" amplifier combinations, limited to operating on the crystal frequency. Most of us, however, are interested in working more than one



A REAR VIEW OF THE TRANSMITTER

The mounting of some of the parts is shown more clearly in this photograph than in the other. The filament by-pass condensers for the oscillator and buffer-doubler stages are mounted on short vertical pieces of copper tubing to provide direct connections to the filament terminals on the tube sockets. The plate blocking condensers for these two stages are also mounted close to the sockets. The tank coils for the three stages have been so mounted that the interlocking between their fields is minimized. All power connections are made to the terminal strips mounted underneath the baseboard.

band and, excluding the possibility of using 7- and 14-mc. crystals, a consideration of doublers becomes necessary.

DOUBLING

Although frequency-doubling amplifiers are extremely common in present-day transmitters, there is a surprising dearth of really informative literature on the subject. For some time it was

thought that screen-grid tubes were poor doublers because regeneration in the doubler was supposed to contribute a large part of the output, yet we have had success with them and find screen-grid tubes used almost universally in commercial transmitters. The argument might be advanced here that the sole justification for the use of screen-grid tubes in doubler stages is to cut down the chances of trouble when the transmitter is tuned by an inexperienced operator and that fewer types of tubes are needed, but it does not seem that these considerations would hold water if much efficiency had to be sacrificed. Our own experiences have shown us that very good results can be secured with screen-grid doublers, at least with the smaller tubes.

Carrying the thing to the other extreme, it was found in the transmitter described here that an actual improvement in performance was secured when the triode doubler stage was *neutralized*, thus preventing any feed-back at all. At least two other transmitters of which we know have given

types of tubes to use to get the necessary excitation for the final tube. It has been said many times that if the final amplifier is to give maximum output and efficiency it should be excited by a tube on the same frequency; in other words, it should not itself be a doubler. This rule is almost axiomatic, yet it may be justifiably abrogated under certain circumstances, particularly in a transmitter designed work on all three bands, if a reasonable amount of power can be secured from the final tube used as a doubler. This is generally the case with tubes larger than the Type '10. In other words, in doubling with a large tube to 14 mc. one can get enough power output to put out a good signal, even though the full possible output of the tube is not obtained and the efficiency is not high. But a Type '10 has a relatively small output even when excited properly, so that it does not seem advisable to use such a tube simultaneously as both output amplifier and doubler.

Another point is that it is neither necessary nor in all cases advisable to use small tubes as doublers and build up the power with "straight" amplifier stages after the desired frequency has been reached. This results in an unnecessarily large number of stages, which, besides being poor economy, may introduce operating difficulties as has been pointed out before.

In choosing a layout, the influence of the power supply on the choice of tubes should not be neglected. A single example will illustrate this. Suppose the final amplifier is a Type '04-A, requiring a 2000-volt plate supply; if a 75-watt tube is needed to excite it the obvious tube to choose is one which also operates from a 2000-volt supply, i.e., the '52 or '60. The use of a Type '03-A would make necessary a separate power supply or else a husky voltage-dropping resistor. The Type '10's in the set would have their own power supply—a relatively small proportion of the total cost of such a transmitter.

The keying system also should be considered—it is preferable to use one power supply for the tubes which operate continuously and have another for those tubes which are keyed. This prevents voltage fluctuations on the un-keyed tubes.

OPERATING CONVENIENCE

Aside from the question of choosing an adequate tube combination, it is also desirable to arrange the transmitter so that changing from one band to another does not become a major operation. Naturally the more stages there are in the transmitter the greater is the number of adjustments which must be made when shifting frequency.

The transmitter shown in the photographs exemplifies the foregoing discussion, and in addition the band-changing operations have been simplified to as great an extent as is consistent

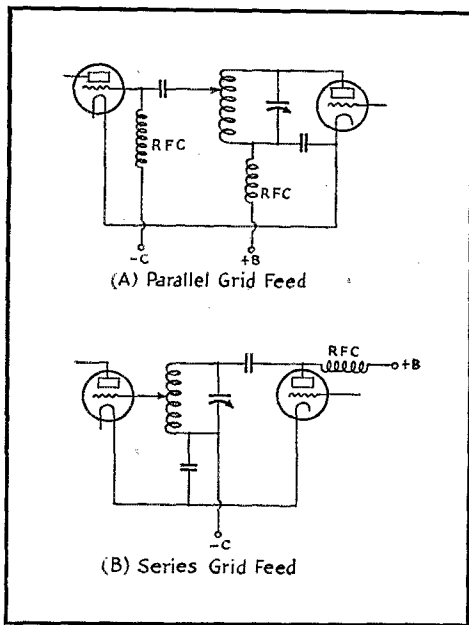


FIG. 1—SERIES AND PARALLEL GRID FEED

Electrically there is little difference between the two schemes, but series grid feed is superior in some other respects to the parallel arrangement, as explained in the text.

the same sort of results, and although time has not permitted making an investigation to procure some really significant information, it does seem that the possibility of improving doubler performance by neutralization should not be overlooked.

The big question to be decided in laying out a transmitter, however, is that of the number and

with efficient performance. In planning the set it was obvious that, since the last tube was to be a Type '03-A, at least one amplifier stage would be needed between the crystal and the 75-wattter if any sort of output was to be obtained on 7 and 14 mc. This, of course, meant that the '03-A would have to work as a doubler on 14 mc., with consequently lower efficiency on that band than on the others. On the other hand, the fact that only three tubes were to be used made it possible to eliminate plug-in coils in all stages except the last.

Since the set was to be used on all three bands, it was necessary to neutralize the Type '10 intermediate amplifier as well as the last stage in order to allow stable operation on 3.5 mc. The tuning condenser of the intermediate stage was made sufficiently large to cover both 3.5 and 7 mc. with a single coil so that this stage could be shifted from one band to the other simply by turning the condenser. A combination of battery and leak bias was used on the amplifier tubes, partly to obviate the cost of a large number of "B" batteries and partly to provide self-regulating bias.

SHUNT OR SERIES FEED?

It is an odd fact that similar ideas seem to strike widely-separated and apparently unrelated investigators at approximately the same time. A recent instance in a series of such coincidences is the receipt of letters from three amateurs in different parts of the globe suggesting the use of series feed on the grids of amplifier stages in multi-stage transmitters instead of the more common parallel feed. This type of circuit is not new, having been described in *QST* several years ago,¹ but seemingly has fallen into disuse in recent years. Such an arrangement necessitates parallel feed for the plates, in contrast to the more common series plate feed and parallel grid feed. The two schemes of connection are shown in Fig. 1. The series-grid connection eliminates the necessity for grid chokes to the same extent that the series plate connection eliminates plate chokes; the unfortunate thing about these circuits is that we can't use series feed on both grid and plate.

At first glance it is not apparent why shifting the choke from the grid circuit to the plate circuit should improve matters to any extent. A choke in the plate circuit can allow just as much energy to leak off as one in the grid circuit, so there seems to be little to gain by making the change. Looking at it another way, however, there do seem to be some advantages to the series-grid arrangement despite the fact that there is no r.f. improvement. In Fig. 1A the full plate voltage appears between the tuning condenser plates and ground, whereas in 1B the only d.c. voltage between the condenser plates

and ground is the bias voltage for the next stage. There is, therefore, less danger of electrical shock — possibly seriously harmful with high-voltage tubes — with the circuit of 1B.

The second point also has to do with the plate voltage. In Fig. 1A the plate by-pass condenser has to be rated to stand the full plate voltage, while the grid coupling condenser must be capable of withstanding the plate voltage plus the grid-bias voltage, in addition to carrying the r.f. excitation current. In Fig. 1B only one condenser, the plate blocking condenser, need be rated to withstand the plate voltage. The grid by-pass condenser only has to handle the bias voltage for the second tube — usually low enough to make an ordinary mica receiving condenser perfectly safe, even with high-power tubes. These two points seem to us to be important enough to justify using the series-grid arrangement in preference to series plate. The transmitter described here uses this type of circuit.

THE CRYSTAL OSCILLATOR

Surely nothing could be simpler than a crystal oscillator, yet under certain conditions it can be responsible for the generation of some new cuss words. Fig. 2 shows two variations of a well-known and widely-used circuit. This is really a tuned-plate tuned-grid oscillator, with the crystal replacing the tuned-grid circuit, but with this difference — the crystal will not pass direct current and, therefore, the grid circuit must be shunt-fed. Once again those trouble makers,

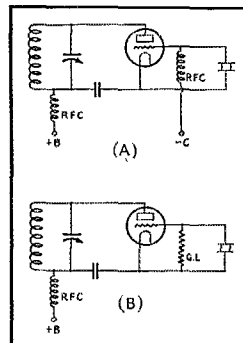


FIG. 2

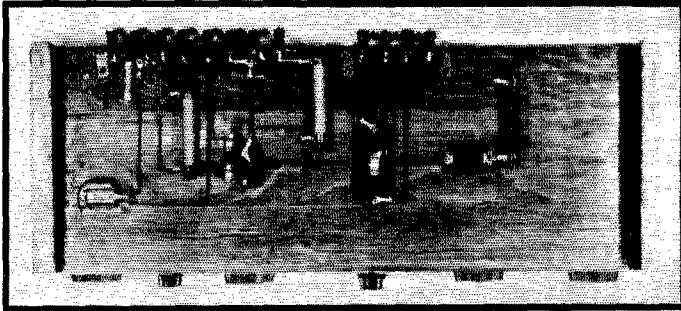
r.f. chokes, come into the picture if one uses battery bias, as at A. We have had oscillator circuits which absolutely refused to work with a choke which looked as though it should be effective, but wasn't. If the choke happens to cause the grid circuit to be resonant somewhere in the frequency range covered by the plate tank the thing will often go off on its own hook as a TNT oscillator, and if a monitor is not used during the tests it is impossible to tell whether the crystal is controlling the frequency or not.² Needless to say, when such a condition exists it should be cured immediately because the oscillator is likely to be highly erratic in operation. Off-frequency operation possibly may result as well. A fair test is to remove the crystal from the circuit and see if the

¹ "An Oscillating Amplifier for the Crystal Transmitter," Ralph Pierce, *QST*, October, 1927, p. 15.

² Oscillations caused by a resonant grid circuit have occasionally been responsible for the "discovery" of new piezo-electric substances. — Editor.

tube will still oscillate, although this does not always give positive results because usually the capacity of the holder is needed to tune the choke.

A better way is to eliminate the choke and bias battery and get the bias from a grid leak, as at B. We sometimes wonder why it is that no one ever seriously advocates using fixed battery bias on a self-excited oscillator and yet it is taken for granted that battery bias should be used on a crystal oscillator. Simple logic indicates that if it is preferable for one it should be for the other, since both are oscillator circuits and there is



CHOKES AND BY-PASS CONDENSERS ARE UNDER THE BASEBOARD

These are placed so that leads from appropriate parts on top of the board drop directly through for short connections. From left to right are the grid by-pass condenser for buffer-doubler stage, grid by-pass for '03-A stage, filament by-pass condensers for '03-A, and plate by-pass for '03-A. The chokes and resistors may be readily identified by referring to the circuit diagram. The by-pass condensers across the voltage divider mentioned in the text are not mounted in the set itself.

nothing mysterious about a crystal which requires different treatment.

Removing the choke and battery and substituting a grid leak does not mean the end of trouble, however, *unless the leak is non-inductive and has low capacity*. It is easy to see that the same sort of resonance and by-passing effects can exist with inductive or high-capacity leaks as with choke coils. An ordinary "wound" resistor was used in the grid circuit of the crystal oscillator in the transmitter shown in the photographs, and, although the crystal was known to be an active one, there was absolutely no sign of oscillation until the offending resistor was taken out and a non-inductive one substituted. When this was done the oscillator started perking immediately. The stick-type resistors such as are used in broadcast receivers seem to be perfectly satisfactory, and since the grid current is rather small the 2-watt size will stand up well. They have the additional advantage of being inexpensive and readily obtainable at radio stores.

The circuits shown in Fig. 2 both have series-plate feed, probably the most common way of using them. No trouble will be encountered with the plate circuit if the plate by-pass condenser is large enough — .002 μ fd. or more. The choke has relatively little to do in such a circuit. With parallel plate feed necessitated in the transmitter

shown here because of the use of series-grid feed on the amplifiers, there may be a different story to tell.

AGAIN THE CHOKE PROBLEM

A good plan to follow in building any multi-stage transmitter is that of starting construction with the oscillator and getting each unit working before proceeding to the next. After correcting the above-described grid-leak troubles in the crystal circuit of our sample set, the oscillator apparently was working normally, although it did seem that

the crystal was getting rather warm for the plate voltage employed. Proceeding to the next stage, the buffer-doubler, it was discovered that this stage would not neutralize correctly. The circuit values were quite normal for the purpose, but the operation of both oscillator and doubler stages became quite erratic when the two were coupled together.

In a case like this the natural inference is that stray feedbacks are present which cannot be compensated for by ordinary neutralization. The ever-useful neon lamp

verified this assumption by indicating the presence of a considerable r.f. voltage on the wrong end of the plate choke in the oscillator stage which, it will be remembered, is parallel-fed in this particular circuit. The buffer-stage choke, however, seemed to be taking care of its job quite nicely, since there was no evidence of r.f. at its "cold" end.

The obvious thing to do was to put in a choke of different constants, since the one already in the set did not seem to be doing much in the way of blocking off the r.f. But, as often happens, the seemingly obvious remedy was not the correct one. Although several chokes which were known to be good performers at 3500 kc. were substituted, none of them seemed to be satisfactory in this particular layout. As a sort of last resort a by-pass condenser was put between the *power-supply side* of the choke and the filament center-tap — and the set's eccentricities disappeared: The crystal cooled off; the doubler neutralized perfectly; and both tubes gave more output with less plate current.

This was rather puzzling, until it was recalled that the plate voltage for the oscillator was being obtained from a voltage divider across a 600-volt supply which furnished power for both oscillator and doubler — and that that voltage divider was made up of the same kind of inductive resistors that previously had given so much trouble as grid

leaks. A skeleton circuit is shown in Fig. 3. The resistors evidently were acting as inductances and passing r.f. around the circuit in all sorts of ways that never were intended. The choke on the buffer stage gave no trouble because the first filter condenser provided a low-impedance path to ground — just what the by-pass condenser on the cold side of the oscillator choke did.

Quite evidently things are not always what they seem. When a rational-looking set starts acting like a temperamental prima donna it is time to go on a still hunt for circuit elements which in addition to possessing the inductance, capacity or resistance shown on their labels, also have over-generous shares of one or both of the other two — *not* shown on the labels or specified on the circuit diagram.

NEUTRALIZATION

Although the subject of neutralization has been discussed and re-discussed since oscillator-amplifier transmitters have become popular, a few somewhat obscure points seem to have been overlooked in most treatments of the subject. Very little has been said about the loading effect of the neutralizing condenser, for instance. Yet this effect became of importance in this particular transmitter and had to be taken into consideration.

Fig. 4 shows the essentials of two popular schemes of neutralization. In the first of these the neutralizing voltage is fed back from the plate circuit to the grid of the neutralized tube, while in B the neutralizing voltage is fed from grid to plate. If one looks at circuit A closely it is easy to see that the neutralizing condenser, C_1 , is in parallel with the tank condenser of the preceding stage (C_2), through the neutralizing winding on the amplifier tank coil. Actually the relation between the total capacity and that of the two individual condensers is not a simple additive one, but if the reactance of the neutralizing winding is low and the capacity of the by-pass condensers large the effect is very nearly the same as though the neutralizing condenser were connected directly across C_2 , so far as the tuning effect of C_1 on the preceding tube's tank circuit is concerned. Similarly, in B the neutralizing condenser loads the circuit formed by C_3 and its associated tank coil.

In an amplifier stage designed to work on only one frequency, or rather a single amateur band, this loading effect rarely need be taken into consideration because it is a simple matter to design the tank coils so that there is plenty of leeway in the tuning of the stage. This is not the case in the buffer-doubler stage of this particular transmitter, however, because it was decided at the outset that this stage was to cover both 7000 and 3500 kc. with a single coil. To maintain a fairly efficient L/C ratio on 3500 kc. it was necessary therefore to use a much higher L/C ratio on 7000 kc. than

would be desirable if this stage were to operate on 7000 kc. only.

In the first attempt at neutralization a cross-connection scheme was tried in which a single neutralizing winding on the doubler stage furnished neutralizing voltage for both the doubler and final amplifier; that is, the doubler neutralized "plate-to-grid" and the final amplifier "grid-to-plate." This was attempted in the hope that it might be possible to simplify the set somewhat, but with a full realization of the prac-

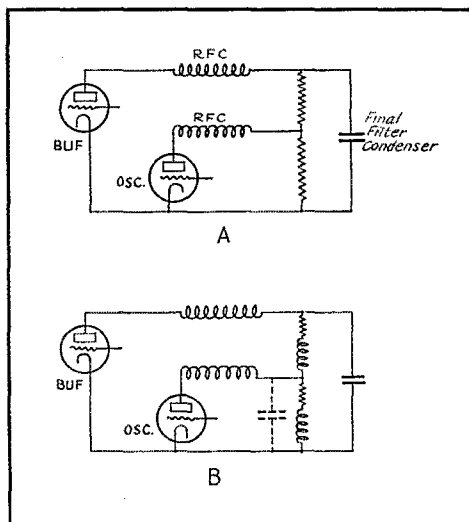


FIG. 3—HOW A VOLTAGE DIVIDER CAN CAUSE TROUBLE

If the resistors making up the divider possess appreciable inductance in addition to resistance, the legitimate r.f. chokes in the circuit may be rendered ineffective. R.f. from the tube marked "OSC" may be coupled back to other parts of the circuit through the medium of inductive resistors and cause considerable trouble. A by-pass condenser connected as shown by the dotted lines usually will clear up such difficulties.

tical difficulties involved in getting everything balanced up without reaction between stages. It was soon discarded as impracticable, however, and the arrangement shown at Fig. 4B was tried on both stages. The neutralizing coil for the doubler stage was made a part of the crystal tank coil, and the one for the final amplifier was a continuation of the doubler tank coil. The reason for trying this method of neutralizing was a purely mechanical one — if it had worked out there would have been no need to bother with taps on the final amplifier tank coil, thus simplifying the band-changing operations. Incidentally, the reason for making the neutralizing coil a continuation of the tank coil and not connecting the tank condenser across the whole coil with the "ground" tap at some intermediate point was the simple one that the hand capacity effect at the tuning condenser is eliminated when

the rotary plates and shaft are grounded. There is always hand capacity if the rotor plates are "hot," as they are bound to be when an intermediate point on the coil is at ground potential.

With the cross-connection scheme first tried the neutralization of the doubler stage was effected by the circuit in Fig. 4A. The neutralizing condenser accordingly loaded the crystal oscillator tank circuit where the loading was not particularly noticeable and the doubler tank circuit covered both 3500 and 7000 kc. very nicely, with a little to spare at both ends. Changing to 4B, however, upset things. More capacity was required at C_2 to tune to the same frequency, which occasioned no inconvenience, but with the final amplifier connected in it was impossible to tune to 7000 kc. on the doubler tank circuit with

about the same low value as when using the tube as a straight neutralized amplifier on 3500 kc. All the doublers we had used previously had taken much higher plate current and exhibited the same relative inefficiency that doublers do as a class. At normal load the plate current on 7000 kc. was just about the same as with normal load on 3500 kc. — and the output was very nearly as great as on 3500 kc. But on taking off the neutralizing connections the plate current on 7000 kc. immediately jumped up to almost twice what it was with neutralization and the efficiency suffered accordingly, although the total output was approximately the same. Obviously neutralization was desirable, since the output was as good as or better than without it, and the input was much lower.

But changing to the connections in Fig. 4B, made the doubler act just as though it were not neutralized at all — plate current went up again, the tube ran hot, and there was no increase in output. Repeated trials of both systems only served to verify these results, so it became a question of weighing doubler efficiency against the bother of neutralizing the final amplifier on its own tank circuit — and doubler efficiency won out. Consequently the neutralizing arrangement for the doubler stage was again changed to that of Fig. 4A and remains that way in the final circuit of the transmitter.

Possibly the explanation of this effect is that actual neutralization for the second harmonic of the exciting frequency is necessary to obtain the better efficiency. This is provided in Fig. 4A, because the balancing voltage is obtained from the doubler tank circuit, in which the fundamental component of the exciting frequency is relatively weak because the impedance of the circuit is low at that frequency. In Fig. 4B, however, the balancing voltage consists principally of the fundamental component passed through the grid-plate capacity of the second tube. That the neutralization for the second harmonic is real in 4A and is not a feed-back which might tend to produce regeneration in the doubler is shown by the fact that it is possible to neutralize directly from the second harmonic of the crystal oscillator. In this particular case the harmonic was strong enough to make a neon lamp glow when it was touched to the doubler tank circuit — with the doubler plate voltage off, of course. Whatever the explanation, neutralization applied in this fashion does increase doubler efficiency.

Switching the neutralizing scheme to that of Fig. 4A made it necessary to neutralize the final amplifier against its own tank circuit; made it desirable, in fact, because the last tube was to be a doubler on 14,000 kc. and the increased efficiency obtainable with "plate" neutralization was something worth having. In this case it was decided to put the tank condenser across the whole coil and place the ground tap at an inter-

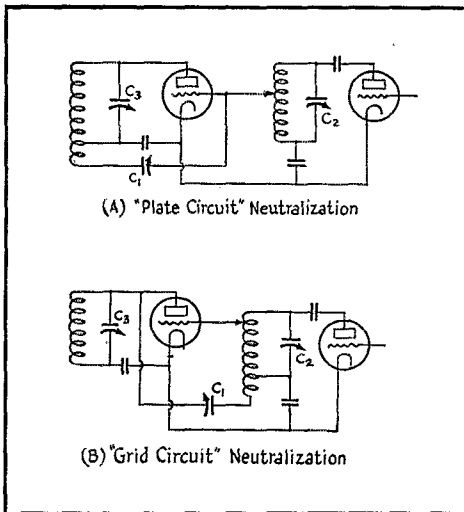


FIG. 4

the same coil. After the familiar process of tearing off turns and starting over again, a compromise was finally reached which would cover both bands.

But this arrangement was discarded after a rather curious thing had been discovered. In planning the transmitter, as has been previously stated, it was the intention to neutralize the buffer-doubler stage so it could be operated on 3500 kc. and it was hoped that the neutralization could be left alone without harmful effects on the power output when working the tube as a doubler. The original neutralization circuit was like that at Fig. 4A, as mentioned above. Rather surprisingly, in the light of past experiences with doublers, the plate current when the tube was operating on 7000 kc. behaved in just about the same way as it did on 3500 kc.; that is, with no load on the tube and the tank circuit tuned to the second harmonic the plate current dropped to

mediate point, partly because that arrangement made convenient connections possible, but principally because the tank coils became so large as to be unwieldy on the lower frequencies with the tuning condenser across only a part of the turns. Accordingly the plate condenser was mounted on an insulating strip so keep r.f. off the wooden baseboard, since both ends of the condenser are at high potential. Series plate feed was used on this last stage because there is no really good reason for using parallel feed here, and the choke might just as well be given as little work to do as possible — especially because three bands have to be covered in this stage.

Although it seemed at first sight that neutralizing the last stage should be a simple proposition, all our troubles weren't over; the amplifier simply would not neutralize completely. Even with the best adjustment there was r.f. in the tank circuit; furthermore, some of it was getting rectified in one way or another and flowing back through the power supply. The mercury vapor tubes in the rectifier showed a distinct glow as the tank circuit was tuned through resonance, and a milliammeter in the plate lead indicated that currents as great as 100 milliamperes were flowing — with no plate voltage on the tube. Incidentally mercury-vapor tubes in the rectifier are really good indicators of neutralization, because they will glow if there is only

a slight amount of r.f. in the tank circuit (the filaments must be lighted, of course). Taking off the power supply stopped the trouble and the neutralization was perfect — but unfortunately tubes do not operate with the plate supply disconnected. After a great deal of testing the trouble was finally located in the plate by-pass condenser — its capacity (250 μ fd.) was too small to bring the plate supply tap on the tank coil effectively to the same r.f. voltage as the filament. When a .002- μ fd. condenser was

substituted the amplifier could be neutralized satisfactorily with the plate supply connected. This by-pass condenser cannot be too large so long as it is non-inductive.

The neutralizing condenser on the final amplifier again exhibited a loading effect on the doubler tank circuit, and after some further testing a satisfactory compromise was reached by bringing the excitation tap down a few turns from the high-potential end of the coil. The position of this tap was really determined by the doubler plate current, however, which was too high with the tap at the extreme end. The tap was so placed that the doubler drew normal plate current — about 60 milliamperes — and the

loading effect of the final amplifier neutralizing condenser decreased.

While on the subject of neutralization, it might not be amiss to mention again the fact that the tank circuits of both the tubes being neutralized and the exciting tube should be retuned each time the neutralizing condenser setting is changed. Ordinarily these readjustments will be small, but they should not be neglected.³ Also, one of the best neutralizing indicators is a milliammeter of suitable range inserted in the grid-bias lead of the tube being neutralized, especially after approximate neutralization has been reached and only the fine adjustments remain to be made. If the tube is not correctly neutralized the grid meter will

invariably show a flicker as the tank circuit is tuned through resonance; this flicker should be

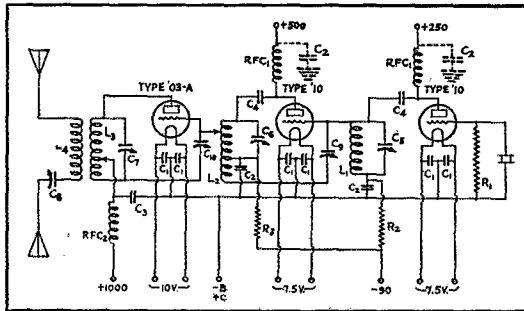


FIG. 5—THE FINAL TRANSMITTER CIRCUIT

- C₁—.004 μ fd.
- C₂—.002 μ fd.
- C₃—.002 μ fd., 5000-volt rating.
- C₄—250 μ fd.
- C₅—250 μ fd. variable.
- C₆—350 μ fd. variable.
- C₇—250 μ fd. variable double-spaced. (The one shown in the photograph is a Cardwell 43-plate receiving condenser with alternate plates removed.)
- C₈—500 μ fd. variable.
- C₉—13-plate midjet.
- C₁₀—50 μ fd. double-spaced condenser (Cardwell 410-B).
- L₁—21 turns of No. 12 enamelled wire on 2-inch bakelite tube.
- L₂—10 turns of No. 12 enamelled wire on 2-inch bakelite tube with slight spacing between turns. Neutralizing coil consists of 6 additional turns, close-wound, 1/4-inch from tank coil.
- L₃—3500 kc.—20 turns of 3/16-inch copper tubing, 2 1/2-inch dia. 7000 kc.—12 turns of 3/16-inch copper tubing, 2 1/2-inch dia. 14,000 kc.—7 turns of 3/16-inch copper tubing, 2 1/2-inch dia. Spacing between turns approximately equal to half the diameter of tubing.
- L₄—11 turns same.
- R₁—20,000 ohms, 2-watt rating.
- R₂—50,000 ohms, 2-watt rating.
- R₃—10,000 ohms, 5-watt rating.
- RFC₁—3-inch winding of No. 36 s.s.c. on 1/2-inch form.
- RFC₂—3-inch winding of No. 32 s.s.c. on 1/2-inch form.

³ The subject of neutralization has been covered rather completely in past issues of *QST*, and it is recommended that those unfamiliar with the process and contemplating the construction of an oscillator-amplifier transmitter read the following articles carefully: "Neutralizing Radio Frequency Amplifiers," Foreman, *QST*, October, 1930, p. 31; "More Power With Better Frequency Stability," *QST* February, 1931, p. 27; "Additional Notes on Neutralizing R.F. Amplifiers," Foreman, *QST*, June, 1931, p. 36; "Adding An Amplifier to the Low-Power Transmitter," *QST*, August, 1931, p. 26.

eliminated entirely or brought to a negligible minimum before the job can be considered finished. The actual value of grid current means little for neutralizing purposes — but the current, whatever the amount, must be unaffected by the setting of the tank condenser when there is no plate voltage on the tube.

A FEW CONSTRUCTIONAL POINTS

The foregoing discussion has been more or less general and admittedly diversified, but is applicable to almost any type of crystal-controlled transmitter. For the benefit of those who may be contemplating the construction of a set using the same sort of the tube line-up and circuit as that shown here, some details of the construction of this transmitter may be helpful. These have not so much to do with the exact values of the parts used, since these are given under the diagram, Fig. 5, but rather with the *order* of these values. There is a rather distressing tendency on the part of many amateurs to insist on having specifications given to a hair's breadth — indicating either mental laziness or ignorance of the function of the various components in a circuit. The chap who builds with an understanding of what makes the wheels go 'round always has less trouble than the one who builds by blindly following diagrams and photographs.

First, the oscillator circuit: The tank coil and condenser should be of such values as to resonate at the crystal frequency. Although the L/C ratio should be fairly high, both for the sake of efficiency and to raise the harmonic output, it should not be so high in the initial tests that it is impossible to tune to the crystal frequency when the buffer-doubler stage is coupled to it. The by-pass condenser between the low-potential end of the tank circuit and the filament center-tap should be fairly large, .002 $\mu\text{f.}$ or so, to effectively ground the rotor plates of the tank condenser. Otherwise an appreciable r.f. voltage appears across the grid-bias resistor and battery on the next stage. The oscillator grid leak may be any convenient size — the greater the resistance the lower the plate current and output, within limits. The value specified, 20,000 ohms, is a good average for general work. The plate blocking condenser is not critical, no more so than in a Hartley or tuned-plate tuned-grid oscillator. The plate choke should be good at both 3500 and 7000 kc. to prevent loss of either fundamental or second-harmonic excitation for the next tube. The by-pass condenser on the power-supply side of the choke is required only under the circumstances previously explained.

In this particular transmitter it was found that coupling directly from the high-potential side of the oscillator tank circuit worked satisfactorily, putting a fair load on the oscillator and providing adequate excitation. Tapping down on the coil does little good unless the tap on the end of the

inductance takes too much out of the oscillator, in other words, beyond the point where maximum output is secured. There is rarely any danger of giving a following amplifier too much excitation; they thrive on it. Since the tank circuits of the oscillator and the buffer-doubler operate with fairly low C/L ratios, the circulating current is comparatively low and No. 12 wire is adequate for both inductances.

In the buffer-doubler stage the condensers and chokes have about the same jobs to do as those in the oscillator circuit and, therefore, have the same values. The plate choke here is called upon to do even more than the oscillator choke, because it should be effective over all three bands. The chokes, incidentally, were all made by following Lidbury's chart originally published in *QST*, some years ago, and now in the current edition of the *Handbook*. The grid resistor for this stage was left at the value shown after a good deal of experimenting with different resistance values. As the leak resistance is reduced the output of the second tube increases on 3500 kc. and decreases on 7000 kc., and vice-versa. By making the leak large enough it is possible to get more output on 7000 kc. than on 3500 kc. with this particular circuit arrangement. With 90 volts of fixed bias and a 50,000-ohm leak the output is approximately the same on both bands, so that the final amplifier receives the same excitation on either 3500 or 7000 kc. As explained previously, the grid tap for the final amplifier was dropped down a few turns on the doubler tank coil to allow the doubler tube to operate with fair efficiency on 7000 kc. and to reduce the loading effect of the final stage neutralizing condenser.

Some juggling with the size of the tank coil in the doubler stage may be necessary to make it cover both bands satisfactorily with the 350- $\mu\text{mfd.}$ tuning condenser. This, however, is simply a question of patience.

In the '03-A stage a 10,000-ohm grid resistor was found satisfactory for both straight amplification and doubling. A lower value of resistance than in the doubler stage serves because the amplification factor of the '03-A is much higher than that of the '10. The plate by-pass condenser has been discussed previously and need not be mentioned again. The plate choke is a "compromise" affair and incorporated in the set more as a precautionary measure than because it is absolutely necessary.

Finally, a word about neutralizing this stage. In general it is well to use as much capacity in the neutralizing condenser as possible and reduce the number of turns in the neutralizing portion of the coil proportionately. This provides a higher-impedance tank circuit for the '03-A with a consequent increase in efficiency, but unfortunately results in a greater loading effect on the tank circuit of the preceding stage. Practice will indicate the proper choice of constants.

Although in this set only one antenna tuning condenser is shown, any of the usual antenna or feeder tuning schemes may be used.

CONCERNING METERS

Since meters are expensive, there is often a natural desire to reduce their number to a minimum — sometimes with detrimental results to the operation of the transmitter. The ones which proved most useful in the testing of this transmitter were a 0-100 milliammeter for the crystal tube, a second 0-100 milliammeter for the buffer-doubler, a 0-500 milliammeter for the final amplifier, and a 0-50 milliammeter for the grid circuit of the final amplifier, in addition to the customary filament voltmeters and antenna ammeters.

A quite common scheme is that of using a single meter arranged to plug into several stages which take approximately the same plate current. In this case, for instance, a single 0-100 milliammeter might be made to serve for both oscillator and buffer-doubler. However economical such a system may be, it is a decided advantage to have separate meters in consecutive stages when tuning, because every adjustment to either stage has its reaction on the other — and much time can be wasted in shifting the meter back and forth each time a tuning control is touched, to say nothing of the inconvenience. If one of the 100-mil meters is to be omitted, a better arrangement would be to have both the remaining meters plug-in so that both could be used simultaneously on either pair of stages being tuned.

The grid meter for the final stage, while not a necessity, is helpful not alone for the aid it gives in neutralizing, as pointed out previously, but because it also indicates to some extent the amplitude of the excitation. Other conditions remaining the same, the greater the grid current the more excitation the tube is getting. Knowing the grid current it also is possible to calculate the actual bias on the tube under operating conditions; for instance, if the grid current is 15 milliamperes when the amplifier is delivering power and the grid resistance is 10,000 ohms, a simple application of Ohm's Law (volts = ohms × amperes) shows that the bias furnished by the resistor amounts to 150 volts. To this should be added the fixed bias voltage plus the resistance drop in the batteries. The latter will be negligible with new batteries but may be appreciable if the batteries are old and the internal resistance is high.

IN CONCLUSION

Of course anyone contemplating the construction of a transmitter like this one will want to know what he can expect from it. The output on 14,000 kc. turned out to be considerably better than had been expected when the set was first planned, and fully justified the use of the '03-A as a doubler. With an input of 150 to 175 watts

the output was sufficient to light a 75-watt lamp used as a dummy antenna beyond normal brilliance, probably representing an output of approximately 80-90 watts — a power with which one can get somewhere on 14,000 kc. The plate of the tube showed no signs of color with this input. On the two lower-frequency bands greater output can be secured without difficulty — up to 150 watts if the input to the tube is run slightly above normal.

The transmitter was given a thorough trial on the air in almost daily operation for several weeks and its performance was fully up to expectations. An attempt to modulate the '03-A on 14 mc. was unsuccessful, however, showing that the stage as a doubler was not capable of operating class C. But, as we said before, there is no need to worry about operating an amplifier used exclusively for c.w. work as class C; what we want is a reasonable amount of power at minimum cost. This story, we hope, will be helpful to some of the crystal-control adherents in getting it.

Television—What About It?

(Continued from page 21)

say that television of the moment is an intriguing and utterly absorbing field for the experimenter. It is a profound and pregnant problem for the laboratory. It is a field with obviously limitless commercial possibilities. But as entertainment for the masses it is, we believe, around the corner. It *still* is!

W9GGH takes issue with the stray about hardening copper which appeared in *QST* a few months ago. He says, "Heating copper softens or anneals it and no difference in hardness results whether it is allowed to cool slowly or if it be put into water. Copper can be hardened only by drawing or rolling and cannot be hardened by heating." Guess we need a referee!

W9BKT recently put up a new Zepp, but after the antenna was pulled into place it was found that the feeders were too long and wouldn't clear the building. The only thing that could be found in a hurry to hold the feeders out was an idle crutch, which was accordingly anchored in the window to do the job. A possible cause of "limpy" sigs!

Seems as though *QST*'s as well as parts are snaffled now and then. Here's what the Enoch Pratt Library of Baltimore says about it: "Please send us a complete file of your publication *QST* for 1930. This publication is so popular in our reading room we can scarcely keep an issue on the rack."

Amateur Radio in a New Field

How Hams Helped at the National Glider Meet

GIVE us the flood, tornado, earthquake, bullfight or air maneuver and we'll show you how amateur radio can make itself indispensable. With some such statement, amateurs have vaunted their abilities for many years past.

In Elmira, New York, there was no flood, earthquake, tornado — no bullfight. There was, however, an impending National Glider Meet at which the nation's exponents of sail-flying were to test their skill in competition. Members of the Elmira Radio Amateur Association saw in it yet another unexploited field for their endeavor. And did they exploit it? *Did they?*

Elmira, from above, looks something like the bottom of an irregular pie-plate, the rim around it being constituted by a series of mountain ridges. On these ridges, it is said, are many spots so suited for sail-flying as to rival the famed Wasserkuppe in Germany. Without necessarily believing that, we can go on to explain that these "take-off" points, each

radio was put to work providing communication between the airport and the particular "take-off" field in use. In between times, the airport station was kept on the air handling traffic from contestants and officials to points all over the country and to foreign countries. In the hands of members of the Elmira Radio Amateur Association, amateur radio did a mighty fine job.

To the Association President T. J. Sweeney, W8EQA, goes the credit for the all-important preliminaries of securing the interest of the glider meet officials, the local Chamber of Commerce and the Press. To these amateurs goes the credit for accomplishing everything W8EQA promised: E. W. Lewis, W8EXQ; R. J. Miller, W8DCX; B. H. Youmans, W8EJN; F. G. Miller, W8DZC; G. E. Meeker, W8ADV; C. C. Kahn, W8BFF; E. D. Miller, W8CJJ.

On the first day of the meet, equipment from W8EXQ and W8DCX had been installed at the airport, and the Association's portable transmitter, W8AUI, fitted out in an automobile. Inclement weather, keeping all gliders at the field, made it possible for the day to be spent jiggling antennas, trimming



Photos courtesy Elmira Star-Gazette

particularly suited for some wind direction, are, with one exception, far removed from the town and out of communication with it. What is more important, they are ordinarily out of touch with the Elmira airport where all gliders must roost overnight and where are stationed most of the contest officials.

During the two weeks of the contest, amateur

feeders and making the usual final adjustments. On the following day, news of a stiff westerly breeze sent most of the gliders scurrying on their trailers out to East Ridge — one of the mountain fields some seven miles from the town. Rapidly assembled, the machines took to the air in quick succession, following each other back and forth along the ridge. Meanwhile, W8BFF and W8EJN had put the portable station on the air, making contact with the airport not five minutes before Major Purcell, the last to take off, fell with a resounding and bloodcurdling crash into the trees near the field. Within a split second the urgent call for an ambulance was started. Not twenty minutes later the badly injured pilot was on his way to a hospital bed already ordered by radio.

As on this first day of activity, the amateur crew was continually on its collective toes for the two weeks of the meet. Sacrificing sleep, eats, vacations and comfort, these fellows chased back

(Continued on page 74)

Standard Frequency Transmissions

THIS issue of *QST* will reach most of its readers just before the Frequency Measuring Test which, be reminded, comes on the evenings of Saturday, October 24th and Saturday, October 31st. If you are not familiar with all the details, dig out the two issues preceding this one and become acquainted with them. Then make prominent marks (preferably bright red ones) on the October "24th" and "31st" squares of the old calendar with a high resolve to be on hand for the fun and to refrain from transmitting during the hours of the test. Barring disintegration of the Heavyside layer, nothing can do more to interfere with the success of this test than QRM caused by thoughtless and inconsiderate amateurs. The official transmitting stations will operate on frequencies spotted throughout the 7000- and 3500-kc. bands and any other station is likely to interfere with one or more of the transmissions. Don't be one of the guilty.

Talking about QRM calls to mind that recent reports from users of the regular standard-frequency transmissions indicate continually growing QRM trouble here, too. Many urge silent periods during the s.f. transmissions. Most complain of failure to log one or more points of a schedule because of QRM, largely from 'phones on the 3500-kc. band. If amateur radio were utopian and all amateurs were angels (thank Heaven we're not!) it might be sufficient to say, "Now fellows, please desist" — and that would be that. But the QRM is this side of paradise and a more practicable scheme is in order. Let's have some suggestions. Experience gained while using the following s.f. transmissions should produce some ideas.

DATES OF TRANSMISSION

Nov. 1, Sunday	C	W9XAN
Nov. 6, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
Nov. 8, Sunday	BB	W9XAN
	C	W6XK
	C	W6XK
Nov. 13, Friday	C	W1XP
Nov. 15, Sunday	C	W1XP
Nov. 20, Friday	A	W1XP
	B	W9XAN
	B	W6XK
Nov. 27, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
Nov. 28, Saturday	BX	W6XK
Nov. 29, Sunday	C	W9XAN
Dec. 4, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
Dec. 6, Sunday	BB	W9XAN
	C	W6XK
Dec. 11, Friday	C	W6XK
Dec. 13, Sunday	C	W1XP
Dec. 18, Friday	A	W1XP
	B	W9XAN
	B	W6XK

Dec. 23, Wednesday	BB	W1XP
	B	W9XAN
	A	W6XK
Dec. 26, Saturday	BX	W6XK
Dec. 27, Sunday	C	W9XAN
Dec. 30, Wednesday	BB	W6XK
	B	W1XP
	A	W9XAN

STANDARD FREQUENCY SCHEDULES

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

<i>Saturday Morning</i>	
<i>Schedule and Frequency</i>	
<i>Time</i>	<i>BX</i>
<i>(a.m.)</i>	
	<i>kc.</i>
	4:00
	7000
	4:08
	7100
	4:16
	7200
	4:24
	7300

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

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

TRANSMITTING PROCEDURE — NEW CHARACTERISTIC LETTERS

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

* W6XK transmits 3650 kc. instead because of local interference on 3600 kc. from fourth harmonic of 900-kc. transmitter.

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

3 minutes — Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W1XP is "G"; that of W9XAN is "O"; and that of W6XK is "M" instead of "Z," as announced in October QST, because a string of "Z's" happens to be the Army-Amateur SOS!

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

2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

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

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

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

REPORT AND TEST BLANKS

Blanks for reporting on the regular S.F. transmissions will be sent postpaid upon request. Just send a card or message to the Standard Frequency System, QST, West Hartford, Conn., asking for S.F. blanks.

WWV 5000-KC. TRANSMISSIONS

The Bureau of Standards Station WWV will transmit calibration signals on 5000 kilocycles, accurate to within one part in a million, between 2:00 and 4:00 p.m. and between 8:00 and 10:00 p.m., E.S.T., every Tuesday throughout November and December, excepting December 29th. The transmissions consist mainly of continuous unkeyed carrier frequency, making them particularly suitable for the calibration of a frequency standard having a harmonic on 5000 kc. The first five minutes of a transmission are taken up with "CQ de WWV" and announcement of the frequency. The frequency and call letters are given every ten minutes thereafter. The Bureau is desirous of receiving more reports on these transmissions and amateurs are urged to cooperate, giving information on signal strength, fading, type of receiver used and type of receiving antenna. Reports should be sent direct to the Bureau of Standards, Washington, D. C., or via A.R.R.L.

— J. J. L.

Corrections

About W6ZZA's Portable

IN Fig. 1, page 23 of October QST, 100- μ fd. fixed condensers connected between the hot ends of the tank inductances, L_1 and L_2 , and the grid ends of the chokes RFC_1 will prevent shorting the bias batteries with the switch in the send position. A grid leak of 50,000 ohms or so connected between the grid and filament of the crystal oscillator also is suggested.

The Mechanics of Modulation — Addenda

Figs. 6, 7 and 8, mentioned but not shown on page 31 of October QST, are reproduced herewith. Our apologies to the author for their inadvertent omission.

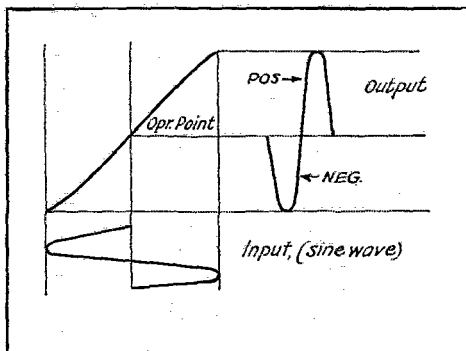


Fig. 6 — If the curves for positive and negative peaks coincide the undistorted output will be maximum.

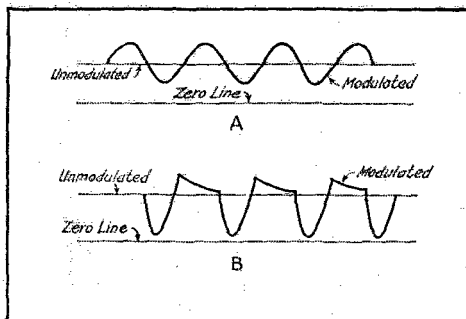


Fig. 7 — A typical oscilloscope and what happens to the waveform when 100% modulation is attempted with a transmitter having a modulation capability of 30%.

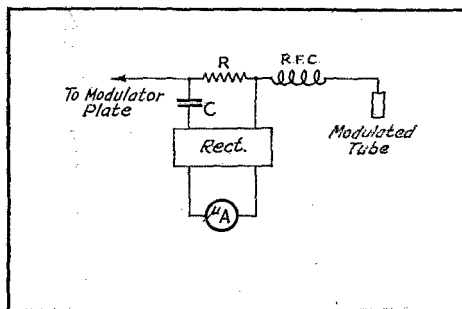


FIG. 8 — THIS ARRANGEMENT MEASURES THE ALTERNATING COMPONENT OF THE CURRENT SUPPLIED TO THE MODULATED AMPLIFIER

EXPERIMENTERS' SECTION

Accurate Calibration of a Receiver

By George Collier, W9CWI

CALIBRATED receivers apparently have been overlooked in the mad scramble for heterodyne frequency meters. However, it is possible to calibrate a receiver and maintain its calibration to as high a degree of accuracy as is possible with many heterodyne frequency meters, and it is most certainly a lot handier when one wants to check the frequency of an incoming signal.

The accuracy of the calibration and the ability of the set to hold this calibration will of course depend on how well the instrument is constructed. Rigidity is one of the prime factors in any frequency measuring device and also should be observed rather closely in any receiver. To hold calibration well a receiver must have rigid wiring, good connections, and above all rigid condensers and indicating equipment. A little care in the original construction of the receiver will be repaid by the "holding" qualities of the calibration. The receiver coils should be adjusted to permit oscillation with one setting of the regeneration control through the band to be calibrated. The regeneration control should have an indicating device on it to allow duplication of the original setting, and a very small variable condenser, controllable from the panel, should be connected in shunt with the main tuning condenser. The capacity of the small variable should be sufficient to cover about ten degrees on the scale of the regular tuning condenser. No indicator is necessary as all the calibration work will be done on the main tuning condenser.

The calibration proper is accomplished in the following manner. First pick a Friday night when one of the A.R.R.L. standard frequency stations is going to be transmitting the altogether too-little-used standard frequency points. Allow plenty of time for the receiver to warm up (15 or 20 minutes) and then tune in several of the high power commercial stations that are on almost continuously. Set the small shunt condenser at half scale and tune one of the commercial stations to zero beat. Record accurately the setting of the tuning dial on this station and proceed to another one, repeating the operation and keeping an accurate record of the settings of the tuning dial. It can be seen readily that the frequency band should be in the center of the dial to allow for picking up these marker stations. A good plan is to have the band cover from 20

to 80 on a 100-division dial; this leaves the balance for the marker stations. Four or five markers are enough.

The first point of the standard frequency transmission should be logged in the same manner as the commercials and so on down the line, being sure to use only the tuning dial and also to get the standard frequency transmissions tuned in to zero beat with the receiver. When the last point has been recorded carefully all the necessary values are known for plotting a curve on graph paper. If the frequencies of the marker stations are known they also can be added to the curve.

The receiver is completely calibrated now but we still haven't used that little condenser. Its function is to correct errors in the scale of the main tuning condenser. In other words, suppose WEE on the original set up came in at 94 but when a frequency check is wanted WEE happened to be coming in on 95. Set the main tuning dial on 94 and then put WEE on zero beat by adjusting the small condenser, thus correcting any error that may have developed since the last time the receiver was used. After the marker station has been "put" it might be wise to run over the rest of the marker stations that happen to be on to see if they appear at their original dial settings. If they do — and they should — the receiver is ready for checking frequency. It is advisable to go back to the marker stations from time to time to make sure the calibration has not changed because of the apparatus "warming up." Also, discretion in selecting marker stations of good frequency stability is imperative.

This method of checking frequency has been in use at W9CWI for some time and has proved very reliable. It is possible to set the receiver for standard frequency transmissions and come to within 500 cycles of zero beat with them. It is also possible to set up on one of the marker stations and tune the others to zero beat on their specified dial readings.

This method of calibration is particularly applicable to battery-operated receivers, the tubes for which generally reach their final operating temperature very quickly. It is more difficult to get really good results with a.c. sets because variations in line voltage make accurate settings difficult because of frequency instability introduced by variations in the "B" supply voltage. — *Editor.*

HOMEMADE TEMPERATURE CONTROL BOX

Fig. 1 shows the details of construction of an inexpensive heater box for crystal control as used by Fred Mueller, W6EHO.

The box is $6\frac{3}{4} \times 8\frac{1}{4} \times 8\frac{1}{4}$ inches, and is constructed of Cellotex. Screws are used for holding the sides together, and all joints must be tightly closed to prevent heat leakage.

Perhaps the most interesting feature of the box is the homemade bi-metallic thermostat. A six-inch piece of steel spring taken from an old

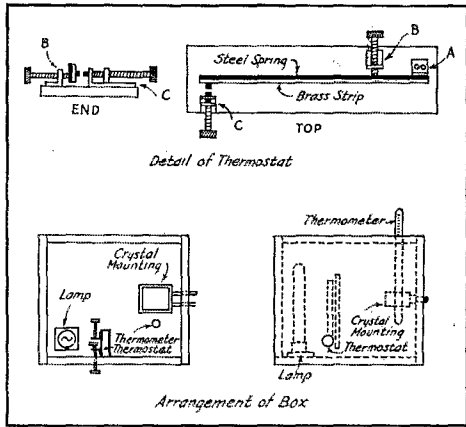


FIG. 1

alarm clock and a piece of strip brass of the same size are held together by brass rivets spaced a quarter inch apart along the length of the two pieces, forming the expansion strip. As shown in the top view of the thermostat in Fig. 1, one end of the strip is held to a suitable base by the brass angle *A*; at the other end of the strip a contact point (points from ignition coils will do

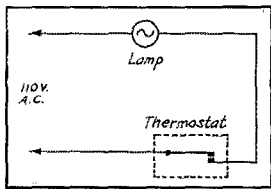


FIG. 2

very well) is riveted on the brass side. A second contact point is riveted on a spring brass angle, *C*, which also is fitted up with a machine screw as shown in the end view to vary the gap between the points. A third angle, *B*, holds another machine screw which adjusts the position of the thermo-strip in relation to the contact *C*.

The lower part of Fig. 1 shows how the parts are arranged inside the box. The thermostat is mounted vertically on one side of the box with the screw *C* projecting through so adjustments may be made from outside. The lamp which furnishes the heat is one of the type used in music racks or show cases, and is mounted so

that the thermostat is between it and the crystal mounting. A 0-100 degree Centigrade thermometer is mounted near the crystal as shown in the drawing. The wiring diagram is shown in Fig. 2.

In adjusting the thermostat the screw *B* is first set so the contact points are not quite touching (this adjustment may need to be changed slightly after the strip has been heated). Screw *C* is then set so the box operates at the desired temperature, a procedure which may take a little time since the air inside the box does not reach a steady temperature immediately.

A box of this type, while not capable of maintaining the crystal temperature within the small limits allowable for precision frequency work, is adequate for general amateur work where the chief job of the oven is to compensate for variations in room temperature so that the crystal will not wander kilocycles from its nominal frequency.

PROTECTING THE AMPLIFIER

W6CKS, who suggested the use of flashlight bulbs in series with plate supplies to protect rectifier tubes some time ago, has another scheme for preventing the amplifier in an m.o.p.a. set from going west if the plate circuit should be inadvertently closed when the bias voltage is off. It is particularly applicable to those transmitters in which separate plate supplies are used for the oscillator and amplifier and in which the bias for the amplifier is obtained from a voltage divider on the oscillator plate supply.

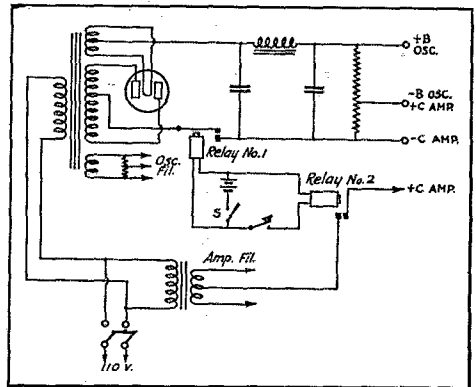


FIG. 3

A wiring diagram is shown in Fig. 3. Two relays are necessary, one to close the high-voltage supply in the oscillator circuit and the other for keying the amplifier center tap. When switch *S* is closed Relay No. 1 closes and bias voltage appears on the amplifier grid. The amplifier may then be keyed. So long as *S* is open, however, it is impossible to close the amplifier center tap and thus no plate voltage can be put on the tube.

The power line switch should be arranged to turn on the oscillator plate supply at the same time the amplifier filament goes on.

AN ELECTRONIC CIRCUIT BREAKER

The overload relay arrangement shown in Fig. 4 was suggested by W1BHH, who writes as follows concerning it:

"During some 5-meter work, my transmitter had to run for long periods without anyone

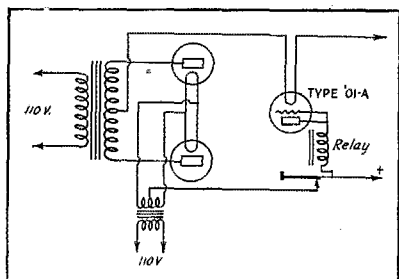


FIG. 4

watching it. At one time it developed a short circuit somewhere and ruined the rectifiers. To prevent further trouble of this sort, I used the idea shown in the accompanying diagram.

"When a short develops, the 201-A tube lights up and current flows through the relay, breaking the circuit. This also happens when the tubes stop oscillating or when a spark jumps across the leads of a filter condenser."

The relay should operate on fairly low current — 50-100 milliamperes — and should be of the normally closed type. After once operating it should not close again unless reset by hand. Otherwise it will go on and off automatically something in the manner of a buzzer as long as the overload persists. This idea should not be

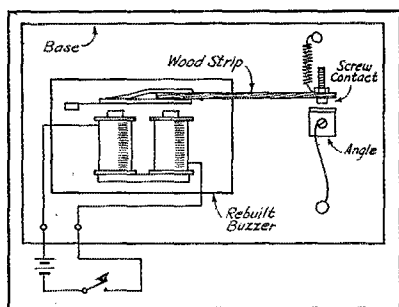


FIG. 5

used on voltages much over 500 because the insulation in the '01-A is likely to break down.

AN INEXPENSIVE RELAY

A buzzer acquired in pre-transmitter days for code learning, having outlived its usefulness as

a buffer, was recently rebuilt into a relay here. This is how it was done:

The cover was removed and the buzzer (so-called 5 & 10 variety) was fastened to the lid of a cigar box. I only put one screw in it so it could be moved to enlarge or close the gap that was to be made later.

The buzzer has a small projection near the armature so that the spring will touch it and make the circuit. This is taken off and a small section of wire is placed on the coil where it is attached. The other end of the wire is connected to the part of the armature that does not move. Now when current is applied the arm does not vibrate but stays down on the magnet until the current is stopped.

A small piece of wood about $\frac{1}{8}$ of an inch thick, an inch high and $2\frac{1}{2}$ inches long, whittled so one end of it can be attached to the armature, is slipped in between the arm and the spring. The part that had the contact point is folded under and pressed in to the wood so the wood will not slip out. A screw helps to hold it in place.

The screw head in the other end serves as one contact of relay. A piece of No. 30 wire is fastened behind the nut that holds the screw in place, and the other end is attached to a binding post.

A piece of lead strip (some other kind of material would be better) two inches long is bent at the center and a hole bored in one side for a screw to fasten it down. A piece of wire from the other binding post comes to this point and the angle is then fastened to the base an eighth of an inch from the screw head in the wooden arm. When current is applied the arm comes down to make contact.

— William McLain, W8BOW

Strays

On September 1st new postal rates became effective on mail matter going to Great Britain and Canada. On letters to Canada and Newfoundland place 3¢ postage, and on postcards to these two countries place 2¢ postage. Great Britain (England, Scotland, and Wales) and the Irish Free State and Northern Ireland place 5¢ on letters and 3¢ on postcards. Watch your postage on letters and QSL cards addressed to these countries.

Correction

Experimenters' Section

In Fig. 7, on page 38 of the October issue, a connection was inadvertently omitted which prevents the feeder switching scheme from working when the switch is thrown to the "parallel" position. There should be a connection between the right-hand switch blade and the right-hand feeder.

AMATEUR RADIO STATIONS

W9FQU, Park Ridge, Ill.

MARCUS L. POTTER, owner of W9FQU, has had long and varied experience in amateur radio. In 1916, after devouring the contents of William B. Duck and E. I. Company catalogs, a complete quarter-inch spark coil transmitter and receiver were purchased from Sears, Roebuck and Company and 9ANI came into existence. Needless to say, nothing much was accomplished except to mystify the neighbors when they happened to notice the elaborate antenna and chicken-wire ground system. After the war a new transmitter, consisting of a one-kilowatt United wireless open core transformer and associated equipment for giving a sixty cycle synchronous note, was built and became quite prominent under the call 9ABL.

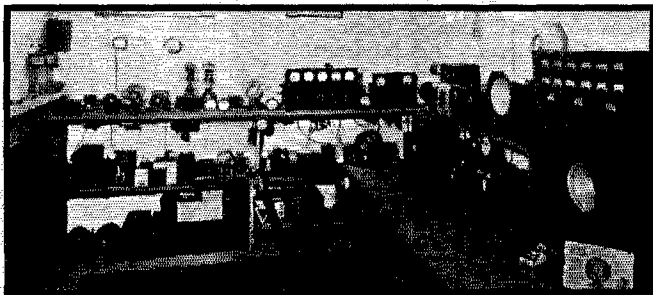
In 1921, going away to school interfered with operation of 9ABL and the call afterwards was lost. However, 9YB at Purdue University, Lafayette, Indiana, then came into the picture and shortly after this 9ABL secured Purdue's broadcasting station license WBAA, because of his being the only person at the University possessing a commercial operator's license. From 1925 to 1927 radio activities ceased on account of lack of time, but the constant urge to get back into the game prompted the building of a small five-watt c.w. outfit during the early part of 1928, which was given the call 9DMI. Because of cramped quarters — the whole outfit was mounted on one shelf of a kitchen cabinet — expansion was out of the question. But in 1930 that problem was solved by moving into a house in Park Ridge, Ill. A radio room was built in one section of the basement and the five-watt outfit soon grew into a crystal-controlled power-amplifier affair, using two 250-watt tubes at the output stage. It was here that the call was again changed, this time to W9FQU, the present call.

W9FQU is primarily a 'phone station, operating on any one of the following frequencies: 3548 kc., 3523 kc., and 3508 kc., although c.w. is sometimes used on 3581 kc. Plug-in crystals are used in changing frequencies.

The transmitter is completely push-pull, and is built up in four stages. Two Type '45 tubes are used in the crystal oscillator; two Type '24's in the class B (second stage) buffer amplifier; two Type '10 tubes in the (third stage) class C modulated amplifier; and two W-E 212-D tubes in the output stage, which is operated as a class B linear amplifier. The power output to the antenna-counterpoise system is approximately 250 watts on 'phone at eighty percent modulation, as measured by a vacuum-tube voltmeter which may be seen on the shelf just above the operating table. This latter piece of apparatus was copied from the modulometer described in August, 1929, *QST*.

A two-stage transformer-coupled speech amplifier, using Type '27 tubes, feeds an 845 fifty-watt modulator, which in turn modulates the Type '10 push-pull amplifier.

Three separate rectified a. c. units supply all



W9FQU — AN UP-TO-DATE 'PHONE STATION

On the operating table in the right foreground are the two receivers, condenser microphone and loud speaker. Sitting on the shelf above the receivers are the modulometer, monitor, heterodyne frequency-meter, a carbon microphone and part of a broadcast receiver chassis. The transmitter, power supply, "C" batteries and some miscellaneous parts occupy the space along the rear wall. The small panel at the right on the top shelf is the speech amplifier; to its left is a panel-mounted unit containing the crystal oscillator, buffer amplifier and modulated amplifier. The linear amplifier is built in breadboard fashion and occupies the left half of the shelf.

plate voltages; a 180-volt supply for the crystal and buffer stages; a 135-volt supply for the speech amplifier, and a 1500 volt supply, using mercury-vapor tubes, for the linear amplifier. This last unit also supplies plate voltage for the modulator and modulated amplifier through two resistors, a 2500-ohm resistor before the modulator to drop the voltage on the modulator to 1000 volts, and a 1000-ohm resistor before the modulated amplifier to still further drop the voltage so that 500 volts

is impressed on the modulated amplifier. "B" batteries and resistors are used for obtaining "C" bias for the various tubes.

An overload adjustable circuit breaker set at 400 mils in series with the positive side of the 1500-volt supply protects the tubes and other



W9FQU'S WELLEQUIPPED WORKSHOP

This is in the end of the radio room opposite the transmitter. The workshop has been of considerable assistance in making many of the parts used in the station.

apparatus in case of a short circuit or overload. It might be added that this piece of equipment has paid for itself over and over again.

A condenser microphone having a two-stage pre-amplifier built in the same case is used for 'phone work, although a two-button carbon type is sometimes pressed into operation.

For reception W9FQU uses two sensitive receivers — a National A.C. SW-5 Thrill Box and a six-tube short-wave screen-grid superheterodyne built in accordance with the information given in the March, 1929, issue of *QST*. The one stage of audio amplification in the latter receiver gives good speaker volume on practically all stations. Very seldom are headphones used.

Although operating intermittently two or three nights a week between 6:30 to 8:00 p.m. and 10:30 to 11:30 p.m. (Central Standard Time) W9FQU has worked on 'phone seven out of the nine United States districts. Although only put into operation in October, 1930, several hundred QSL cards have been received, and all of course are being used for wallpaper.

The radiating system, due to lack of space, is nothing more than an antenna-counterpoise system. Its support at one end is a fifty-one foot iron flag pole, which is a double section affair (pipe inside of pipe) starting with three-inch pipe at the ground and ending up with 1½-inch pipe at the top. The special construction makes the pole so rigid that guy wires are not necessary. The other end of the antenna is fastened to the house and is then led into the operating room through holes drilled in glass panes of a window.

A complete work-shop with almost every kind of tool, including a Model Makers screw-cutting metal lathe, is also a part of the equipment of W9FQU. The photograph shows the work bench and many of the tools, which have been of con-

siderable assistance in making some of the special equipment used.

One of the most valued items at this station is a complete set of bound volumes up-to-date of *QST* starting with the re-opening number (July, 1919) after the World War.

W3KW, Merchantville, N. J.

W3KW is owned and operated by R. W. Barrington, 7434 Park Avenue, Merchantville, N. J. The station is about five miles air line from the center of Philadelphia. There are nine operator's licenses on the wall, all excepting the first being commercial licenses, a first grade commercial license at present being held.

One transmitter and three receivers are in use at this station. The transmitter is about ten feet from the operating table and is designed so it can be remotely controlled from any part of the house. It consists of Type '10 crystal oscillator, Type '10 doubler and a 203-A output tube. At present 125 watts input is used on the final amplifier on frequencies of 3674 and 7204 kc. The crystal and buffer are operated from one power supply, receiving 250 and 550 volts respectively, and a separate supply furnishes 1444 volts to the output tube, the plate current on which is slightly



W3KW'S TRANSMITTER IS MOUNTED ON GLASS PANELS

The transmitter is crystal-controlled, with a Type '03-A final amplifier working on 3.5 and 7 mc. On the table at the right are a combined medium and long wave receiver and a short wave a.c. receiver. The honeycomb coils on the shelf on the wall bring back pleasant memories

under 100 mils. Conventional circuits are used throughout.

The antenna is a voltage-fed Hertz, 132 feet long starting from a tuned tank circuit inductively coupled to the amplifier tank. There is a meter in the tank which shows 6 amperes with the antenna connected but goes off scale when the antenna load is taken off. Five foot glass rods are

(Continued on page 76)

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager

E. L. Battey, Asst. Coms. Manager

Saturday, November 21st—A Two-Band QSO Party

SOMETHING new to try! Mark the calendar for November 21st to tune in for a "get acquainted" session with the gang working in another band. For our first party the two bands will be specified as 7 mc. and 3.5 mc. The whole day of November 21st, your local time, 0000 to 2400, will be open for this type of operation suggested by W9UZ. All W/VE hams are invited.

The plan is this: All amateurs with 7-mc. transmitters will CQ and listen for replies on 3.5 mc.; and similarly those transmitting on 3.5 mc. will listen, November 21st, on the 7-mc. band for replies to their calls. Get on the air on November 21st prepared to meet a new bunch of stations, and see what's going on for the evening in a different band than you normally use for transmitting. With a bunch of stations on, it should be easy to move traffic in any direction, have rag chewing galore, and work new stations as well as meet old acquaintances.

In CQing for the purpose of this TWO-BAND work it is suggested that normal 3 x 3 CQs be used, but followed with the figure "3" or "7" to indicate respectively that 7-mc. stations are standing by for replies on 3.5 mc., or that 3.5-mc. stations are covering 7-mc. territory for replies. For example, call like this on 7 mc., "CQ CQ CQ de W5 --- W5 --- W5 --- 3 AR." The reason for placing the band designation where you will listen last is, of course, to differentiate the calls in this party from normal directional CQs made in accordance with the R. & R. placing a designation of direction or district right after the CQ call itself. Give the two-band idea a good try on November 21st. Then shoot us a message or postal giving your results and suggestions for the future. If you like the idea we'll have another operating session like it; if not, at least we think you'll agree it was worth a try. Remember the date, November 21st, Saturday night or all day, as you please — but most of the gang will probably be on for this work during the busy evening operating hours.

Station Licenses Revoked

FEDERAL RADIO COMMISSION, Washington. — On the first day of September, 1931, the Commission entered an order revoking the station license of Station W4AJ, Marshall Castleberry, Adel, Ga., as licensee. The said order of revocation shall become effective on the fifth day of October, 1931, unless pursuant to Section 1 of Subtitle C, of General Order 93, written application for hearing on said order is made. A similar order had been entered revoking the license of W9AJD, Joy P. Miller, Ashland, Nebr., licensee. The reasons set forth in the orders of revocation are as follows: (1) That the licensees had upon several occasions operated their amateur radio stations upon frequencies in the broadcast band and had broadcast music over said stations, all in violation of the Commission's amateur regulations and the terms of the station licenses; (2) that said licensees knowingly and willfully committed said violations, and (3) that the acts of said licensees have been the source of complaints.

UNLICENSED STATION FINED

An unlicensed radio station detected by the radio inspector at Boston, Mass., was seized by that Federal agent.

The operator pleaded guilty and was fined \$2000. In addition he was given a suspended sentence of three years in the Federal Prison at Atlanta, Ga. The suspension stipulates that the operator shall not engage in any radio activity which has to do with the transmission of radio communications.

CALL PIRATE CAUGHT

To protect properly licensed amateurs from borrowing of their call signals the Radio Division recently made an example in the case of an unlicensed station improperly signing W9FRP (rightfully assigned to E. D. Spiller, Denver, Colo.), and the operator's license of Frank R. Parsona of Indianola, Iowa, was suspended for one year in connection with this case.

The A.R.R.L. requests aid of all members in reporting all violations, and the use of unauthorized calls so individual operators may be warned or any action necessary taken to improve the situation which has led to action by the authorities. In the cases of W9AJD and the illegal use of W9FRP evidence submitted by law-abiding amateurs was of material assistance to the Government in obtaining a conviction and remedying each case cited.

Armistice Day Message

THE annual Armistice Day message from the Chief Signal Officer to Army Amateurs will be broadcast from WLM on 6990 kc. and W3CXM on 3950 kc. on Monday night, November 9th. The message will be broadcast every hour, on the hour, from 6:00 p.m. until 2:00 a.m. (Tuesday) E.S.T. Corps Area Control Stations will rebroadcast the message.

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

All stations copying the message should mail their copy direct to the Chief Signal Officer, Munitions Building, Washington, D. C. The message should show the operator's name and station call, the hour received and from what station received.

All Amateurs, whether members of the Army Amateur Radio System or not, will have their calls listed on the Army honor roll, and also in *QST*, if they copy and mail in the received message.

1750-kc. Code Practice

The following are the schedules of the "1750 kc. Volunteers," who are engaged in transmitting code practice for beginners on the 1750 kc. (160-meter) band: W1AKY, Quincy, Mass., 1750 kc., Thursdays, 8:15 p.m.; W3AC, Montague, N. J., 1940 kc. (crystal), Sundays, 6:00 p.m., Wednesdays and Fridays, 9:00 p.m.; W5AEI-W5BXD, Oklahoma City, Okla., 1940 kc., daily, 7:30-8:00 p.m.; W6BUZ, Reedley, Calif., 1715 kc., Tuesdays and Thursdays, 9:00 p.m.; W7GZ, Spokane, Wash., 1975 kc., Wednesdays, 8:00 p.m.; W8CSW, Montour Falls, N. Y., 1774 kc., Wednesdays, 7:00-8:00 p.m.; W8UF, Youngstown, Ohio, 1750 kc., daily, midnight-1:00 a.m.; W8UP, Youngstown, Ohio, 1770 kc., Tuesdays, 9:30-10:30 p.m.; W9AFP, Tabor, S. Dak., 1750 kc., Tuesdays, 9:30-10:00 p.m., Thursdays, 9:30-10:30 p.m., Sundays, 9:00-10:00 a.m. and midnight-

1:00 a.m. (Monday); W9BPK, Minneapolis, Minn., 1775 kc. (crystal), Mondays, 7:00 p.m.; W9CXD, Paducah, Ky., 1995 kc. (crystal), Wednesdays and Saturdays, 10:30-11:30 p.m.; W9GCG, Kansas City, Mo., 1750 kc., Saturdays and Sundays, midnight; W9GDL, Lincoln, Nebr., 1900 kc., Fridays, 8:30 p.m., Sundays, 3:30 p.m.

W4IT, Ozark, Ala., 1720 kc., Tuesdays and Thursdays, 9:00-10:00 p.m., W8DNT, Rochester, Mich., 1875 kc., Monday, Wednesday and Friday, 7:30-8:30 p.m.; W9IK, Cogswell, N. Dak., 1770 kc. (1965 kc. on request), Tuesdays and Thursdays, 7:15-8:15 p.m. All hours given are *Local Standard Time at the transmitting stations.*

Any stations working in the 1750-kc. band wishing to volunteer regular schedules of code practice should get in touch with A.R.R.L. Headquarters at once, so that their schedules may be published and distributed by mail to those interested. The above list may be revised from month to month, and the changes mentioned in *QST*. A complete list of stations sending code practice on the 1750-kc. band will be mailed to anyone requesting same.

LISTEN ON 1750 KC.

On the five Sundays of November, G2FS, G5RX, G6FO, G6ZH and G5UM will transmit between 1970 and 1740 kc. (152-172 meters) between 0000 and 0800 Greenwich (7 p.m., Saturday night, to 3 a.m., Sunday morning, E.S.T.). Two stations, at least, will be on the air all the time, and a special effort will be made to put signals across to the U. S. A. Please listen, and report results to A.R.R.L. Headquarters at once. If successful in pulling G-stations through our QRM, later official tests will be arranged for two-way working with these stations on this band.

Are You Doing Your Part?

By L. B. Laizure*

In January *QST* (page IV) we invited contributions on every phase of amateur communication activity. New ideas and viewpoints, criticisms of and remedies for conditions, hints on DX, suggestions concerning radio club organization, information on interference elimination, exceptional two-way communication work covering emergencies, athletic games and trips, timely attention to operating practise, commentary on the place of radio-telephony, experimenting or development work in present-day amateur radio, data on low-power possibilities, 1750-kc. operation, etc., all are needed. There is plenty of romance and real accomplishment in amateur work. Read this contribution and the one presented last month. Then give us some real operating stories or the benefit of your views on different subjects.

In addition to publication of the best articles in *QST*, the author whose article appears to have greatest value of those received for consideration, has his choice of (1) a copy of *The Radio Amateur's Handbook* bound in leather cloth, (2) six pads of message blanks, or (3) six of the new type A.R.R.L. log books. Our offer is good throughout 1931. The article presented herewith is the prize-winning article for this month.

— Communications Manager.

In a body of some 23,000 amateur station operators, there is naturally a considerable divergence of primary interests. Thus we have those who are experimenters in this or that particular field; we have phone enthusiasts; we have rag-chewers, who delight in conversations lasting sometimes for hours with the other fellow on the other side

* W9RR, Section Communications Manager for Missouri, A.R.R.L. Lt. (jg) U.S.N.R.

of the country; and we have the group whose chief interest is in traffic-handling. All of these things are worth while in themselves. Yet in the present state of affairs, one wonders at times if some have failed to realize that traffic-handling is perhaps the biggest justification that we have for amateur radio.

From time to time we are reminded forcibly that our place in the spectrum is coveted by different interests. But — our work is regarded as essential by the Government; our continuance is in the public interest, convenience, etc., justifying protection by the Government. The Government regards the amateur fraternity as the reservoir — the training camp, if you please, from which the ranks of commercial and military operators are to be recruited in the future, as they have been in the past. That condition will be maintained most positively in exactly the ratio in which we evidence interest in the handling of traffic, which develops operating ability, skill and knowledge of systematic procedure. It then devolves upon us to see to it that the Government is fully advised regarding our work in this direction.

Fortunately we are already provided with the means to accomplish this purpose; but we find that many do not take advantage of it, for their own good and the good of the fraternity. We have a monthly record of traffic-handling in *QST*. This has been called on time and again for statistics regarding our activity in handling traffic. League Headquarters officials and our SCMs are not mind-readers; we cannot manufacture reports for those who are too careless or lazy to supply them. At no time in our history — unless it was at the very beginning — were complete figures available as to the real magnitude of traffic handled. Partial figures ONLY can result from partial reports. The writer confidently believes that if EVERY station handling traffic would report the figures to his SCM for just ONE month that the result would astonish everyone. Inasmuch as our value to the Government results chiefly from our traffic-handling activities, we must conclude that the moment we cease that function — or give the impression that we are drifting away from it, we jeopardize our Government support. We lay ourselves open to the attack of covetous outsiders. Manifestly it behooves each and every one of us to show that we are doing our bit in traffic-handling, and the place that showing is indelibly recorded is in the reports printed in *QST* each month. Many of us grossly neglect this plain duty and opportunity to get credit for our work at the same time we do OUR part in solidifying the position of the amateur in Government circles. Reporting is distinctly worth while; and failure in this respect is only failure to use what reasoning powers we have in self-preservation.

At this point a discussion of the ORS appointment is not out of order. The first requirement of an ORS is the regular handling, and REPORTING, of traffic passing through the station. If a station is interested in traffic work, and does handle messages regularly — not necessarily a huge total per month, or a BPL score, but a reasonable number, then that station is entitled to and should become an ORS. The station which handles traffic and does not report it for record in *QST* is not playing fair with the amateur fraternity, whether an ORS or not. It is no disgrace NOT to be an ORS, if traffic-handling is not numbered among the interests of the station owner; ORS who are inactive in regard to traffic are of no particular benefit and load down the list with deadwood. They should resign and have their appointments honorably cancelled, renewable if and when they meet the requirements for an appointment; this will result in the ORS list truly representing the active traffic stations among the membership, which is most desirable.

Let's wake up, fellows, and declare a new deal on this business of traffic reports and ORS appointments.

KGEG

"Bill" Crabbe, W6ESW, operator of the Schooner-Yacht *Northern Light*, KGEG, is now in the southern part of the Indian Ocean, south of Australia. He worked W6ATJ and W6EGH, recently, and expects to arrive in Singapore about Christmas time. KGEG sends "CQ ARRL" for general contact with 7-mc. amateurs, daily, on 8330 kc. (36 meters) at 0810 Greenwich (0010 P.S.T.). Look for KGEG!

Traffic Summaries

(AUGUST-SEPTEMBER)

Central led by Ohio (8585)	18,357
Pacific led by Los Angeles (4037)	13,091
Atlantic led by Southern New Jersey (2842)	8,436
Midwest led by Kansas (1089)	2,970
New England led by Connecticut (1226)	2,671
Hudson led by Eastern New York (1477)	2,599
Roanoke led by Virginia (2226)	2,398
West Gulf led by Oklahoma (788)	1,800
Delta led by Arkansas (274)	830
Southeastern led by Eastern Florida (369)	811
Ontario	750
Rocky Mountain led by Utah-Wyoming (379)	686
Dakota led by Southern Minnesota (315)	542
Northwestern led by Oregon (245)	522
Quebec	99
Vanilla led by British Columbia (93)	93
Prairie led by Saskatchewan (40)	71
Maritime	42

895 stations originated 16,575; delivered 11,702; relayed 28,491; total 55,768 (70.8% del.)

The OHIO Section has a "death grip" on the Banner, and is again at the top with a total of 8533. The runners-up are Los Angeles, 4037, and Michigan, 3630. The above summary shows the relative standing of all Divisions and the leading Section in each Division for the August-September reporting month. The total for each leading Section is shown in parenthesis. Attention is called to the fact that deliveries went down from 74.7% for the previous month to 70.8% for August-September. This is a bad sign. Every one is urged to WATCH DELIVERIES. Note the slogan of the Illinois Section Net — "Relay and Deliver All Traffic. Create Only Better Traffic."



Official Broadcasting Stations (Local Standard Time)

CALL	FREQUENCY	SCHEDULES
WIATFR	3725 kc.	Sun., 3:00 p.m.; as often as possible throughout week, 5:30 p.m.
WIAJC	3800 kc.	Tues., Thurs., Sat., 6:00 p.m.
WIAPK	3600 kc.	Mon., Tues., Wed., Thurs., Fri., Sat., Sun., 7:00 p.m.
WIAQX	3790 kc.	Mon., Tues., Fri., 7:00 p.m.; Sun., 4:30 p.m. if possible.
WICDL	3900 kc.	Tues., Sat., 6:30 p.m.
WIKH	7160 kc.	Tues., Thurs., Sat., 6:20 a.m.
WIQP	4045 kc.	Fri., 7:30 p.m.
WIXU	3700 kc.	Mon., 10:30 p.m.; Tues., 10:00 p.m.; Wed., 8:30 p.m.; 10:30 p.m.; Thurs., 10:00 p.m.; Fri., 10:30 p.m.; Sat., 8:00 p.m.
W2ACD	3915 kc.	Mon., Tues., Wed., Thurs., Fri., 6:15 p.m.; 11:00 p.m.; Sat., 12 midnight. During Sundays and other days when conditions permit.
W2AKC	7007 kc.	Tues., Thurs., 8:30 p.m.; Sun., 12:00 noon.
W2BIV	3800 kc.	Sun., 1:00 p.m.
W2AZV	3900 kc.	Sun., 9:00 p.m.; Mon., 6:00 a.m.; Wed., 8:00 p.m.; other days at midnight and 5:30 a.m.
W2BLJ	7105 kc.	Wed., 10:15 p.m.; Sat., 6:30 p.m.
W2BGO	3875 kc. 3750 kc.	Mon. at no special time. Daily except Mon. & Tues., 3:00 a.m.; Wed., Thurs., Fri., Sat., 1:00 p.m.
W2BO	7130 kc. (cc)	Sat., 11:00 p.m.; Sun., 10:00 p.m. Miscellaneous times weekdays.
W2CBB	7200 kc.	Mon., Wed., 5:40 p.m.; Thurs., 10:00 p.m.; Sat., 1:00 a.m. (or later).
W2CL	3832 kc. (cc) 7261 kc. (cc)	Sun., 5:00 p.m. Sun., 9:00 a.m. Other times frequently on both 3832 and 7261 kc.
W2MQ	3890 kc.	Tues., Fri., Sun., 7:45 p.m.; 10:30 p.m. Various times on Sundays.
W2PF	3900 kc.	Wed., 7:00 p.m.
W3AFF	3835 kc.	Tues., Sat., 6:00 p.m.
W3ALE	3600 kc. 7300 kc. 7200 kc.	Mon., Thurs., 10:30 p.m. Mon., Thurs., 7:00 p.m. Tues., 1:45 p.m.; Fri., 11:15 p.m.; Sun., 4:00 p.m.
W3AOJ	7010 kc. (cc)	Wed., Thurs., Fri., 7:00 p.m.
W3BWT	3640 kc.	Sat., 7:30 p.m.
W3PN	7120 kc. (cc) 14,240 kc. (cc)	Daily except Sun., 7:00 p.m. Sun., 11:00 a.m.

W3QP	3700 kc. (CW) 7285 kc.	Tues., Fri., 9:00 p.m. Mon., Wed., Fri., approx. 6:15 a.m. Tues., 4:30 p.m.; Fri., 8:30 p.m.
W3ZA	3518 kc. (phone)	Sat., midnight; Sun., 10:30 a.m.; Wed., 7:30 p.m.
W4AAD	3540 kc. (phone)	Mon., Fri., 8:00 p.m.
W4ABL	3533 kc. (phone)	Sun., 6:30 a.m. Also during week at best times.
W4ACB	7100 kc.	Sun., Tues., Thurs., 7:45 p.m.
W4AEM	7010 kc.	Sun., 4:30 p.m.; Tues., Thurs., 8:30 p.m.
W4AJH	14,100 kc. 3640 kc.	Fri., not definite. Sun., 9:30 a.m.
W4CK	7250 kc. 7240 kc.	Tues., Fri., 5:30 p.m. Tues., Thurs., 7:30 p.m., 10:30 p.m.; Sat., 10:30 p.m.
W4FV	7020 kc.	Sun., Fri., 10:00 p.m.; Wed., 8:00 p.m.; Sun., 5:00 a.m.
	14,040 kc.	Sun., 6:00 p.m.; Mon., Tues., Wed., Thurs., Fri., Sat., 5:00 p.m.
W4KP	3640 kc. (cc) 7280 kc.	Tues., 8:30 p.m.; Fri., 8:30 p.m. Oct. 1, 1931.
	14,072 kc. (phone) 3518 kc. (phone)	About Dec. 1.
W4MS	7120 kc.	About Nov. 1.
W4PM	3633 kc. 7266 kc.	Mon., Wed., Fri., 5:30 p.m. Various times on other days when conditions favorable.
W5ACY	7150 kc.	Wed., Fri., 7:30 p.m.
W5ASQ	7120 kc.	Sun., 1:00 p.m.; Wed., Fri., 9:00 p.m.; Tues., 3:00 p.m.
W5AUC	7150 kc.	Tues., Thurs., 7:00 p.m., 9:00 p.m.
W5AUW	7100 kc.	Mon., Wed., Fri., 6:30 p.m.
W5AWP	3538 kc.	Mon., Wed., Fri., 12:30 p.m.; Sun. at various times.
W5AZV	7180 kc.	Mon., Wed., Fri., 9:00 p.m.
W5BHO	3525 kc. (phone) 7150 kc. (CW) 7290 kc. (cc)	Wed., Fri., 6:30 p.m. Mon., Wed., Fri., 7:30 p.m. Daily, 12 noon, 11:30 p.m., 7:00 a.m. Phone Crystal Control on Sundays only.
W5MS		Tues., Thurs., Sun., early morning hours.
W5OJ	7025 kc.	Sun., Thurs., Tues., Fri., 9:00 p.m.; Wed., 7:00 p.m.
W5PP	3550 kc. 3600 kc. 7100 kc.	Mon., Fri., 7:00 p.m. Mon., 10:30 p.m. Tues., Thurs., 7:00 p.m.
W5VJ	7225 kc.	Tues., Wed., Thurs., 9:30 p.m.
W6AEO	7190 kc. (cc)	Tues., Thurs., 6:30 p.m.
W6AMM	7270 kc.	Tues., Thurs., 7:00 p.m.
W6AWT	3532 kc. (phone) (cc)	Tues., Thurs., 7:00 p.m., 10:30 p.m.
W6BBJ	3500 kc. (phone) 7100 kc. (CW)	Mon., Wed., Fri., 10:30 p.m.
W6BIP	14,000 kc. (phone) 7280 kc.	Whenever convenient. Sun., whenever convenient.
W6BIF	7280 kc.	Mon., Wed., Sat., 9:00 p.m.
W6BVF	7050 kc.	Send B/C often early a.m., 6:00 a.m., 8:00 a.m.
W6BVY	3800 kc. 7150 kc.	Daily, 7:00 p.m.; Sun., daylight. No definite time.
W6BYB	7175 kc.	Tues., Thurs., 8:45 p.m.
W6BYH	3600 kc. 7200 kc.	Mon., Wed., Fri., 5:45 a.m. (or P. 1. and Orient Hams.)
W6CDU	7225 kc.	Daily, except Sun., 9:30 a.m.
W6CEC	3548 kc. (phone)	Daily, except Sun., 12:15 p.m.
W6CFN and/or W6NLF	3990 kc.	Daily, except Sun., 5:15 a.m.
W6CLS		Daily, 6:00 p.m., 10:30 p.m.
W6CPF	3660 kc. (phone) 7250 kc.	Tues., Thurs., 7:00 p.m.
W6CRF	3507.5 kc. (phone) (cc)	Daily, 8:30 a.m., 5:00 p.m.; 5:00 p.m. broadcast some-times uncertain.
W6CVV	7100 kc.	Mon., Thurs., 8:00 p.m., 12:00 a.m.
W6CXW	7145 kc. (cc)	Mon., Wed., Fri., 6:00 p.m.
W6DVF	7300 kc.	Wed., Thurs., Fri., 3:00 p.m. Several times each Sun., daylight.
W6EGH	7162 kc. (cc)	Daily, 6:00 p.m. to 8:00 p.m., 8:00 p.m. to 12:00 p.m.
W6ESA	7174 kc. (cc)	Daily, 5:00 p.m.
W6ETJ	3800 kc. 7175 kc.	Mon., Wed., Fri., 5:30 p.m.
W6T	7270 kc. (CW) 14,350 kc. (CW) 7250 kc.	Tues., Thurs., Sat., 9:30 p.m. Various other times during daytime.
W6ZE	7250 kc.	Mon., Wed., 6:30 p.m. Fri., 6:30 p.m.
W7AAT	7040 kc. (cc)	Mon., Wed., Fri., 8:00 p.m.; Sun., 7:30 a.m.
W7ANT		Daily, except Wed. & Sat., 9:30 p.m.
W7AYH	3515 kc. (phone) 3625 kc.	Tues., Sat., 11:30 p.m.
	7250 kc.	Sun., 8:00 p.m.; Wed., 1:00 a.m.; Fri., 10:00 p.m.
		Sun., 4:30 p.m.; Wed., 12:30 a.m.; Fri., 9:30 p.m.

W7BZ	3538 kc. ('phone) (cc) 12:35 p.m. 7275 kc. (CW) (cc)	Daily, except Sun., 12:20 to 12:35 p.m. Daily, except Sun., 12:00 to 12:15 p.m.	W9EDW W8EFN	3541 kc. ('phone) 3540 kc.	Daily, 12:30 a.m. Daily, except Sun., 6:00 p.m. Several times on Sun. if conditions good.
W7MQ	3580 kc. 7080 kc.	Mon., Wed., Fri., 7:30 p.m. Mon., Wed., Fri., 1:00 p.m.	W8HD W8ON W8WF	3615 kc. (cc) 3610 kc. 3531 kc. ('phone)	Mon., 8:00 p.m., 10:00 p.m. Tues., Thurs., Sat., 8:45 p.m. Daily, 6:00 p.m.; Wed., Sat., 12:00 p.m.; Sun., 9:00 a.m.
W7PL	7280 kc. (cc)	Tues., Thurs., Sat., 8:00 p.m.	W9ACS W9ACU	3750 kc. 3500 kc. ('phone)	Tues., Thurs., Sun., 10:30 p.m. Tues., 9:00 p.m.; Thurs., 6:45 a.m.
W7AFM	7100 kc. (CW) 14,200 kc. ('phone)	Mon., Wed., Fri., 7:15 p.m. Also various times Sundays.	W9AFN	7030 kc. 7140 kc. (cc) 14,280 kc. (cc) 3650 kc. (cc)	Mon., 12:00 noon. Other irregular times on 3500 kc. Sun., Mon., Wed., 11:30 p.m. At appropriate times. 11:30 p.m. if thought of enough importance and necessary. (On either frequency.) Other odd times.
W8AJ	3940 kc.	Sat., Sun., Mon., 8:00 p.m.	W9AHQ	7300 kc. (cc) 14,156 kc.	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8AXV	14,380 kc. 3900 kc.	Sat., Sun., Mon., 8:00 p.m. Tues., Thurs., Sat., 9:00 a.m.; Tues., Thurs., 8:30 p.m.	W9AIO W9AIR W9BAN W9BEF	7032 kc. 3800 kc. 7075 kc. 28,400 kc.	Sat., Sun., Wed., 6:30 p.m. Mon., Wed., 9:15 p.m. Mon., Wed., Fri., 10:00 p.m. Sun., 12 noon.
W8BWP	7160 kc.	Mon., Wed., Fri., 7:15 p.m. Daily, 7:00 p.m.	W9BJA	3660 kc. 7140 kc. 1760 kc.	Sun., 5:00 p.m. Also various times at dusk through the week. Sun., 7:30 p.m.; Mon., Wed., Sat., 8:00 p.m.
W8CEO	3705 kc.	Mon., Tues., Fri., 7:00 p.m.; Mon., 10:00 p.m. Daily, 5:00 p.m.; Sun., 2:00 p.m., 5:00 p.m.	W9BKJ W9CJQ W9CTW W9DUD	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8CIO	3538 kc. ('phone)	Mon., Tues., Fri., 7:00 p.m.; Mon., 10:00 p.m.	W9BKA	3660 kc. 7140 kc. 1760 kc.	Sun., Thurs., 8:30 p.m. Tues., Thurs., 7:00 p.m. Mon., Wed., Fri., 7:00 p.m. Mon., Wed., Sun., 5:00 p.m.
W8CLN	3503 or 3522 kc. (cc)	Daily, except Sun., 5:00 p.m.	W9BKB	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., 5:00 p.m. Also various times at dusk through the week. Sun., 7:30 p.m.; Mon., Wed., Sat., 8:00 p.m.
W8CMB	3750 kc.	Mon., Tues., Fri., 7:00 p.m.; Mon., 10:00 p.m.	W9BKC	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8CPC	14,010 kc.	Daily, 5:00 p.m.; Sun., 2:00 p.m., 5:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., Thurs., 8:30 p.m. Tues., Thurs., 7:00 p.m. Mon., Wed., Fri., 7:00 p.m. Mon., Wed., Sun., 5:00 p.m.
W8CRA	14,016 kc.	When conditions are good. Mon., Wed., 7:00 p.m.	W9BCL	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., 5:00 p.m. Also various times at dusk through the week. Sun., 7:30 p.m.; Mon., Wed., Sat., 8:00 p.m.
W8CUI	3900 kc.	Mon., Fri., 7:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8DDS	3900 kc.	Mon., Wed., Fri., 8:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., Thurs., 8:30 p.m. Tues., Thurs., 7:00 p.m. Mon., Wed., Fri., 7:00 p.m. Mon., Wed., Sun., 5:00 p.m.
W8DLG	3850 kc.	Tues., Fri., Sun., 7:30 p.m. Also as time permits during week and Sun.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., 5:00 p.m. Also various times at dusk through the week. Sun., 7:30 p.m.; Mon., Wed., Sat., 8:00 p.m.
W8DME	3930 kc.	Mon., Tues., 7:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8DFO	3650 kc.	Tues., Thurs., Sat., 7:00 p.m., 10:30 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., Thurs., 8:30 p.m. Tues., Thurs., 7:00 p.m. Mon., Wed., Fri., 7:00 p.m. Mon., Wed., Sun., 5:00 p.m.
W8DRJ	7150 kc.	Daily, except Sun., 7:00 p.m., 9:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., 5:00 p.m. Also various times at dusk through the week. Sun., 7:30 p.m.; Mon., Wed., Sat., 8:00 p.m.
W8DRJ	14,200 kc. 7020 kc.	Several times Sun., daylight. Mon., Sat., 5:30 p.m., 11:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Mon., Thurs., 6:00 p.m. Repeated on 'phone immediately after CW B/C
W8DZY- W8BCZ	3945 kc.	Daily, except Sat. & Sun., 11:00 p.m.	W9BCK	3735 kc. 3635 kc. 7160 kc. (cc) 7980 kc. (cc) 3540 kc. (cc)	Sun., Thurs., 8:30 p.m. Tues., Thurs., 7:00 p.m. Mon., Wed., Fri., 7:00 p.m. Mon., Wed., Sun., 5:00 p.m.

REVISED WIMK OPERATING SCHEDULE

15-min. Period E.S.T.	SUNDAY	MONDAY	TUESDAY	THURSDAY	FRIDAY
7:00-7:15 p.m.	W3BWT 1850	W3BWT 3575	W3BWT 3960	W3BWT 1850	W3BWT 3575
7:15-7:30	..... 1850	..... 3575	W9CRV 7150*	..... 1850	..... 3575
7:30-7:45	W2KG 1850	++++ 14008	++++ 3960	++++ 1850	QST 3575 & 14008
7:45-8:00	++++ 1850	++++ 14008	++++ 3960	++++ 1850	"
8:00-8:15	++++ 1850	++++ 14008	++++ 3960	++++ 1850	★ 14008
8:15-8:30	++++ 1850	++++ 14008	++++ 3960	++++ 1850	++++ 14008
8:30-8:45					++++ 14008
8:45-9:00	QST 1850 & 7150	QST 3575 & 14008	QST 3960 & 7150	QST 1850 & 7150	++++ 14008
9:00-9:15	..... 7150	W9ERU 7004	W2KG 3960	W2KG 3960	W9ERU 7004
9:15-9:30	W6EGH 7150	W6EGH 7004	W3YD 3960	..... 3960	W6EGH 7004
9:30-9:45	..... 7150	NY1AA 7004	W3CXM 3960	W3YD 3960	..... 7004
9:45-10:00	W9FPD 7150	++++ 7004	++++ 3960	W3CXM 3960	W9FPD 7004
10:00-10:15	++++ 7150	++++ 7004	++++ 3960	++++ 3960	..... 7004
10:15-10:30	++++ 7150	++++ 7004	++++ 3960	++++ 3960	..... 7004
10:30-10:45	++++ 7150	QST 3575 & 7004	++++ 3960	++++ 3960	QST 3575 & 7004
10:45-11:00	++++ 7150		++++ 3960	++++ 3960	
11:00-11:15	W9ENH 3575	..... 7004	W9ENH 3960	W9ENH 3960	..... 7004
11:15-11:30	..... 3575	..... 7004	..... 3960	..... 3960	..... 7004
11:30-11:45	W9OX 3575	W4AGR 7004	W9OX 3960	W9OX 3960	W4AGR 7004
11:45-12:00	..... 3575	..... 7004	..... 3960	..... 3960	..... 7004
12:00-12:15 a.m.	QST 7004 & 3575	++++ 7004	QST 3960 & 7150	QST 3960 & 7150	++++ 7004
12:15-12:30		++++ 7004			++++ 7004
12:30-12:45	++++ 3575	++++ 7004	W6AEO 7150	W6AEO 7150	++++ 7004
12:45-1:00	++++ 3575	++++ 7004	++++ 7150	++++ 7150	++++ 7004

WIMK's frequency in kilocycles is given for each period. *Periods after 12:00, midnight, are the morning of the following day. A series of dots in any period indicates that the time is open for schedule. +++++ indicates *General Operating Periods* when any non-scheduled stations desiring contact should call. *Second and fourth Tuesdays of each month only, to get message to be sent over A. R. E. L. Net for the American Legion. Other Tuesdays at 7:15-7:30, this time is used for General Operating on 3960 kc. ★Friday is Standard Frequency Night. Station frequency measuring equipment is checked regularly to be available for giving QRG's accurately. All amateurs are urged to likewise use the S. F. transmissions from W1XP, W9XAN and W6XK. One-half hour has been set aside for the QST periods, when all Official and Special Broadcasts to A. R. E. L. members are transmitted. When the full half-hour is not used, the remainder of the time is used for General Operating on the band indicated in the chart for the next period following a "QST."

W9EPY	3855 kc. (cc)	Tues., Wed., Fri., Sat., 11:00 p.m.
W9EQX	3520 kc. ('phone) (cc)	Sun., Wed., 7:00 a.m.
W9ERU	3700 kc.	Daily, except Sun., 7:30 p.m.
W9ESL	3506 kc. ('phone)	Tues., Thurs., Sat., 6:30 p.m.
W9ETD	3531 kc. ('phone)	Mon., Thurs., Sat., 11:30 p.m.
W9FCW	3800 kc.	Daily, except Sun., 9:30 p.m.
W9PKE	3500.3 kc. ('phone)	Sat., Mon., Thurs., 6:00 p.m. Various other times during week.
W9FNK	7200 kc.	Sun., Mon., Thurs., 3:15 p.m., first two weeks of month; 10:45 p.m. last two weeks.
W9FYM	3650 kc.	Daily, except Mon., 7:00 p.m. Also several times during week.
W9FZO	7110 kc.	Mon., Fri., 8:00 p.m.
W9GDL	14,220 kc.	Sun., 1:30 p.m.
	1900 kc.	Mon., Wed., Fri., Sun., 7:30 p.m.
	3800 kc.	Mon., Wed., Fri., Sun., 11:00 p.m.
W9GFL	3800 kc. (cc)	Daily, except Sun., 7:00 p.m.
W9GY	7005 kc.	Daily, except Sun., 10:00 a.m., 1:30 p.m.
W9HYK	3800 kc.	Daily, 8:30 p.m.
	1700 kc.	Daily, 8:30 p.m.
W9IO	7126 kc. (cc)	Mon., Wed., Sat., 9:00 p.m.; Thurs., 5:00 p.m.
	14,252 kc. (cc)	Mon., Wed., Sat., 4:30 p.m.
W9JL	7160 kc.	Mon., Thurs., Sat., 1:30 p.m.
W9QT	3900 kc.	Daily, 8:30 p.m.
W9SO	7120 kc.	Mon., Wed., Fri., 1:00 p.m.
W9YB	3750 kc. (cc)	Mon., Wed., Fri., 5:00 p.m.
W9DY		

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W8BAH	546	381	572	1499
W8PFP	199	155	1038	1392
W8SM	834	143	371	1348
W8AXV	127	238	124	529
W8DDQ	156	192	704	1052
W8CGS	278	196	529	1003
W8BCK	724	12	136	872
KA1HR	177	486	197	860
W8EJW	344	292	222	858
W8DDS	96	241	378	715
W8DVL	68	72	568	708
W6ATJ	75	57	576	708
W8BKM	150	84	450	684
KA1CF	250	256	135	639
W8ENU	119	377	140	636
W5VQ	534	74	26	634
W6AQ	589	1	—	590
W8EAO	221	101	249	571
W8EGH	145	210	192	547
W8DSS	30	30	341	371
W8DFR	142	32	354	528
W8BJO	87	59	380	526
W8DYH	131	66	325	522
W1MK	130	146	245	519
W8CDU	72	152	250	514
W8AMO	49	53	406	510
W3AQ	498	—	12	510
W8BET	163	276	70	509
W6DNL	192	271	3	466
W8BWT	115	105	204	424
W8YAT	89	168	30	287
W6AMM	133	112	—	245
W8BUY	74	107	30	211
W8CNM	25	110	50	185

Month of August 16th-September 15th above. Deliveries count! Note the stations responsible for over one hundred deliveries.

A total of 500 or more bona fide messages handled and counted in accordance with A.R.L.R. practice, or just 100 or more deliveries will put you in line for a place in the B.P.L. Why not make more schedules with this reliable stations you hear and be sure to handle the traffic that will qualify you for B.P.L. membership also?

DIVISIONAL REPORTS

ATLANTIC DIVISION

SOUTHERN NEW JERSEY — SCM, Robert Adams. 3rd, W3SM — The Delaware Valley Radio Club installed W3AQ at the Trenton Fair and had a nice total. W3QL now has remote control working. W3BEI is still reporting off-frequency stations. W3AEJ sent in his first report. W3BSC is working for his ORS. W3BDO is moving to new QRA. W3BPD reports the formation of the Cumberland County Radio at Millville. W3BEI received two cards from Russia. W3AWH is often QSO the West coast. W3ARV

had a good total. W3SY is going to 7 mc. W3BAQ is handling traffic on 'phone. W3JL reports W3ANP and W3ATA on vacation and W3AWT is moving. W3ARN is new ORS. W3ZI is active in Army-Amateur work. W3KD is still in Beach Haven as a BCL repair man. W3SMI broke the thousand mark due to I. E. S. Convention traffic. The Southern New Jersey Radio Club is visiting the Lawrenceville station of the A. T. and T. Co. this month. Don't forget the SCM's broadcasts on Thursday at 2200 E.S.T. on 3648 kc.

Traffic: W3ZI 20, W3JL 48, W3AWH 4, W3QL 152, W3AEJ 46, W3SM 1348, W3ARN 185, W3BAQ 15, W3BEI 42, W3BDO 6, W3ATC 88, W3AWV 190, W3AQ 510, W3ARV 108, W3BPD 6, W3BSC 38, W3SY 36.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Harry Ginsberg, W3NY — Fourteen ORS handled traffic this month, and more ORS are enrolling. We'll look for 100% of ORS reporting traffic next period. And you non-ORS will receive hearty welcome for any traffic you handle, so please send it in with a report. Two new ORS have joined, W3BEG and W3LL; and an old-timer, W3DG. The Maryland gang extends a hearty welcome to W3BAT of the Washington gang, who is now located at Silver Springs, Md. Maryland: W3BEG leads the gang. W3AOO is finding it difficult to neutralize his 50-watt final amplifier. W3DG is feeling the heat enough to stay out of the shack. W3AFF is holding things down FB as our Western Maryland Route Manager. W3ZK's crystal-frequency meter is giving accurate readings from 500 kc. to 7500 kc. W3AHG has found a "Million Dollar Baby," etc. W3NY says work has allowed little time for brass-pounding. W3AMI, "should-be ORS," is building a FB low power rig. 3BR's QRA is 3300 Alto Rd., Baltimore. District of Columbia: W3BWT made BPL on deliveries. W3CXL reports traffic scarce on 7 mc. W3CAB is doing nice work for our Section. W3CDQ is bound for the Roanoke Division Convention at Winston-Salem, N. C. W3PN copies message regularly for *National Geographic* from PFCF. Delaware: W3HC was on only one day due to moving and delay in license. W3ALQ tried some CW on 7 mc. for first time in three years.

Traffic: W3BWT 424, W3CXL 234, W3BEG 75, W3CAB 74, W3AOO 54, W3NY 54, W3AFF 25, W3BAT 23, W3HC 10, W3AMI 9, W3ALQ 6, W3CDQ 5, W3DG 5, W3ZK 1, W3PN 40.

EASTERN PENNSYLVANIA — SCM, Jack Wagen-seller, W3GS — W3ZF has been appointed assistant SCM and W3MC Route Manager for Philadelphia and vicinity. We are going to step out! We need more lively ORS! Reports are welcome from every station handling traffic. W3QP is now an ORS. The ORS and OO tickets of W3UH have been cancelled due to inactivity and not reporting. W8AWO is away at school in N. Y. C. W3OP handed in his ORS due to school QRM. W3MG still insists on being high man. FB. W3UX reports a carload of traffic. W3BBK has earned an ORS ticket. W3NF has arisen from the dead at last. W3NA and W3BRH are showing plenty of pep. W3AAD added a frequency meter to his station. W3BHU is in line for an ORS. W3EV came back to life again. W3AQN is handling lots of Red Cross traffic. W3VB should report every month and become an ORS. W3AFG submits his first report. W8FCB and W3BOL report for second time. W3DZ blew several tubes. W8VD has DX fever. W8DHT complains of YL QRM. W8CWO rebuilt whole station. W3ADE says he can't get out. W3BTP spent 1% of time on traffic. Hi! W8CFI at Bucknell University expects to do some FB traffic work this winter. W8EU built an AC receiver. W3AKB is arranging her winter schedule. W3OK has QRO to 50-watt MOPA. W3ARK was almost too late. The SCM offers a nice prize for highest total next month. Who will get it?

Traffic: W3MG 254, W3UX 204, W3BBK 152, W3NA 96, W3BRH 94, W3BHU 87, W3AAD 86, W3MC 49, W3EV 46, W3VB 44, W3QP 36, W3GS 35, W3AQN 30, W3AFG 28, W3ARK 28, W3NF 24, W3AKB 21, W3BOL 21, W8FCB 19, W3OP 18, W3DZ 13, W8VD 13, W8DHT 12, W8CWO 9, W3OK 8, W3ADE 7, W3BTP 3.

WESTERN PENNSYLVANIA — SCM, R. M. Lloyd, W8CFR — Don't forget, gang, that in order to count for the contest, traffic reports must be in the SCM's hands no

later than the 19th. W8BUC leads the section this month. W8CPE promises a lot of traffic this winter. W8CUG has installed a 50-watt. W8CAX is away at school. W8DKL worked his first "six." W8AQY is editor of the Erie Amateur Radio Club's news sheet. W8DUT sends his report via radio. W8AJE used his vacation for traffic work. W8CRA is working lots of DX. W8CQA is primed for the frequency measuring contest. W8FJ has a new AC receiver; he and W8BUL are at Carnegie Tech. W8APQ passed his commercial exam. W8AVY operated W8BEM from his summer cottage. W8BSE has gone to Detroit University. W8CEO and W8JU are both in new QRAs. W8CMP is back at State College again. W8EEC has a new monitor. W8EHC sends a lot of news; he reports W8DDU, W8CAF, and W8BFZ are active in his town. W8CFR has a schedule with PY2AK.

Traffic: W8BUC 125, W8CPE 53, W8CUG 41, W8CAX 21, W8DKL 19, W8DUT 16, W8AJE 12, W8CQA 10, W8FJ 9, W8APQ 8, W8CRA 4, W8CFR 3.

WESTERN NEW YORK — SCM, John R. Blum, W8CKC — W8DHU is back from vacation. W8AGS is also busy again. W8BLP is working foreigners. W8CKC handles all his traffic on 14-mc. phone. W8CPC is working the world on 14 mc. W8ERC and W8ERZ are new ops over in Awaseo. W8BHK is back on the air. W8BR is rebuilding. W8BUP has gone phone. Among the leaders this month is W8DBX. W8DSS has some total due to his schedules with W8EIH. W8CIL is off the air. W8BYD has moved to Ohio. It's their gain and our loss so watch the Ohio totals swell. W8BJO has another beauty of a total this month. The Rochester, Auburn and Buffalo clubs have started up full blast. A big Hamfest in Rochester and a Conventioneette in Buffalo are scheduled. W8BDV let his license run out. W8BLH is active on 14 mc. W8KS, W8BSL, W8DPK, W8BPK, W8HR are in police work in Rochester. W8CUI has an antenna like the Powder River (any A.E.F. remember) 300 ft. long and 4 ft. high. W8BFG has a '52 on 14 mc. W8DHQ has a little W1MK all by himself with 8 daily schedules. W8DME is working plenty of Navy traffic. W8AFM spends most of his time on phone. W8CZP is going to college. W8DWJ is on 14 mc. again. W8EWF, W8EXG and W8EUY are new stations at Ripley (B.I.O.N.) N. Y. W8GQ is also new in Utica. W8BFN was heard in N. Z. on 3.5 mc. This is your SCM's last report as he is resigning. Too QRL with other things. It has been a lot of fun and I wish my successor the very best of luck and thank the ORS for their splendid cooperation. W8CSW will again send code practice for beginners on 1774 kc., Wednesdays, from 7-8 p.m. W8DES has a splendid total this month. PB! W8B7W wants early morning schedules Western New York, Northern New York, and Southern Tier. W2CIZ is operating his portable W2ZZW at the Henry Morse Farm, Denver, N. Y.

Traffic: W8DEU 33, W8CKC 10, W8AGS 34, W8CPC 36, W8ERZ 48, W8DMJ 126, W8BHK 91, W8BR 2, W8BUP 53, W8DBX 238, W8DSS 541, W8DDZ 200, W8BJO 526, W8BDV 26, W8BLH 2, W8CUI 10, W8ADG 4, W8BFG 20, W8DHQ 270, W8DME 31, W8AFM 2, W8DII 8, W8EUY 21, W8B7W 53, W8DES 317, W8BYD 93, W2ZZW 2.

CENTRAL DIVISION

ILLINOIS — SCM, F. J. Hinds, W9APY — RM: E. A. Hubbell, W9ERU. Let's originate more good traffic and send messages to all stations you schedule. W9VS is now on the air. He is Ex9KL, Ex9SR and Pre-War 9AIZ. W9CTP is now on with crystal. W9GDM is back at school. W9FAU uses a '45 TNT with 300 volts on 3500. W9HUL is a new ham in Rockford. W9FYZ is on again. W9GRW is building a 50-watt outfit. W9APY received two report cards from Russia. The '10 blew up at W9CNY. W9AMO sent his report by radio. W9BXJ and W9KJB have scheduled for a long time. W9DDE is about ready to go on the air. W9WJ initiated the new 7000 crystal set by working Cuba, Mexico, Canada, New Zealand, Australia and all U.S. districts the first night. W9FRA has been appointed Net Control Station of the first Army Amateur Illinois District. W9FXE has been relief operator at WSUI. W9HUX waxed his feeder separators and nearly burned up the shack. Hi. W9GDI heard a station CQ and sign "STESMIB." W9ET worked three Japanese districts and ZC2XX in Transjordan, Asia

Minor. W9GIV is now sojourning with his "Ideal" just married. Hi. W9ATS has but little hope of making the BPL under the new rules. Hi. W9EJO is again getting R7-8 in Australia. W9BVP is coming along fine with schedules. W9JO is rebuilding high-voltage transformer. W9ALA uses Break-In for fast traffic work. W9FPN worked Canal Zone. School QRM at W9BSR. W9AVB put Illinois on the map in the April 'phone contest. W9BIL reports things about the same. W9CN is on again. W9BIR is trying out 'phone. W9KPK worked his first VK. W9FCW is battling them out with good schedules. W9AFN had a total of 52 QSOs in 15 countries outside U. S. A. this month. New receiver is being built at W9CSB. W9BRX is getting ready for the frequency measuring contest. W9ACU says to look at his total and see what good schedules will do. W9DZU is still using low power of 15 watts. W9EMN is moving QRA. W9CZL worked VK5GR. W9ACE handled an emergency message. W9DBE is getting all South Side Chicago stations to join the South Town Radio Amateur Association. W9FGD will be on shortly with a new transmitter. W9DKF says 3500 is going haywire. W9AFB has a new MOFA. W9HY and W9ANB have combined at W9CNC. W9HSG has been on 55 days and worked 194 stations. W9FTX now schedules W9FI. W9FO is still waiting for his new license. W9CUH says they have two new hams in Waukegan. W9QI reported direct to HQs.

Traffic: W9AMO 510, W9ALA 328, W9FCW 277, W9CTP 247, W9ACU 203, W9ACE 188, W9ATS 102, W9APY 89, W9FI 88, W9CSB 72, W9EJO 71, W9ERU 70, W9PK 55, W9AFB 49, W9CNC 43, W9EF 43, W9FAU 40, W9ENH 39, W9DBE 31, W9GAI 30, W9CZL 28, W9CN 27, W9BSR 26, W9CUH 25, W9AFN 24, W9GRW 24, W9HSG 16, W9VS 14, W9BRX 11, W9FYZ 11, W9FTX 10, W9BIR 9, W9GDM 9, W9DKF 7, W9AVB 6, W9CNY 6, W9HNK 5, W9GDI 4, W9BVP 3, W9FGD 3, W9DZU 2, W9GIV 2, W9JO 2, W9EMN 1, W9FPN 1, W9QI 8.

MICHIGAN — SCM, Ralph J. Stephenson, W8DMS — W8DYH pinch-hitting while Steve is cooperating with the Legionnaires in Drinking Canada dry: — This is being written at the Legion Station W8BIN. Excuse everything, please. W9GJX visits and is visited. W8BTK continues to pound them out. W8AUT is QRL farming. W8U is program director for WXYZ. W8DDO will be QRL until City College kicks him out. W8LU promises —. W8DDV is interested in frequency tests. W9EGF vacations. W8AKN has a new station. W8AE sends in a few. W8BMG, our new Western Michigan RM, is busy pepping up the gang. W8EKZ, another new Kazoo station, handles his share. W8BBX says henceforth —. W8PP leads with the best summertime total we have seen yet. PB, very. W8DFR team, are xpcd, 8707 kc. W8BGY totals 252 in less than a week. W8CFZ has push-pull with '52. W9GPN is a new Calumet station. W8EGI is in line for ORS. W8ACW handles a phew. W8VJT works VK. W8EWO is at 12162 Martindale, Detroit. W8DZ shows the world what a good YL can do. W8DED will be on 3800 regularly. W8BV made WAC with '10. W8DVQ will work A.A.R.S. this fall. W8BNS is new Grand Rapids traffic hound. W8DEH pushes up new 35-foot stick again and again. W8SS is QRL U. of M. 'till Christmas. W8AW and W8DXS incorporate and consolidated. W8FX goes West! pardon me, North, same thing. W9GXE hopes to work the gang from W9AXW. W8DXY is going to stay at his summer home all winter. W8GP needs some help in his basement. Line forms on the right. We are thanking W8HP of WCK for installation and use of his transmitter at the General Motors Bldg., and Mr. Kohlenberger of the United Motors Corporation for office space, equipment, printing and a lot of hard work in putting over the Legion Convention — A.R.R.L. traffic plan. Also the hams throughout the country in addition to Detroiters, who QSP'd and also devoted their time to operating W8BIN.

Traffic: W8PP 1392, W8DYH 522, W8BMG 385, W8BGY 281, W8DFE 228, W8DZ 108, W8FX 101, W8DED 31, W8CFZ 30, W8EKZ 73, W8GPM 17, W8UU 61, W9GJX 58, W8GP 40, W8AW 37, W8DXY 32, W8BTK 28, W8DMR 27, W8DEH 26, W8AKN 18, W8SS 14, W8DOV 12, W8BNS 7, W8AE 7, W8BV 6, W8EG 6, W9GXE 5, W8DDO 2, W8ACW 3, W8BJT 3, W8EWO 2, W8DVQ 2, W8AAF 2, W8DMS 64.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — This month — 2632. W9EDQ celebrates RM appointment by pushing Kentucky record-traffic-total higher. Not far behind is W9BWJ. This is farewell report of W9BTM who has gone to West Virginia. Sure sorry to lose him. Reports from W9CEK are better each month. The 852 sure did boost W9GGB's totals. W9CNE has new receiver. W9BAZ put a counter-weight on his antenna. W9AUH has done considerable rebuilding for 56 and 28 mc. You can get a QSL card from W9BAN — he just got 500 new ones. W9CDA is moving to another "shack." W9LH wants an ORS; says Ike Watkins now has a call; W9BPB still good on 14 mc.; W9GJZ has 15 watts on 7 mc.; W9JL has a larger crew of ops. W9FQQ leaves for Bliss in Washington, D. C. W9EQO helped W9OX rebuild his "wagon." Bad conditions on 7 mc. is cause of low totals at W9DDQ. W9AC9 enjoyed pounding brass on U.S.S. *Paducah*. The circular seems to have increased the "circulation" of the entire Section. We are glad to welcome the new reporters. W9FRF will soon have 3.5-mc. 'phone and 7 mc. CW. A new AC receiver graces W9AEN's shack. W9EYW was "taken for a ride" (speed-boat) by WSDAQ. W9HMY was recently destroyed by fire. W9EDY says his 'phone is all ready to do its stuff. W9AZY has finished the Nat. Guard trans. It will operate as W9HXN. W9GXZ puts Providence on the map. W9GYC wants some dope on super-hot converters. W9BBO is putting '10s push-pull. W9FWT is in new location. W9FZV has finished new crystal job. We hope W9BNE gets western Kentucky organized. We are expecting a new call in Maysville. W9BXX has relinquished ORS tag due to press of other duties. W9ECO has 50-watt 'phone going on 3.5 mc. W9DQC gets out well with his 'phone. W9QT's doctor will not let him take up his A-A work this year.

Traffic: W9EDQ 1052, W9BWJ 558, W9BTM 359, W9CEK 63, W9GGB 63, W9CNE 49, W9BAZ 32, W9AUH 26, W9BAN 25, W9CDA 24, W9LH 18, W9FQQ 15, W9FQO 14, W9DDQ 11, W9OX 11, W9AC3 4, W9FRF 4, W9AEN 2, W9ECO 2.

INDIANA — SCM, George H. Graue, W9BKJ — W9CLJ sends in his first report. W9CVQ is thrilled with his DX contacts. W9GJG has a new frequency meter. W9GJS is leaving soon on a commercial job. W9RS is leaving for Ohio, where he will operate W9FA, and wants schedules with Indiana. W9AET still busy at WOWO, likewise W9CVX. W9ABW has changed to TPTG. W9CKG is attending Purdue Univ. and will be heard under the call of W9QG. W9DHJ will be on with new rig this fall. W9AXH is still keeping American Legion schedules. Air gap tubes are the main source of trouble at W9EFV. W9FQ is building an MOPA. W9CHA reports a ham club being organized in Evansville. W9AEO is getting ready for A.A.R.S. schedules. W9AIN expects to have his station going soon. W9AEB is planning several changes. W9HTX is putting in crystal-control. W9AEA is busy at WRK. W9HHI has a new AC receiver. W9GYB has applied for an ORS. The Mitchell gang are organizing a club. W9AJX is using a new receiver. W9FFT is back again after a long absence. W9ADU is attending DePauw Univ. W9DOO pounds W.U. brass. W9DDB is the chief op at W9YB-W9DY. W9AGG is a new station in Bloomington. W9GZU sends in a welcome report. W9DVO has a new tickler. W9AHL promises to come on with CC in the near future. W9BKJ wants to rebuild, BUT? W9BHM blew a couple of 211Ds. W9BWI's 1/2-kw. 'phone rig is still under construction. W9CLF has a new cond. mike. Bloomington Wireless Assn. is a new club at Bloomington. The Indianapolis Radio Club announce date of hamfest to be held there Oct. 31 and Nov. 1. A bigger and better manifest than ever before. Come and enjoy the fun.

Traffic: W9GJG 54, W9GJS 33, W9CVQ 30, W9RS 15, W9AET 14, W9BKJ 13, W9ABW 11, W9CKG 9, W9DHJ 7, W9AXH 6, W9AIP 2, W9EFV 2, W9FYB 2, W9FVB 2, W9GZU 12.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9GFL had an automobile accident and is in the hospital for a while. W9HFH schedules W8CKI. W9DKH and W9SO will be on regularly. W9EBO is getting a '52. W9ZY is getting things organized in his Section. W9FAA reported via W9AZN. W9HMS applies for an ORS. W9FAV will have a 50-watter on 3801-ke. crystal soon. W9BIB visited Beloit,

Janesville and Rockford hams recently. W9ALX-(W9AN) has 50 watts crystal on 3776 kc. W9AN is 100 watts crystal on 3920 kc. W9BWZ is back with us. W9ABM has a Pilot Super Wasp. W9EHD schedules W9EPJ and W9AFN. W9DCT is active. W9DLQ doesn't know there is a depression — he has three transmitters! W9ANJ reported from Lacrosse. W9VD has another antenna system.

Traffic: W9GFL 162, W9ZY 62, W9DKH 63, W9HFH 38, W9FAV 26, W9BIB 23, W9ALX 15, W9SO 11, W9EHD 10, W9DLQ 3, W9ANJ 6, W9VD 18.

OHIO — SCM, Harry A. Tummonds, W8BAH — Ohio is still plugging for that promised 10,000 total. Ohio members in the new BPL were W8AXV, W8CGS, W8DDS, W8DVL, W8DFR, W8CNM, W8BAH. District No. 1: W8DDS is now spending full time as General Ohio RM. W8DVL is new RM for this district. W8AXV leads this district. All 7-mc. men should write him regarding schedules. W8CIO wants more traffic. Some FB schedules on W8AIR report card. W8BNC took a vacation. W8TH reports Lakewood Radio Club active. W8OCK can use a ton of "B" Batteries. W8EGO has fine report. W8BFA says QAW with arrival of new YL. W8ELL schedules W8DYG. W8AGF is new reporter. W8CTP has card from Moscow. W8BMX has new MOPA. W8EBY is QRL school. W8EBT is back again. New receiver at W8DDV. Another new reporter, W8BOT. A break for Ohio: W8BYD now reports from Cleveland. W8EXA increases total 1300%. Hi. W8DYG is secretary of Garfield Heights Amateur Radio Assn. Here is an old-timer who reports, W8ML. Reports also received from W8EEW, W8DIH and W8EEO. W8BAC on vacation. District No. 2: W8BKM, RM, leads district. W8CEI and W8BCI report. District No. 3: This district reports 100%. W8APC leads the gang. W8AND, RM, says QRL. W8JR sends FB letter. W8BTT and W8CSB report. District No. 4: W8UW leads this district with W8DTW and W8QO giving him a good run. W8HT QRL football. Rather hot here says W8QC. W8FBC is new reporter from Lima. W8EEQ keeps same schedule with W8ENH. W8OQ reports. District No. 5: Once again W8DFR leads the district. W8NP, RM, is working hard for his gang. Back on air again reports W8LL. W8EFN will be ORS by next report. W8DVE is rebuilding. W8FBL and W8BSR report. W8BKP is new reporter from Washingtonville. District No. 6: This district lost W8DU who moved to Detroit. W8CNM is new RM. W8CNM leads the district. W8EQC is new reporter from Springfield, W8BBI QRL service work. W8ARW expects to have a good 'phone this winter. All ORS please take note of date of your certificate and return to SCM for renewal. ORS who have not been reporting regularly are to be cancelled this month. This is first and last time cancellations will be mentioned in Ohio reports. District No. 7: W8VP leads the district again. W8CKX, RM, is heard on air regularly. District No. 8: W8CGS, RM, leads the district and keeps district No. 8 in second place. W8FA reports back with the gang again. W8ENH still keeps early morning schedule with W8CIO. Wanted. Reporters from Cincinnati. District W9: W8TK leads this district again. W8DUV reports new ham, W8CXM, in Athens. Total of 63 stations report this month. Going up, gang. W8BAH had just one less than 1500 and still trying to set the pace. Cleveland and other Ohio stations helped handle New York State fair traffic from Syracuse, N. Y., also helped with American Legion traffic from Detroit. If you don't have regular schedules now, get a couple and get a kick out of this game. The SCM is donating a W.E. 50-watter for highest total Sept.-Oct., and another for highest Oct.-Nov. total. Hop to it, gang.

Traffic: W8BAH 1499, W8AXV 1229, W8CGS 1003, W8DDS 715, W8DVL 708, W8DFR 528, W8APC 368, W8CIO 264, W8AIR 260, W8CNM 185, W8ENH 153, W8VP 137, W8DU 131, W8BNC 128, W8TH 123, W8CKX 100, W8BKM 88, W8UW 86, W8NP 86, W8DTW 63, W8CMB 57, W8QO 59, W8EGO 46, W8TK 46, W8CCK 45, W8EQC 44, W8BKP 41, W8EEQ 27, W8FBC 23, W8BOT 23, W8HT 22, W8BBI 22, W8QC 22, W8AND 21, W8BFA 20, W8BAC 20, W8DYG 18, W8LI 18, W8EFN 13, W8DUV 15, W8FA 15, W8EXA 14, W8ML 14, W8JR 13, W8AGF 12, W8EBY 10, W8DVE 10, W8ARW 9, W8BMX 8, W8DDV 8, W8EIL 8, W8CTP 4, W8DIH 2, W8EHO 1.

DAKOTA DIVISION

SOUTHERN MINNESOTA — SCM, H. Radloff, W9AIR — Twenty-two hams were in attendance at New Ulm on Sept. 2 for the hamfest staged by W9BKX ops and the SCM in honor of E. L. Battey, W1MK-W1UE. W9FJK has been appointed R. M. of Minneapolis. The '04 is all set for traffic at W9EPJ. W9BTW-W9ELA believe a good DX season is at hand. W9BN made quite a showing in Army-Amateur QSO party. W9BNN is all set for a busy winter. W9EXR reports an MOPA there now. W9CKU got his First Grade ticket at Sioux City Convention. W9FAD sends official broadcasts in 1.8-mc. 'phone. W9FAJ has portable call, W9HXH. W9GBZ plans a 50-watt 'phone. W9HFF put his PP TNT set on 14 mc. W9AHX visited the Minneapolis gang. W9DGH has crystal on 7 and 14 mc. W9FUI claims the '10 perks better than the '03A. A new 'phone job at W9EKU. W9HOP says 14 mc. is a real band these days. W9GUX is a new ORS. W9EMV wants schedules with beginners. W9HNO is a Morse op. W9COS had Battey over to visit the Rochester gang. W9EYL built a dynatron frequency meter. W9FFY received his First Grade ticket. W9DGE had a visit by W9EKY. W9TF rebuilt. W9EAT awaits a new '45. Pentodes are in use at W9DRK. W9FMB rebuilds for 1.7-mc. Band. W9FDX inspected WCCO and WLB. W9SF reinsulated to keep 4500 volts going about its business. W9EFK was host to visiting hams. W9DHP hamfested at Galena, Ill. W9FUR and W9HUU 'fested at Heron Lake. W9BQJ, W9CTW, W9BBT, W9CKU and W9AIR attended the Midwest Convention at Sioux City. W9BQF is QRL business. W9EJR dusted off his heap. W9AKN spent his vacation canoeing on the border. W9GTX moves QRA to Tennessee. W9CYX supervised a crystal grinding job at W9BNF-W9FUI. W9DBC took his 50-watter out of storage.

Traffic: W9EPJ 44, W9BNN 25, W9EXR 11, W9CKU 7, W9FAD 5, W9BTW-W9ELA 55, W9FJK 20, W9BKX 17, W9HFF 14, W9BN 95, W9AKN 6, W9AIR 2, W9DGE 1, W9EJR 2, W9HOP 2, W9COS 3, W9GBZ 5, W9EMV 1.

SOUTH DAKOTA — SCM, Howard T. Cashman, W9DNS — This report is written by Stanway Gough for the SCM. W9FQX has gone to U. of Minn. W9DNS, SCM, has gone to Iowa State College at Ames. W9EUH, W9ID, W9FQX and W9FLI attended convention at Sioux City. W9FLI got a third-class commercial ticket. W9CPB built a new screen-grid receiver. W9CFU is rebuilding. W9NM let his station license expire. The Sioux Falls Radio Club has secured a room in the City Museum. Meetings are held every Thursday night. All hams are welcome. W9FLI suggests a S.D. QSO party. Let's have your opinions on this suggestion.

Traffic: W9DKL 49, W9FLI 36, W9ALO 2.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — The amateur radio business should begin to pick up now that fall is here. W9DFF is going to try a schedule with W9BAN. W9DGS, RM, is offering 100 QSL cards to the station in the N. Dak. Section who handles the most traffic for a period of two months. He is going to do this all winter. Let's get busy, gang! W9DM has his low-power rig going FB. W9CRL handled some traffic. W9BVF has two transmitters, a special '10 TGTP for AARS work on 3.5 mc. and a '52 on 7 and 14 mc.

Traffic: W9DGS 48, W9BVF 14, W9CRL 9, W9DM 8.

NORTHERN MINNESOTA — SCM, Raymond Weihe, W9CTW — W9BBL leads the section this month. W9HDN is in line for ORS. W9FAQ has QRM from school. W9BRA promises to be active. W9DOQ reports new hams, W9HNI and W9HUK. W9BVI is still the DX hound of the Section. After a month's vacation W9HIE is back on the air. W9BHH went to sleep on job of keeping YL awake. W9EHI is finishing up his new transmitter. W9ADS is rebuilding. W9FNJ reports no traffic. W9FNQ is the latest addition to the ORS. W9CWI is still after the off-frequency gang. W9CTW has the new job on the air now on 3500 and 7000 kc. The Inter-sectional Contest is in full swing. Get on the air and do your share. The St. Paul Radio Club had its first annual banquet, and we must say, "Hats off" to them.

Traffic: W9BBL 15, W9HDN 15, W9FAQ 12, W9BRA 6, W9DOQ 5, W9BVI 3, W9HIE 2, W9CTW 2, W9BHH 1.

DELTA DIVISION

MISSISSIPPI — SCM, William G. Bodker, W5AZV — The winter traffic season is fast approaching. Those interested in ORS appointments please communicate with the SCM. W5ANX turned in another nice total. W5AWP is now using crystal on his 3.5-mc. 'phone. W5AZV has a new 50-watt TNT on 3.5 mc. W5AKP is heard occasionally on 7 mc. W5BNX is taking his portable 'phone station to school at Cleveland. W5BUI is recuperating from injuries received in an automobile accident. W5VJ, W5BHL, W5BOT and W5AZV are the active Army-Amateur stations in Jackson. W5BXA is a new station in Gulfport.

Traffic: W5ANX 50, W5AWP 28, W5AZV 22, W5VJ 12, W5BOT 7.

ARKANSAS — SCM, Henry E. Velte, W5ABI — The SCM has moved to Smackover, so in the future please send all reports to him at P. O. Box 307, Smackover, Ark. W5BMI is again our leading traffic handler. W5IQ is busy with the Army-Amateur Net. W5ABL is going to increase power. W5BPE burned out his power transformer. W5BED has several nice schedules. W5BKB has a new receiver. W5BRI has been away to a convention in Boston. W5BDR is getting out well on low power. The SCM would be glad to receive reports from all operators in the state.

Traffic: W5BMI 183, W5ABI 72, W5BED 19.

TENNESSEE — SCM, James B. Witt, W4SP — Monday night, Sept. 14th, Mr. A. A. Hebert met with the Memphis gang and they had 47 hams present. FB. After the meeting was over they worked schedule with "RP" at W1MK for Mr. Hebert over W4OI. W4VK has worked all districts on 'phone. W4VK will be at Purdue University for the next nine months and will use the call W9DZJ. W4AFS is getting the AA Net going again. W4AFM on a recent trip to the coast looked over the radio equipment at the Naval Base and on the German seaplane DO-X. Ex-W8DCM of Huntington, W. Va., is now located at Johnson City, Tenn. W4AHD is a new station at Dyersburg. W4AAD has 1000 watts input on his 'phone. W4CW went on U. S. N. R. cruise. W4RO says all schedules went laywire.

Traffic: W4VK 65, W4AFM 47, W4OI 45, W4AAD 31, W4RO 11, W4CW 2.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — W5EB made the convention in Oklahoma City along with W5AXU and W5NS. W5AII has a PP rig on 3.5-mc. 'phone band. W5WF is rebuilding and getting ready for DX. W5ASJ is QRL. W5RR-W5WI is getting FB results. W5BJA says, "Not so hot." W5BYY and W5BYQ are new hams in Shreveport. W5CAX is also a new comer for this fair city. W5BHV-W5FPR is on daily for traffic between 11 a.m. and noon. W5BUC has been sick. W5ACY will be on for traffic soon. W5KC still has his crystal rig perking. W5RPN reports a pickup in traffic. W5BDJ is again at KMLB. Haven't heard from W5MO, W5ANQ, W5QJ, and lots more for long time. 'Smatter W5ZY, YL? W5BPL turns in a nice report and takes New Orleans off the dark list. If you need report cards, drop us a line and let us know about it and they will go on the first train your way. Let's have a report for every Louisiana station next month.

Traffic: W5BPN 38, W5ACY 32, W5AXU 9, W5BUC 31, W5EB 34, W5WF 77, W5BPL 3, W5BSR 12.

HUDSON DIVISION

EASTERN NEW YORK — SCM, R. E. Haight, W2LU — Your new SCM appreciates the responsibilities of his new position and asks continuation of the cooperation which was previously extended to my worthy predecessor, W2QU. W2BJA handled N. Y. State Fair traffic. W2AVS joins ORS gang. W2CJP tried his luck on 7 and 14 mc. W2ACD and his "chevy" are perking FB. W2DEL makes initial report. W2BER acquired new Vibroplex and Dynatron. W2CTC is looking for DX schedules on 7 mc. W2CL was honored by visit from W3OA and W3OP. W2BDB submits his first report. W2UL was on U.S.N.R. cruise aboard U.S.S. *Wyoming*. W2OP is QRL with AA schedules. W2CGO is changing from '10 to '03A in P.A. of his MOPA. W2BSH has been busy putting SARA Banquet over the top. W2BLV is experimenting with sky wires. W2CTA visited W8DDL and operated WADM at lakes. W2ACY is still snagging

DX. W2ATM is having trouble with his power supply. W2AJD is rebuilding. W2ACB is QRL touring U. S. with House of Magic of G. E. Co. W2BKW is kicking out on 14 mc. W2BIA is active on U.S.N.R. drills. W2ZZK closes station at Boy Scout Camp and plans to operate from SARA Banquet on 3900 kc. W2AMM is the proud possessor of new Jr. Opr. W2CBX, Ex-W2BA1, is not having very good luck receiving a two letter call. W2BZZ and W2BNA report.

Traffic: W2LU 325, W2BJA 286, W2AVS 280, W2CJP 134, W2ACD 76, W2DEL 60, W2BER 50, W2CTC 43, W2CL 38, W2BDB 13, W2OP 11, W2UL 10, W2CGO 9, W2BLU 8, W2BSH 8, W2CTA 3, W2ACY 2, W2ATM 2, W2BZZ 102, W2BNA 17.

NEW YORK CITY AND LONG ISLAND — Acting SCM, Wm. J. Warringer, W2BPQ — Received a bunch of nice promises this month, but they will never win that traffic banner. The ax is about to fall on four or five missing ORS. Write W8BYD for information on Empire State Net. Long Island: W2KG leads the pack this month. Both ops are from Colorado, being Ex9ENM and 9CAW. W2NO-APV is still playing reporter. He says W2AKL has a 50-watt crystal job running. W2BNW ditto. W2AST is using 50-watt crystal 'phone. W2AXV has a 20-watt crystal on 7 and 3.5 mc. W2ASS is leaving for college. W2BTE is sure helping this section along. W2AUS is now Alt. NCS for L. I. District in AA. W2BST is using 7-mc. crystal. W2OB is working all kinds DX with '52. W2CO1 is doing fine work on low power. W2OQ is NCS. L. I. District in AA Net. W2BDN had a swell time in the Argentine. W2HO has changed to crystal for more reliable schedule work. W2AOJ gave a fine lecture before Manhattan Radio Club, Brooklyn: W2PF was very active in AA QSO party. W2BO is using National Receiver. W2APK handled his traffic in one hour. W2AZV will be busy at Radio Show. W2CCD-KW is contemplating a 'phone. W2DBQ is member of CWC. W2LB is trying to rebuild and keep on air at same time. W2AQN will have crystal going soon. W2BRB is looking for more company on 1800 kc. Bronx: W2FF has schedule with RX1AA in Canal Zone. W2BGO is now struggling with a MOPA. W2CWP worked U.S.S. Eagle "NEKB." W2BHB is a new ham. W2CBB has been roaming all over New England. W2APV has been motor-boating. XW2BPQ will be sporting his new call soon. XW2ANE has built a push-pull TPTG and is waiting for his call. W2APT is all set for AA work. W2VG has resigned as ORS, married now. Manhattan: W2SC handled his traffic in two evenings. W2BNL is still traveling for NBC. W2BDJ now schedules WLM. Get in touch with him if interested in live-wire ham club. W8APK-W2BZN is back again. W2ADI is building one of those bigger and better 'phones. W2CBW is sold on Pentodes. W2AOU blew his rig up again. W2CLO says VT keying filters are the berries. W2AWT is ready for 56-mc. work. Staten Island: W2WP is now an AA. W2DHK, John Rieb, 318 Forest Ave., West New Brighton, is a newcomer. W2CKN visited W8AKF over Labor Day.

Traffic: Long Island — W2KG 94, W2NO-APV 56, W2ASS 54, W2BTE 26, W2AUS 22, W2BDN 9. Brooklyn — W2PF 35, W2BO 34, W2APK 16, W2AZV 15, W2CCD 14, W2DBQ 6, W2LB 4, W2AQN 3, W2BRB 2. Bronx — W2FF 78, W2BGO 14, W2CWP 10, W2CBB 7. Staten Island — W2WP 13, W2CKN 4. Manhattan — W2SC 42, W2BNL 2.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — W2AH, O. O., not only notifies off frequency offenders but follows up with a telephone regardless of the location as he works for the A. T. & T. Co. W2JF is kept busy with his usual large list of schedules. W2AOS was on active U.S.N.R. duty on the U.S.S. Wyoming. On day W2AGX received 33 cards and the next day 14, all of which were from foreigners. W2CJX says the depression increases his work in N.Y.C. W2BPY with W2WP attended the hamfest at Poughkeepsie, N. Y. W2MQ maintains his OBS schedules. W2CEX is fooling with crystals. W2AKX is working on his 56-mc. 'phone. W2CLX expects to become a commercial operator. W2AUP spent the entire month handling traffic. W2ZC is installing a 500-watt SG tube. W2AGO gave lively news from Bergen County. W2DES is new in Ridgewood. W2DFM is using '45s.

Traffic: W2JF 67, W2AOS 5, W2AGX 11, W2CJX 6, W2BPY 35, W2MQ 172, W2CEX 31, W2AKC 8, W2AUP 32, W2ZC 94, W2AGO 101.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9EYE carries off the high honors this month. FB, OM. W9FWW is putting Lincoln on the map. W9DMY is just raring for traffic. W9EWO is holding up Western Nebraska. FB, W9D1 and W9DFR just returned from U.S.N.R. cruise. W9FUW is going again after complete overhauling. W9EEW is just plugging along. W9FAM has completed rebuilding. W9GRQ says not much doing yet. W9BQR had FB time at Topeka Convention. W9GDL is QRL business. W9GNZ will help out from now on. W9DHA is busy getting a new radio club organized at Grand Island.

Traffic: W9EYE 159, W9FWW 124, W9DMY 112, W9EWO 77, W9D1 53, W9FUW 27, W9EEW 17, W9DFR 15, W9FAM 10, W9DHA 4, W9GNZ 1.

IOWA — SCM, George D. Hansen, W9FFD — Some better this time, but come on, gang. We must step on it, with all this close competition amongst our neighbors. Those inert ORS must come through or else . . . ! W9FFD leads with a total of less than a hundred. W9BCL hands us the news that he is moving back to old Kentucky; Iowa's loss is a good gain for Kentucky. W9EIV reports and lists schedules. W9ACL says on schedule next month. W9FZO has come out from under the strain of convention duties. W9EJQ, our RM, is getting ready to resume schedules. Get in touch with him, fellows, about schedules. W9AHQ had report from T13LA on his 14 mc. OBC. W9BPG says new Tri-City Club organized. W9FEB is resuming schedules again. W9AYC is a new ORS. W9AHX reports vacation took some of his time. W9GP just returned from convention trip to Kansas and Missouri, where he found the same old Midwest spirit. W9BJP says new transmitter and receiver. W9IO reports first club meeting at U. W9DPO is readjusting for a big season. W9GWT says new Zepp and a '52 now ready to do their stuff. W9GQE says more later. W9FWG reports new receiver. W9DIB reports back from vacation. W9AYC and W9CWG, both new ORS, are preparing for a big season. We need more ORS, fellows. Look it over in the regs and let us have your applications. Your SCM is looking for that traffic report next month.

Traffic: W9FFD 98, W9BCL 52, W9EIV 48, W9ACL 48, W9FZO 32, W9EJQ 19, W9AHQ 19, W9BJP 19, W9FEB 15, W9AYC 15, W9AHX 11, W9GP 10, W9BPG 9, W9IO 8, W9DPO 6, W9GWT 6, W9GQE 1.

KANSAS — SCM, J. H. Amis, W9CET — W9BNU leads the Section. He wants schedules with Colorado, Iowa and Arkansas. W9CFN is talking crystal. W9FLG has just finished a new power supply. W9ESL offers to check any of the gang's frequency on his new dynatron. W9BNX is looking for 3500-ke. 'phone traffic. W9BGL is going to school at K. U. W9FCR is thinking about replacing his '10s with a 211. W9GCL is going back to 3500 kc. W9HL has a new MOPA at the power plant under the call of W9FLL. W9FMX says the gang at Hutchinson and vicinity are planning a radio club. W9FRU built a new MOPA and worked K61R right off the bat. W9CET is planning a new crystal rig with a pair of 211's in last stage. W9CXW is now a commercial second. W9EVT has moved four miles out in the country. The RMs, W9FLG, W9CFN and W9ESL, are holding an ORS meeting, each Sunday afternoon, beginning at 1:30. Get on the air, gang, and give these fellows your support.

Traffic: W9BNU 636, W9CFN 179, W9ESL 43, W9BNX 33, W9BGL 19, W9FCR 17, W9GCL 14, W9HL 10, W9FMX 31, W9FRU 6, W9FLG 101.

MISSOURI — SCM, L. B. Laizure, W9RR — St. Louis: A feed and hamfest was held Sunday night, Sept. 13th, at the Melbourne Hotel; sponsored by the OBP Club. W9AAU acted as chairman. Present were Mr. Battey of Headquarters, Director Kerr, the SCM and a crowd of St. Louis hams that caused the SRO sign to be hung out. After one of these hamfests an American Legion Convention may be classed as mild entertainment. Who does not know now who the King Fish is in St. Louis??? W9DZN comes back to life for traffic. W9AMR is now W9HUZ. W9HVK was a visitor

at the SCM's shack. W9DUD reports several candidates for ORS. SMARA convention was held at Rolla on Sept. 11th-12th. A good program was enjoyed by all present, and there was a liberal prize distribution. W9FVM is at Fayetteville in Univ. of Ark. W9EYG was appointed to take charge of the U.S.N.R. unit at Monett. A unit is under organization at Sullivan. Another unit is being formed at Parkville by W9AQX. W9BJA had a good month for traffic. A-A netters are called on to report traffic to the SCM and help Missouri showing. W9DEN reports a group of hams at Central College, Fayette — W9's — AOG FYF CNU EYB and DHN. W9AIJ reports some rush traffic in injury and death resulting from accident. W9ENF reports A-A schedules picking up; W9ASV is rebuilding; W9GLY is operating 'phone on 3.5 mc.; W9GWC moved from Joplin to 7th district. W9BGW joined the Lion Tamers Club by putting a red light on mast that works when the key is used — SOS!! W9AQX lost his father in Colorado this month. W9BGN is on for U.S.N.R. schedules. W9FHT has been in Colorado on vacation. Wanted — more reports from fellows out in the state!! Kansas City: W9FPI is home from U.S.N.R. cruise. W9FCF and W9FWM are building 'phones. W9DAE is now in Rice Inst., Houston, for senior year. W9EQT moved to California. W9AOG has applied for a portable. W9FHV applied for ORS. W9EQC is doing his bit in watches at NDP for the U.S.N.R. W9RR plans several recruiting trips for U.S.N.R. soon. The ORS list is due for annual overhaul — those who have been inactive may be suspended. No dead heads is the idea. Watch out!!!

Traffic: W9BJA 277, W9BGW 147, W9FHV 111, W9CVT 69, W9EQC 70, W9AIJ 49, W9RR 30, W9EYG 27, W9ENF 25, W9AOG 21, W9DZN 14, W9FVM 6, W9DUD 10, W9DHN 2, W9CFL 8.

NEW ENGLAND DIVISION

EASTERN MASSACHUSETTS — SCM, Miles W. Weeks, W1WV — My term of office having terminated, Joseph A. Mullen, W1ASI, 16 Mercier St., Ashmont, has been elected SCM and reports should now be made to him. W1ASI is an OT in amateur radio, now being senior operator at WNAC, and is well qualified to minister to all the wants of the Section. I take pleasure in welcoming him and trust you all will cooperate with him as heartily as you have with me. 73 and good luck. W1AFF heads the traffic list. W1LM is preparing for a busy winter. W1LQ is in Bermuda on vacation. W1BJM is keeping a daily schedule with the Schooner *Elise*, W1FEC. W1ME won the last month's Handbook. He handled Honduras disaster traffic. W1BNJ was QSO SUICH on 7 mc. W1BGW is on the inactive list during a three months' vacation. W1WV has a new National SW-3 DC receiver. W1BFR is building a new receiver. W1BXB has been on several U.S.N.R. week-end cruises. W1ABG has changed QRA in Lowell. W1CQN and W1ANK both report a little traffic. W1ATX says good outdoor weather has curtailed his radio activities. W1ADK handled traffic with NAMS. W1CHR blew his power transformer. W1ACH is dusting off the summer dust. W1KH and W1AKY are resuming their OBs. W1AKY will resume his "Code Lessons" with 'phone on 1750 kc., each Thursday, at 8:15 p.m. E.S.T., beginning November 5th. W1AGA again reports traffic. W1ACD, at school in Virginia, has the call W3RS. W1BZQ is waiting for the season to pick up.

Traffic: W1AFP 132, W1ADK 30, W1ASI 26, W1BJM 16, W1KH 12, W1BFR 11, W1AGA 11, W1ME 10, W1BNJ 8, W1CQN 7, W1ANK 6, W1ATX 3, W1AKY 2, W1ACH 1, W1ACD 11, W1BZQ 42.

CONNECTICUT — SCM, Fred A. Ellis, Jr., W1CTI — W1MK makes the BPL, FB, Bob. W1BEO is going strong. W1AMQ is all set with a new receiver and transmitter. W1BDI is back on 3900 kc. W1CJD was visited by a bolt of lightning which demolished nearly everything in the station. Our sympathies. Gil. W1QV reports W1DCM, W1CKO, W1CTO and W1DBU as new hams in his city. W1ASP is looking for some reliable schedules. W1AOK worked a VK on 7000 kc. W1BFS sent in his first report. W1AFB has a new transmitter. W1YU will be going full blast with the opening of school. W1AZG blew out his plate transformer. W1AVB says swimming put radio on the shelf. W1BNB blew his transmitting tubes. W1APJ says 1750 kc. is FB,

and wants more of the gang on that band. The transmitter at W1CBA was revamped by W1UT. W1FL moved and is installing his equipment. W1TD wants schedules in all directions. Try W1CJD, OM. W1BBU has a job in New Haven. He keeps daily schedule with W1HD on 58,000 kc. W1AMG is busy getting the bug out of his new MOPA. W1CTI paid a visit to Headquarters. Come on, gang, send in those reports! Winter is here and Connecticut must maintain her lead over New England.

Traffic: W1MK 519, W1BEO 115, W1AMQ 99, W1BDI 51, W1AOK 49, W1QV 27, W1ASP 26, W1AKI 25, W1BFS 20, W1AFB 19, W1YU 14, W1AZG 14, W1AVB 8, W1BNB 7, W1APJ 6, W1CBA 2, W1TD 1, W1CJD 224.

MAINE — SCM, John W. Singleton, W1CDX — We are holding an "All Maine QSO Party" on the 16th of every month, and every Maine man is urged to be on the air and enjoy fun. The SCM will give a copy of the *Amateurs Handbook to the Maine station handling the most traffic* in three months. This contest started August 16th, and the traffic totals at the foot of this report is the standing to date. The SCM advises Maine amateurs to read the amateur page of the *Portland Sunday Telegram* if they want the hot dog on what is going on in the Pine Tree State. W1BEZ is high in traffic totals again. The SCM has a good total too, hi. W1BLI has a new transmitter. W1BOF has some nice schedules. W1CEQ turns in a nice list. W1APX is in line for an ORS. W1CGG has a good VE schedule. W1CFG, ex-NULAAV, is back on the air. W1BEU is busy with U.S.N.R. activity. W1AFA sends in a report. W1IR says QRM is tough on 3500 kc. W1CPT has handled a lot of traffic with NAMS the U.S.S. *Nantucket*. W1AKR was QSO Scotland on 3500 kc. W1BFA is back at school. W1AQW has a new rig. W1BWB is still going strong. W1BWO has been away a lot this summer. W1CGN reports a few. W1AXJ reports a new ham, W1CYE, in Belfast. W1AQL says things will pick up soon. W1QH is busy building transmitter for the Queen City Club. W1COV and W1BTG report new apparatus. W1KQ will soon be back on the air. W1BIG is at WSG, La Crosse, Wis.

Traffic: W1BEZ 144, W1CDX 82, W1BLI 54, W1BOF 47, W1CEQ 47, W1APX 36, W1CGG 30, W1CFG 28, W1BEU 26, W1AZQ 24, W1AFA 21, W1IR 16, W1CPT 16, W1AKR 14, W1BFA 14, W1AQW 10, W1BWB 6, W1BWO 5, W1CGN 4, W1AXJ 4, W1AQL 3, W1QH 3, W1BTG 3, W1COV 1.

WESTERN MASSACHUSETTS — SCM, Leo R. Pelouquin, W1JV — The Springfield Radio Association has started its winter schedule of lectures and code practice, and is conducting a code speed contest over the air. The Worcester Radio Association has resumed its weekly meetings. W1AIF has contracted YL-titis. W1BZ has moved to his new shack. W1BVR blew his Mueller 30-watter. W1BNL has changed his QRA. W1ATK has cancelled all schedules until fall. (Fall is here.) W1ASY reports the sad news that W1QN was electrocuted at WBZA. W1AWW took his portable on a camping trip through Maine and kept in touch with his home daily. W1BVP is now one of the operators at WBZ. W1BXF wants to get in touch with any operator in Western Massachusetts who is interested in 56-mc. work. W1AZW says he had a baby girl born August 21st. W1APL has built two new transmitters, one for 7 and 14 mc., the other for 3.5.

Traffic: W1AWW 51, W1ASY 51, W1BVP 38, W1BVR 18, W1BXF 14, W1OF 11, W1APL 6, W1AJD 2.

RHODE ISLAND — SCM, N. H. Miller, W1AWE — W1MO still manages to work a few DX stations. W1CAB is low on traffic. W1BGM has a nice low power rig. W1BCR is back with a 250-watt 'phone. W1BCZ is perking out with a DC note on 7 mc. W1BUX still hangs out on 14 mc. W1CBS has his new transmitter ready. W1EJ will get back on the air if he can find time to fix up his station. W1AQ held its fall hidden transmitter hunt with quite an interest shown by members taking part. W1ARK is taking on more weight. (He is getting married.) W1EX is on 3.5 mc. with U.S.N.R. W1BIT works his set every day. W1BDQ makes MOPA jobs perk with ease. W1AWE chews the fat with the world. W1DW pushes his key quite often. W1MG is all set for the winter. W1BQD seems to be inactive. W1BLV is high man this month. W1JJ and W1RJ service radios.

WIASZ ripped his finger, but can still push the key. W1BTP has opened up for a good season. W1CPV is on the air daily. WIAMD is chief operator of WPAW. W1BOY is a new ham at 184 Harrison St., Pawtucket, R. I. W1AMU has been busy at WPRO. W1BGA perks out well. WIATM is quite active. W1CPH is out of town. W1AFO is building a new 'phone. W1AFM, W1LD, W1GV, W1CGM and W1BLJ all are experimenting with 'phone. This report shows that little old Rhode Island is coming right along for a season of greater activity than ever before. Keep up the good work and report on the 16th of each month. 73.

Traffic: W1BLV 43, WIASZ 27, W1CPV 25, W1ATM 16, W1MO 6, W1AWE 4, W1CAB 2.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — W1APK has built a new chemical rectifier. W1IP handled a bunch of traffic on 3950 kc. "Grandpop" W1ANS says to notify the gang of the birth of a granddaughter, August 5th. The SCM also reports a new Jr. op., born August 22nd. Portable W1ATT has returned to Riverdale, N. Y. His home call is W2CBB. W1CCM has a new 3-tube crystal outfit all planned. W1BII will soon be OBS. W1BAC is planning on setting his junk up in the luncheon room where he works so he can pound brass between orders. Hi. W1AXL is trying a new power supply.

Traffic: W1ATT 7, W1BII 84, W1IP 74.

NORTHWESTERN DIVISION

OREGON — Acting SCM, F. L. Bernhardt, W7WL — W7EO has a fine looking 500-watt crystal-control transmitter. W7ALM is about ready to put his new job on the air. W7PL will soon have a crystal job with a flock of tubes feeding a 250-watt final amplifier. W7ZD is on with a 50-watter. W7AEM is attending radio school in Portland. W7AJD is a new station in Portland. W7AMF came home from the convention with a fine power transformer as a prize. Many of the gang attended the convention in Tacoma, and all report a fine time. W7AME reports that the southern Oregon bunch are badly bitten by the 'phone bug. W7UN has moved to Medford. A. A. Hebert spent a couple of days in the state and met with the Portland and Coos Bay Clubs. His talks and the pleasure of meeting him were enjoyed by all. Let's get busy, gang! Traffic is the backbone of our organization and we need to handle more of it.

Traffic: W7AMF 45, W7QY 8, W7ZD 12, W7AEM 6, W7AME 7, W7EO 2, W7WL 37, W7PE 11.

IDAHO — SCM, Oscar E. Johnson, W7AKZ — W7AYH became the proud father of a junior op. on August 20th. W7BAU has joined the A.A.R.S. net. W7BDL failed to get his transmitter going on 3.5. W7AFT has kept a schedule with VE4FR for nearly two years without a break. W7ACD has been experimenting with AC super-hets. W7ACP is installing a crystal. W7KG is building a new frequency meter. W7KJ expects to be back on soon. W7BEO lacks power. W7ACO punctured a crystal. W7ACP, W7ALY and W7ANA attended the convention in Tacoma. W7AUR has taken to commercial work. W7AJQ is back home. W7AKZ has built a new pentode transmitter.

Traffic: W7BAA 6, W7KG 25, W7ACP 22, W7ACD 54, W7AFT 3, W7ALW 6, W7AYH 3, W7AKZ 17.

MONTANA — SCM, O. W. Viers, W7AAT — W7CU works on 3900 kc. W7ASQ is building a low power set for his father, W9CAB. W7AHL has a new 3500-cc. Zepp. W7AOD is building a new A.C. receiver. W7BFA reports on time. W7AFS is on with a pair of '45s. We must have more reports in to the SCM's office each month. Let's make our slogan "A report from every Montana station."

Traffic: W7CU 33, W7AFS 20, W7AHL 16, W7BFA 5, W7ASQ 4.

ALASKA — SCM, W. B. Wilson, W7WDN — K7ANQ urges all Alaskans to report to the SCM so that the report in these pages may be longer.

Traffic: K7ANQ 63.

PACIFIC DIVISION

HAWAII — SCM, L. A. Walworth, K6CIB — The Hawaiian Section Convention was postponed to Thanksgiving week, so that better preparations could be worked out. K6CRW entertained K6SH, K6DYC, K6CXY and K6CIB Sept. 5th, 6th, and 7th. All climbed Haleakala and tried to do their stuff with portable K6EM on RM-SCAL

NITE, but the tubes went west in the receiver and spares were 40 miles DX by rough road, so ND. CRW drove down second day and put portable in shape and, on second night, K6BJJ, K6AVL and K6AYD were worked. Hilo has a live Ham Club now. K6AJA is president, and he boasts 100% membership of the local hams. School began Sept. 1st and K6YAJ and K6YAL are getting 'phone-minded. K6AYD has a 3500-cc. 'phone talking the 100 miles into Honolulu from Maui. K6SH, K6CXY and K6CIB visited K6DYC, K6ERO and K6AYD while on Maui. K6ERO is interested in 'phone now. K6BQJ is interested in bees and honey. K6ED recently worked former SCM Fullaway in Alaska. K6CRW worked a ZL with an '01A. K6DVZ contacted two W5's and got homesick, for Texas is his home. Bernard H. Linden visited Hawaii during August and inspected 48 commercial stations besides the Army and Navy rigs, so did not have time to attend a ham meeting planned for him. He extends his sincerest Aloha to all K6's and those of us who met him know he is sure a big-hearted "ham."

Traffic: K6AJA 144, K6AVL 129, K6FCX 127, K6COG 110, K6CCS 11, K6EDH 4, K6CIB 2.

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — With 500 watts of crystal-controlled energy in the air, W6BET smashed through the trans-pacific QRM with a total of 509 messages — FB. W6AMM has held a PI schedule for years. W6DCP is handling traffic, as is W6YG after a summer's layoff. W6BMW is fire warden. The Watsonville gang, W6DKM, W6DBQ, and W6DDS sent in their first reports. FB. W6ALW will have an '04A on 7000 kc. W6PBW is being congratulated, as his OW (W6DHW) passed her amateur first examination with 92%. W6CEO has a '52. W6DMJ sends in his final report with the splendid total of 466. Hereafter W6FEY will handle W6DMJ's schedules. W6HM will be back on the air Oct. 1st.

Traffic: W6BET 509, W6AMM 245, W6DCP 91, W6YG 84, W6BMW 28, W6DKM 21, W6DBQ 24, W6ALW 16, W6PBW 10, W6DDS 12, W6CEO 2, W6DMJ 466.

EAST BAY — SCM, J. Walter Frates, W6CZR — W6ATJ, a comparatively new traffic man, romped away with the honors this month. He was closely followed by W6BKM. W6ATJ kept a schedule with AC8GO. W6BKM was one of the men who assisted W6ZM in handling the traffic put out by portable station W6AQ at the California Flower Festival at San Leandro. The third highest traffic station on the list was 6AQ. W6ZM with the cooperation of a small group put on a fine show. The 'phone transmitter in the booth was loaned by W6AHL, the CW transmitter by W6CUG, and the power amplifier by the Gardner Transformer Company. Everybody who took part in the work deserves the thanks of the Section, for if it hadn't been for them the Section totals would have been very meagre this month. W6CDP hammered out a consistent bunch of messages; W6RJ was heard in England and Italy. By a strange coincidence W6ALX batted out the same total as W6RJ. W6PB, an old-timer from spark days, clicked off WDDE as one of his first DX stations. He reports W6BUY on with a vertical 14,000-cc. Zepp. W6BZU came back into the traffic game with a bang this month. W6FBI is another man who believes in using all ham waves. W6CBE has been handling some traffic from the Olympic Games and the recent Fiesta de Los Angeles. Through the courtesy of W6ATJ, W6YM, the station of the Central Trade School in Oakland, sent in its traffic total this month. W6DLT is still pounding away at the traffic. W6FCW's monthly totals are picking up. W6BBJ handled a death message. W6FCN worked EX7C, and wants to know his QRA. Got me! He reports W6CSV, W6DYP, and W6IG as new hams. W6CZN is back on the air with an AC receiver and power pack. W6BMS is still in the rebuilding stage. W6DQH announces that he has opened a printing office of his own again. W6CDA is still keeping engagements with the Letterman Hospital in San Francisco. W6AN represented the section at the Pacific Division Convention in San Francisco. The Oakland Radio Club copped the stunt prize. Everybody is looking forward to Long Beach next year. W6BSB announces that he is the new president of the Oakland Radio Club.

Traffic: W6ATJ 708, W6BKM 684, W6AQ 590, W6CDP 153, W6RJ 102, W6ALX 102, W6PB 53, W6BZU 44,

W6FBH 41, W6CBE 35, W6YM 26, W6DLT 19, W6FCW 12, W6BBJ 7, W6FCN 7, W6ZM 7.

ARIZONA — SCM, Ernest Mendoza W6BJF — The Arizona Short Wave Club, at its fourth weekly meeting in Phoenix, had 36 members, 12 of them being out-of-town amateurs. It published its official organ — the *Arizona Short Wave Radio News*. And it held its first banquet, all within one month. Twenty-seven hams reported to the SCM via cards this month. If you lack these, drop me a line and I will send you some. Don't forget to report to me on the 16th of every month. If your call doesn't appear here, it is because I knew nothing about your activities. Only one man made the BPL this month, since the requirements were raised on totals for qualification. W6CDU makes the BPL both ways. W6BRI is the new call of his wife. W6ALU lost one of its 80-ft. towers when struck by lightning. W6CPF is handling his share of traffic. W6CEC is daily covering the state on 'phone with his OBS. Mrs. W6CEC is now 6BYN. W6EUT has been experimenting. W6EFN is putting in a 50-watter. W6BJF was sent to San Francisco for eight days by the Arizona Short Wave Radio Club, as Arizona representative to attend the Pacific Division Convention. W6EJN is doing good work with his 3500-cc. 'phone. W6COI may be inactive during winter due to college work. W6HS just finished MOPA 50-watter for 7000 kc. W6AWD, ye editor of a Mesa paper, is with us again. W6CKW's low-powered 'phone is working out very well. W6BCD has just returned from three months' vacation in Arkansas. W6BYD installed a 50-watt linear amplifier. W6CQF is a new ham in Tucson. W6BLP has just replaced his antenna poles. W6AYW has been on with couple of '45s in TNT PP. W6DCQ occasionally turns on his 212D modulated 50-watt 3500 kc. 'phone with Esco mg. and blocks all local receivers. W6DRE expects to exercise his pair of '52s and rectobulbs on 7000 kc. again. W6EEB, KGUP, American Airways, is rebuilding into a 100-watt crystal 'phone. W6EFC is all set for some winter DX. W6BZO is technical sergent. of the Chandler Brigade HQ Co. W6EKP will be on with PP '10s. Ex6CCN is working on a 'phone heap. Ex6DWP has a new license on its way. Ex6DXC has a new crystal transmitter. Ex6EAA wishes to confirm rumors about dancing lessons. Ex7CH is second op at 6EFC. W6CWI will be back from coaching the Arizona rifle team at Camp Perry, Ohio, when this is read. W6DIE is in California trying to tack up his new commercial ticket where he can get some service on it. W6AEK is back in Phoenix. W6GVW will soon be on air again. W6ANO dropped in to see 6BJF and W6EFC while at Flagstaff encampment. W6DVJ has not been heard from lately. W6DTU returned to Tennessee College for the winter. W6CPX was in Nat'l Guard camp as a 2nd Lieut. this year. W6ATR of Superior is now 5BWU in El Paso, Texas. W6FAI has come to life again on the 3500-cc. 'phone band. W6DNE is a new portable at Fort Huachuca. W6FEA has a nice radio parts store in Phoenix for hams. (Free ad. Hi.) W6EJQ is a new man in Ajo. W6CUR is using a '10 TPTG. W6AWH builds some beautiful transmitters. W6CAP is building up a low-powered crystal rig. W6GS, the oldest ham in Arizona, will be on the air with a '10 TPTG after 15 years off the air! W6EL is back in Prescott. W6BFA is on after the vacations. W6AMV now has a 1000-volt m.g. and two 50-watters. W6AAM is off the air due to too much work. W6UP is seriously ill, and will be missing for an indefinite period of time. We all wish you a speedy recovery, old-timer.

Traffic: W6CDU 514, W6CPF 200, W6CEC 51, W6EUT 26, W6EFN 22, W6BJF 20, W6EJN 19, W6AWD 16, W6CKW 15, W6BCD 10, W6BYD 7, W6CQF 5, W6BLP 2, W6HS 3, W6COI 3.

SAN FRANCISCO — SCM, Clayton Bane, W6WB — Well, fellows, the convention has passed into history and from all reports heard, it was successful. Another notch in the handle for A.R.A. W6EKC leads again for the seventeenth time. W6DFR comes next with his usual good total. W6DHE is back on after long absence. W6ZS reports with good traffic. W6MV is installing crystal rig. W6BVL just about ruins W6WB's cans when he starts up. Old uncle Ell, W6DPF is about ready to come on. W6SC is working down South. W6BNA is all pepped up after the convention. W6ECS says convention was FB. W6ADK reports again.

W6DZZ is working hard as RM. W6IU says traffic still low. W6ABB is lining up some schedules. The Associated Radio Amateurs of S.F. scored a big success with their broadcast of the Annual Golden Gate Swim. This is the second year that they have successfully broadcast a stroke by stroke report from a yacht to the PA system on the beach. W6CAL says college takes up most of his time. W6ERS is back on 7 mc. W6PW is getting his frequency measuring equipment brushed up for the coming contest. W6ETR is hot after higher power. W6AKU has the prettiest layout we've ever seen. W6KJ says his fifty went west. Don't be bashful, you new men, send in your reports.

Traffic: W6EKC 219, W6DFR 133, W6DHE 89, W6ZS 52, W6MV 32, W6BVL 28, W6BNA 29, W6ECS 22, W6DZZ 11, W6ADK 29, W6IU 22, W6ABB 7, W6CAL 5, W6ERS 4.

SACRAMENTO VALLEY — SCM, Paul S. Farrelle, W6AXM — W6CMA is high man in traffic. W6AIM is next. W6EVS is worrying over crystal control. W6EWB says pentodes are the berries. W6DON will soon have his new crystal 250-watt rig going strong. W6AUO is heard on 7000 kc. W6EOU is going to college. W6EOC has a new car. W6DYF will have a new '52 soon. W6ADS will soon be WAC. W6BYB's 1-KW 'phone will be heard this winter. W6BBW and his U.S.N.R. unit seem to be defunct. W6AXT is a new call heard on 'phone. W6AXM has temporarily discontinued his traffic schedules with the Orient. Come on, gang, and bring our traffic totals up to the high marks we had a few months ago.

Traffic: W6CMA 63, W6AIM 10.

LOS ANGELES — SCM, H. E. Nahmens, W6HT — To eliminate delay in receiving mail, a P.O. box has been obtained. SCM's permanent mailing address is now: Box 903, Long Beach, Calif. Los Angeles Section was splendidly represented at the convention held in San Francisco. Without opposition, it was voted to hold the 1932 convention at Long Beach, to be sponsored by the Associated Radio Amateurs of Long Beach. W6BCK leads the Section with a splendid total. W6EGH makes the BPL both ways. W6CFN reports Unit 2, Section 2, U.S.N.R., has secured quarters in Riverside County Court House. W6YAU is strictly a traffic station with 40 schedules per week. FB, OM Grening! W6CAE is coming to front as traffic man. W6AIX and W6ETM are now in the ORS ranks. W6HT had a swell time at the convention. W6DZF reported direct to HQs. W6AKW urges hams to join Army Amateur Net. The light bill at W6DEP mounts month after month. W6CVZ almost won QLF contest at convention. W6DLI spends most of time at sea. W6ERL is still working on MOPA. W6EQW couldn't sit down for a week. Ask him about it. A bad power leak holds up production at W6CXW. We will soon be hearing W6TE holler, "Hullo, Howsh my moshulashun?" It's a shame something can't be done about the power leak at W6BVZ. W6EZN wields a wicked pair of barber shears. W6ETJ lost his job. W6AWY visited the ARA while in Long Beach. W6ASM attended convention in a Spanish outfit to advertise La Fiesta de Los Angeles. My! My! W6EBK steps right out with his '45 Hartley rig. W6BLS sends in first report. A long sick spell left W6AKD with little pep. W6WO is studying radio and sound recording at L.A. Junior College. W6ESA is busy preparing for the Frequency Contest. W6ALQ is starting a radio club in San Luis Obispo. W6DMY is building crystal transmitter to use at Stanford. W6BHO, father of W6DJZ, is a new ham at Santa Paula. Working out of town kept W6DWW off the air. W6ENR has new layout. W6ANS' is now going strong. W6FAU is working on 14 mc. W6GVV yanked out his flat '52 and gets out much better with couple '10s in push-pull. W6FT has schedule with KGQs, yacht *V'lechi*. W6DSP is an Army Net station. W6AM is building a crystal-control portable using a '52. W6ANN reports South America pounding through on 14 mc. W6TN says eastern stations all "too busy" to take his traffic. W6DOZ is attending California Tech. W6MA enjoyed the San Francisco Convention more than any she ever attended. QRM has W6DZI going around in circles. W6ON has a 56-mc. 'phone. W6EBB is now on 14 mc. W6KPA visited hams during his vacation. Portable W6ZZA was demonstrated at both the Tacoma and the San Francisco conventions. W6VO says if the MOPA he is building

doesn't work, he is through. W6CBJ is rebuilding. W6EQD is QRL at school. W6ACL just finished his crystal rig. W6ABR has been laid up with pneumonia. W6VH doesn't look like a ladies' man, but — my, oh my! The bakelite in the transmitter at W6CUH went up in smoke when some 600 watts went coursing through it. Vacation and trouble with transmitter kept W6DLV off the air. W6AKC absent mindedly ordered '10 shells for his shotgun! Hi! It seems the YLs just won't let W6BCX alone. The new "loudspeaker" at W6AWY's shack keeps his YF, W6ATE, busy. Received reports from W6CUJ, W6BYD, W6CZT, W6EFA, W6BGF, W6DEL, W6DNA, W6EAZ, W6FAN, W6FFF, W6CTD, W6AIV, W6CPS. The Riverside Radio Club now holds their meetings in the U.S.N.R. Armory. One of the most progressive clubs in the Section is the Santa Barbara "Y" Radio Club. The Tri County Radio Club has installed a 250-watt crystal control transmitter at the L.A. County Fair in Pomona. A series of lectures on crystal control have been started at the Pasadena Short Wave Club. The Glendale Radio Club meets in the Chamber of Commerce Bldg. every other Thursday, at 8:00 p.m., instead of every first and third Thursday of each month, as reported last month. A great deal of credit is due Frank Charters, W6DTE, for the work done at the Amateur booth, sponsored by A.R.R.C., at La Fiesta de Los Angeles. The unusually high totals of the past few months have been largely due to La Fiesta traffic. This was the original idea of Mr. Norman L. Madsen, who contributed a great deal of time and effort to the project. On behalf of the Section, I extend him our appreciation and thanks.

Traffic: W6BCK 872, W6EGH 547, W6CFN 288, W6YAU 287, W6HT 204, W6CAE 196, W6AIX 161, W6AKW 110, W6ETM 101, W6DZF 96, W6DEP 92, W6CVZ 88, W6DLI 77, W6ERL 71, W6EQW 66, W6CXW 63, W6AOR 55, W6CUJ 54, W6TE-53, W6BYD 49, W6CZT 49, W6BVZ 41, W6EZN 40, W6ETJ 39, W6AWY 31, W6ASM 30, W6EBK 25, W6RLS 24, W6EFA 21, W6AKD 20, W6W0 19, W6ESA 16, W6ALQ 16, W6DMY 16, W6DWW 14, W6FAU 12, W6CVV 10, W6FT 10, W6DSP 10, W6AM 10, W6ANN 10, W6TV 9, W6UU 8, W6DOZ 6, W6MA 4, W6DZI 3, W6ON 2, W6ZZA 2, W6BGF 2, W6DEL 2, W6DNA 2, W6EAZ 1, W6FAN 1, W6VO 1, W6DLV 1.

SAN JOAQUIN VALLEY — SCM, E. J. Beall, W6BVY — A big time was had by all at the Pacific Division Convention in San Francisco. It was one of the best in every respect that has been the SCM's privilege to attend. The gang had the opportunity to meet Mr. Grammer, who represented H.Q. in an admirable manner. W6BRV, W6ADB and W6FFU are holding down a heavy schedule with W6DQV handling U.S.N.R. drills. W6QA has moved to Brawley. W6AOA will handle all requests for schedules in this Section. W6EXM succeeded in working ZL2FR, a YL in NZ, on 3.5 mc. W6CLP reports best DX east. W6FFU is monkeying with 56-mc. transmitters and receivers. W6BQC gathered in a bunch of traffic. W6FFP is having trouble with QRN on his schedule with K6COG. W6SF reported for Stockton gang. W6FAN has moved to San Rafael and uses call W6CNF. W6DIV is attending U.C. W6BBC is on with his '52. W6EXH is a new QRA. W6CXT won't get off the air even when he rebuilds. The gang is getting its dynatrons in shape.

Traffic: W6AOA 219, W6EXM 22, W6EJ 24, W6CLP 16, W6FFU 6, W6BQC 170, W6DQV 102, W6AME 3, W6FFP 65, W6BBC 10, W6FAN 9, W6DZN 17, W6SF 12, W6EXH 6, W6CXT 79, W6BVY 68.

NEVADA — SCM, Keston L. Ramsey, W6EAD — Reno was well represented at the convention at San Francisco with W6CRF, W6AJP, W6BYR and W6EAD attending. W6CRF and W6EAD spent a week visiting the brethren in various parts of California. W6U0 is high man this month. W6AJP is rebuilding. W6CRF is holding code classes. W6AAX and W6BYR are working Army-Amateur schedules. W6YAR is getting ready for a busy winter. W6BTJ has been QRL with the girl friend.

Traffic: W6U0 44, W6AJP 33, W6CRF 7.

PHILIPPINES — Acting SCM, I. S. Limer, KA1SL — KAJJR turns over reins of Acting SCM to KA1SL. Mr. Schultz has done a fine job of organizing section affairs, and

is sure to be missed. KA1HR and KA1CE make BPL. KA1HR worked W2MK, New York, several times, which is exceptional. DX. KA1CE developed some rare receiving antenna ideas. KA1CO is quite active on China traffic. KA1ZC has new instructor. KA1SF works W2 on QRP '01A. KA1RT and KA1JM have nice crystal notes. KA1CM is coming into action intermittently. KA1EL is giving key a rest. KA1AC will be on soon. KA1UP is ready to start up. KA4SW and KA9PB still rush out the traffic. OM1TB, OM2CS, OM2CJ are only Guam stations regularly active at present. Please cooperate, fellows, and send in your report even if there's nothing to say but 73.

Traffic: KA1HR 860, KA1CE 639, KA1SL 144, KA1CO 87, KA1SP 7.

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6BGL on 'phone leads the Section. W6BKX has a '52 on the 14-mc. band and another '52 on 7 mc. W6CTP attended the convention at San Francisco and reports a fine time. W6AKY is on with a new set. W6APG is trying for an ORS ticket. W6AYK has started a radio shop in La Mesa. W6BAM has his crystal going. Six hams from Long Beach were in San Diego and were made members of the P.A.T. Club. The SCM would like to hear from any ham that is a member of Pi Alpha Tau Radio Fraternity. Several San Diego hams attended the Quarterly Banquet of the Los Angeles Section held in Long Beach. W6QY is still on 14 mc. W6AJM is thinking of trying 7 mc. W6EOL has moved. W6DNW has a new portable receiver. W6DNS is rebuilding with crystal. W6FBF has installed a new 50-watt. W6CTR is on with a new 'phone outfit. W6BOW has a 50-watt now. W6DAI is QRL installing sets in Autos. W6DNL has a new portable.

Traffic: W6BGL 34, W6APG 31, W6BKX 26, W6EOP 6, W6CTP 11, W6AKY 4.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffman, Jr., W8HD — Army-Amateur schedules have been resumed with WSOK as State NCS. W8DPO again leads the state in QSOs with VKs and ZLs. W8BTV is leaving us, and hopes to be on from Lehigh College. W8CDV is working on 3.5 mc. W8CSF and W8AZD are doing some nice work on 3.5 and 7 mc. W8HD had a nice visit from old 8BT-8XM. W8DNN is at NAM, and W4AFM, "Honorable" Cancellation of ORS for month: W8CBV and W8BTV. There are quite a few hams in the state who are active and should have ORS appointments. Let's hear from you fellows.

Traffic: WSOK 28, W8DPO 22, W8BTV 2, W8HD 1, W8CDV 1.

VIRGINIA — SCM, J. F. Wohlford, W3CA — W3YD, new call for W3BLU, made contact with Belize, British Honduras, 1 a.m., Sept. 13th, and handled 11 messages. W3CXNI did not report as "BN" was on vacation. W3BRA-W3BWS has new MOPA. W3BFT received a flock of foreign cards. W3BEK expects pair '03-As on 'phone soon. W3NT spends most of his time with U.S.N.R. W3NB is call of U.S.N.R. transmitter on 3.5 mc. W3AQK is attending college. W3HL is handling traffic. W3CBA is portable call for W3BRQ. W3BWS is portable call for W3BRA. W3BDQ is on 7 and 14 mc. W3WD will be on soon. W3TN is fast traffic man. W3BRK is on more often now. W3ARU was assigned to high-frequency work using the call W3ABX. W3AUG had an '03A, but the junior operator dropped it. W3AER is on with 3.5-mc. crystal 'phone. W3APT still works 7-mc. band. W3CGF has gone to Europe to enter college. W3FE worked RX1AA on 14 mc. using '01A. W3ZU was trying to make BPL, but the ante was raised, so he will have to try again. W3AMB is back on air with crystal-control job. W3BUY spent two weeks with U. S. Marine Reserves at Virginia Beach. W3ZY is working 'phone outfit. W3BJX sends his second report. W3BAZ lost five pounds working schedule from 7:30 to 10:45 p.m., one night, with 90 degrees registering in the shack. W3AAR sold out. W3BRY has schedule with W3WO. New ORS appointed during month: W3AMB, W3BAZ, W3CFL and W3YD. W3AEW made a welcome visit to the SCM. W3FJ is working crystal-controlled job. W3CFL was elected Secretary of Richmond Short Wave Club to succeed W3ZU, who was

(Continued on page 78)

• I. A. R. U. NEWS •

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

President: H. P. MAXIM

Vice-President: C. H. STEWART

Secretary: K. B. WARNER

Headquarters Society:

THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

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Nederlandsche Vereeniging voor International Radioamateurisme
New Zealand Association of Radio Transmitters
Norsk Radio Relæ Liga
Radio Society of Great Britain
Rede dos Emissores Portugueses

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

Conducted by Clinton B. DeSoto

THERE is a disturbing tendency on the part of certain American amateurs, aided and abetted by those abroad, to indulge in a particularly unsportsmanlike form of the still important phase of amateur radio known as QSL'ing. Many amateurs, unable because of lack of ability, application, or suitable equipment to work foreign DX, apparently find it much simpler to merely fill out a QSL card in the ordinary "worked" form, mail it to some more or less prominent foreign station, and hope that a reply will be received in the nature of an unquestioning acknowledgment of the non-existent QSO.

Most particularly does this become a pernicious evil when an amateur of the aforesaid class finds that he has accumulated sufficient legitimate and illegitimate cards to enable him to qualify for membership in the WAC Club. The WAC certificate is at present regarded as the highest general award that can be given an amateur. Approximately 2 percent of the total number of the amateurs of the world are members; they are extremely proud of their distinction. It is a justifiable and laudable ambition, then, to aspire to membership in this lofty company. But not to acquire that membership on the basis of proofs supplied by faked or falsified QSL cards. Not that such instances often occur. Obviously faked cards are quickly denied by the purported sender. Normal reply cards, admitting an untrue contact, are admittedly more difficult to handle. But the discrepancy is, sooner or later, observed. Very few applications are made that are accompanied by false proofs, because there are few amateurs either clever enough or persistent enough to stick to such a form of progress long enough to make it work out. The prize is not

worth the risk, anyway. Most fellows would have earned WAC legitimately before they could complete the necessary fanoodling.

But even the tendency to try is a deplorable one. The man who cheats in business affairs has at least the excuse of the "first law of life." But there can be little sportsmanship at all in the man who cheats at his hobby.

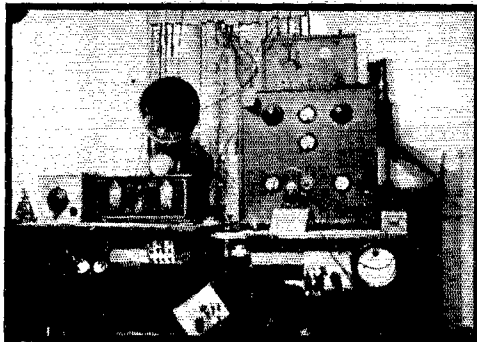
In the foregoing we have ascribed the sending of requests for false cards to American amateurs, and the granting of these requests to those in other countries. It rarely works in reverse, although occasionally something like this occurs: quoting a well-known W8 to an Asiatic station: "I have heard you two or three occasions . . . I have filled out the card in QSO form for your sake, you can send me one if you like . . . hope my card gets you WAC."

Either way, it's bad. The practice, while still narrow and confined, merits some definite mention in *QST* because of its incipient danger, we believe. Therefore, we earnestly hope that you, as an amateur, will refrain from asking for acknowledgment of non-existent QSO's, and that you, as an amateur, will refuse to grant such acknowledgments when requested. Here! Here is an example of how to handle such matters, by Britain's so-well-known YJ, Miss Barbara Dunn: "W— : . . . I have never QSO'ed your station! And I have not even heard your signals! . . . B. Dunn, G6YL."

The QSL Bureau for the Dutch East Indies, maintained by the N.I.V.I.R.A., notifies us of a change of address. In future all cards intended for these islands should go to PK1CF, 66 Leyzers Vie

Leyzers, Van Heutz Bouelvard, Batavia, Centuz, Java, D. E. I.

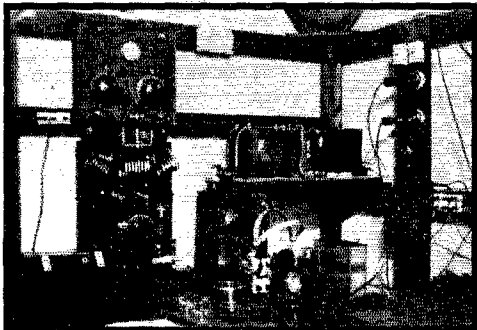
Brief items of gossip from the month's mail: C. J. Werkema, famous as unlicensed PA0AP, with which call he became WAC, prevented for years by invalidism from obtaining the regular governmental license, so that PA0AP was even-



TWO SOUTH AFRICAN STATIONS TO BE PICTURED THIS MONTH; TRANSVAAL'S ZS6Y, AND ZEIJH IN SOUTHERN RHODESIA

The photograph above is that of WAC ZS6Y, owned by Robert Keir, Largo Colliers, Welgedacht, Transvaal, South Africa.

Below, we see ZEIJH, I. Clifford Fynn, Department of Lands, Salisbury, Southern Rhodesia, South Africa. This station has been chartered by the Rhodesian Government to maintain daily contact with an expedition in the Kalahari desert, and no difficulty is being experienced in holding down the job.



tually assigned to another amateur, has now been licensed with the call PA0APX. FB! . . . R. Ohrbom, VK3OC, reports working 42 countries in all continents since beginning high frequency operation, or within a period of ten months. Summer conditions in Australia have been very poor, he says, especially on 7 mc., with only a few West Coast W's coming in during the afternoons; Europeans heard occasionally but not worked. 14 mc. was slightly better during the afternoons. . . . Captain Walter G. Ashbridge, ZL2GP, General Secretary and Communications Supervisor of the N.Z.A.R.T., is the Senior Wireless Officer in the New Zealand Signal Corps. . . .

Many old-timers have been coming back during the past year — dozens, even hundreds, of them in this country — and also abroad, of course. Among these is Harold G. Fownes, Wellington, once world-famous as ZL2GO, and now back on with fairly low power. . . . John Lagererantz, SM5SV, has been working during the past summer on a commission from the Royal Air Force to develop high-frequency transmitters and receivers suitable for aircraft use. Since commercial and military planes in Sweden have not been using high-frequency radio apparatus, it is an evidence of the esteem in which Sweden holds her amateurs that he should have been chosen to execute the commission. . . . K. S. J. Rancombe, YI6KR, is now back at his Mosul headquarters, battling out with 100 watts crystal-controlled. He reports having heard in one hour early one morning 16 W's on 14 mc. and 15 on 7 mc. in the Diana location, which was a Levy (Syrian) outpost, 126 miles s.s.e. of his headquarters, Mosul. . . . Czechoslovakia would seem to be a unique amateur country. The number of WAC Club members there recently was equal to the number of licensed stations; that number, in turn, being nearly equal to the number of crystal controlled stations.

Here is a record we'd like to see claimed: a possible six-band WAC, with the confirmation QSO with each continent carried out in a different band. The idea came from a letter from G. O. Milne, W2ZA-W2RRR-W3JA, who was granted WAC Club membership recently on the basis of proofs supplied covering contacts made on the 28-, 14-, 7- and 3.5-mc. amateur bands. The four bands make a good start; with the addition of a 56-mc. local QSO for one's own continent, and possible trans-oceanic 1750-ke. work in a year or two, the possibilities for some of the better DX stations to claim an honor of this kind are good.

Anyone else have any good ideas for a new record to conquer?

British Report

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

Arrangements are now well in hand for the forthcoming R.S.G.B. tests. These will take place as follows:

28 mc. January 19th-20th, 26th-27th, and March 12th-13th, 19th to 20th. Times, 1200 Saturdays until 2400 Sundays, G.C.T.

3.5 mc. February 6-7, 13-14, 20-21, 27-28. Times as above.

B.E.R.U. February, 1932 (suggested four week-ends).

Full details will be circulated to all overseas societies, and it is hoped that many foreign and colonial amateurs will assist us in our endeavors to make the tests successful.

(Continued on page 62)

• CALLS HEARD •

W4FD, J. B. Epperson and N. S. Hurley, P. O.
Box 972, Knoxville, Tenn.

7000-ke. band

em5ea on8eis d4mfm f8bf f8tx g5by haf3d hk1da hh7c
k6aja k6bmn k6ces k6dmm k6dqf k6dvw k6ed k6erh k4rj
k7aml k7ce k7oj lofh msl4r nmlnc pa0ql rx lao tpla
ve1an ve1bb ve1bi ve1bm ve1du ve2ea ve2el ve2er ve2ex
ve3em ve3ho ve3ly ve4do ve4fti ve5aw ve5hh ve5oj ve5ov
vk3bb vk3ca vk3gu vk3hk vk3jk vk3ka vk3wl vk3wy
vk3zx vk4ju vk4uk vk5gr vk5ju vk5lx vk5pk vk5ra vk5wr
vk6cb vk6sa vk7ch x1b x1er x5c x14 x1ao x1lap x1lar x1lv
x12ab x12ac x12oj x12gj x12gq x13as x13aw x13bb x13ec x13em
x13cp x13cv x13cx x14ao x14ba x14bk x14am

14,000-ke. band

b7x ear12 f3me f8dm f8hr f8sm f8tv g2ip g2by g5bj g5by
g6hp g6yk g6xn oa4x rx1aa ti2ags velab ve1al ve1co ve2ca
ve2er ve2cx ve4bq x9a

E. C. Williams, Apartado 234, Maracaibo,
Venezuela

14,000-ke. band

em1by em1fm em2jm em2sh em2wa em2wd f8ex g2kl g2ao
g2by g5bj g5ml g5vl g6oh g6yk g6vp ho1fg on4jb on4uo
oh7bn py2ba py7aa rw1asq x2irs ti2wd vu2ah w6as wlaex
w1auj w1awj w1ax w1az w1bby w1bdl w1bvk w1bus will
w1wv w2afm w2alk w2aoe w2aqf w2bak w2bke w2box
w2brq w2ccj w2cet w2egv w2cl w2ms w3afu w3aiz w3bic
w3by w3uy w4abh w4abo w4ago w4akh w4aoj w4hj w4wv
w5aav w5ada w5aea w5ark w5axu w5ba w5bke w5hoc
w5lbn w5rw w5rwu w6aqj w6bgt w8hk w8bwj w8bkw w8bu
w8ote w8ctn w8djv w8dij w8lt w8sy w9aay w9adn w9akj
w9apd w9gbb w9ghh w9ot

W1ZL, Carlton A. Weidenhammer, 33 Washington
Pl., Bridgeport, Conn.

(Heard during May)

14 mc. band

celai celao ce3ch ce3cr em1by em1fm em2ax em2ef em2fc
em2gf em2sh em2sv em2wa em2wd em2xi em2ta ct1ow ct2af
ct2an ct2aw ct2bt d4aap d4acj d4bbk d4ggg d4iwi d4ilj
d4mfm ear16 ear18 ear21 ear52 ear128 ear185 ear436 earcu
ei2b ei7c ei8c f8bx f8btr f8dot f8eb f8ej f8eo f8er f8ex f8fs
f8gi f8hr f8ij f8lw f8od f8ok f8ol f8pm f8px f8pz f8rs
f8sk f8sm f8swa f8tex f8tl f8tp f8tq f8tr f8tv f8uq f8ux
f8vj f8xd f8zx f3mta fm3er fm3eg fm3hs fm3mst g2ao g2by
g2dh g2in g2gf g2gm g2gn g2kl g2lx g2ma g2nh g2oi g2op
g2ow g2pa g2pe g2qv g2un g2vq g2vw g2wy g5bd g5bj g5by
g5bz g5cm g5cx g5dd g5fc g5la g5lv g5mb g5ml g5ni g5oc
g5qa g5qf g5qy g5rq g5sr g5sy g5vl g5wy g6ba g6el g6dh
g6fx g6ge g6hp g6je g6jg g6lb g6li g6mb g6nx g6oh g6ot
g6qb g6rb g6rg g6rw g6sc g6uo g6vp g6wn g6wt g6wy
g6xn g6xq g6yl g6yk haf3d haf3ky ho1fg i2aa k4bpf k4hp
k4kd k4ug ialg la2b la2z oa4x oh1nf oh2pg oh3nh oh7ne
ok1aw ok1na on4ar on4bc on4bx on4dj on4fe on4fg on4gn
on4gw on4ho on4hm on4ja on4jf on4mo on4on on4ro on4uf
on4va oz1j oz5a oz7hs oz7vp pa0bn pa0fb pa0fx pa0gg
pa0kw pa0mm pa0qf pa0tw pa0zk pylaa py1er py2bn
py2cr py2qa py8ia rx1aa sm3xj sm6ua splkx sulaq ti2ags
ti2ta ti3xa uo1jh uo1un ve5ou ve5va ve5xan vo1aw vo8j
vp2pa x1n x8a y1yb y1zrd xw1b xv8i xoz7h b7x nams

W2CBB, H. J. Conti, 417 West 238th St., N. Y.
City

7000-ke. band

em1by em2fn em2jm em2ra em2wa em2ww em5ni em8yb
ct2ba daiv dol d4aex ear21 ear110 f8fke f8myl f8pww f8pz

f8wok f8xd ho1fg hh7c hk1da k4aan k4kd k6agi k6aja
k6coq k6erw lepww nj2pa nmlnc ti3xa ve1al ve2aq ve2ar
ve2bb ve2be ve2ca ve2cl ve2cp ve2cu ve2ex ve3ay ve3be
ve3bk ve3bv ve3ca ve3cb ve3ce ve3cf ve3da ve3gt ve3kp
ve3rf ve3rs ve3wk ve3zx ve4db ve4fp ve4gf ve4gt ve5ac
ve9ai ve9el vk2hb vk2ix vk2ns vk2oj vk2sa vk2yj vk3bw
vk3bz vk3hl vk3jj vk3ka vk3kv vk3rj vk3tm vk3vp vk3wl
vk3xi vk3zx vk4bs vk4ju vk4rw vk5lx vk5wr vk6ob vk6wi
vk7ch vk7hl vn2hg w6akw w6alu w6am w6any w6aoh
w6aor w6awp w6bax w6bbq w6bck w6bfa w6bie w6bit
w6bkm w6bqk w6bbq w6bss w6bvg w6bvs w6by w6ceo
w6eii w6epe w6de w6dfb w6dhe w6dtw w6dyn w6ebg
w6ebn w6ec w6een w6egk w6ehy w6emk w6ezg w6ft w6ma
w6sc w6sf w6uh w6wv w6yu w6za w6zzg w7aaw w7acd
w7aet w7ajv w7arw w7ek w7fd w7fu w7fv w7oj w7td w7lj
wml wpn wsq wyf xba1 x7fo x1af x1g x1x x9a y1fml z1lar
z12cb z12gq z13as z13aw z13cc z13cx z14ao z1yaz

OM2CS, K6GC, C. R. Spicer, Agana, Island of
Guam, M. I.

(Heard from March 12th to May)

14,000-ke. band

w1mo w1xp w2ais w4mk w4ao w4agp w5alk w5bsf w5tw
w5bqg w5aea w5ajr w6dzy w6azh w6een w6bax w6byc
w6bip w7ia w7fx w7fb w7fh w7bc w7dvw w7fw w7ys w7vk
w7gt w7uj w7mx w7lk w8af w9aic w9gv ap6jm em2sh
cx1af cx2bt d4oyx ear121 ear128 eu2hi f8ru f8rj f8xz f8rv
fm3mst f8ja f8tv fo5hn f8sx g5is g6hp g6wy ho1fg haf2d
haf4d haf9af hb9n luldv lu3dh oh5ng oa4j oa4z oh1nj
oh2pg oh1nu oklaw on4jb on4je on4j on4ox oa4vp pk1oi
pa0fp pa0dw py1cm py2qa py3aa splkx sp1yl uo2op ve4dt
ve5aw ve1bv ve4gf vq4cr vu2jb vu2ah vzx4x vq4cr vs7ai
vp1ff ze4fm z5v

7000-ke. band

w6ax w6axm w6aam w6ain w6ahi w6acp w6bec w6bqc
w6bqk w6bck w6chy w6cx w6cwf w6cub w6cya w6chy
w6dza w6dmj w6ejz w6eju w6eju w6exq w6ezg w6za w7ahx
w7fv w7jq w7jr w7mx w7vt au1rd au1nz au3ea au7kah
eu5kaa on4fm py2qa py9hc zs2a zsz1

G6YL, Miss B. Dunn, Felton, Northumberland,
England

14,000-ke. band

w1aao w1acm w1afd w1avl w1bhm w1bli w1ccz w1fw
w2amr w2anu w2arb w2bhw w2btv w2bkg w2mb w2tp
w3ajy w3fq w4bs w4mk w5bnz w5bax w6qg w6uf w6dyv
w7ahl w7ahz wyaul wyjk w8arg w8cte w8dhe w8erh w8kc
w8sf w8ef et2an f3mta fm4ab fm8bg fm8er fm8eg on8mk
cv2vm fn2o ho1fg lu3de oa4x py1er st6aa sulaq suloh v1yb
velab ve1br ve1dr ve2ar ve2bb ve2bd ve2be ve2bo vo8an
vs6ae vulhf vulsz vu2ah vu2bd yiled yilrm yx16r y12bv
zc6jm celno em2jm em2wa embyb cx1aa nams b7x oxze
asp3em xx3ns

W5NW, Wayland M. Groves

(In Jungles of Sumatra, D. E. I., during April)

7000-ke. band

ac2aw, ac8tj ac9jc az6nr au1nz vzx4x o5aq om1tb kalce
katol kalhr kaljr kalpw kalse kalsl kalsp kalxa kalza
ka4hw ka9pb vk2hb vk3am vk3vp vk4bs vk5kw vk5li
vk5mb vk6bo vk6cb vk6mo vk6mu vk6nj vk6ow vk6ps
vk6wi vs2ae vs8ae vs8ag vs8ah vs7sg w6am w6alj w6atw
w6apd w6axm w6aor w6ahk w6bax w6bwp w6bkg w6bou
w6bvl w6caf w6edu w6efi w6ehy w6eb w6cyn w6cyr w6cuh
w6cwf w6dew w6dou w6dpf w6diz w6ea w6eoc w6ejc
w6eii w6ew w6eem w6een w6ein w6eyo w6erm w6exq
w6iff w6ha w6hm w6lx w6og w6p w6q w6uc w6zza

• CORRESPONDENCE •

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

W Sigs in South Africa

Shenfield, Koekemoer, Transvaal, South Africa
Editor, QST:

It is a pleasure for me to be able to write and report reception of one of the Standard Frequency Transmissions—the BB schedule from W1XP at 2100 G.C.T., July 10th. I heard nothing of the 7000- and 7100-ke. signals, but, to my great joy, picked up the 7200- and 7300-ke. transmissions sufficiently strong to make an accurate check on my crystal. This in itself made it worth while sitting up half the night; besides, the value of having the band well calibrated from a system that one knows is accurate made any inconvenience doubly worth while. One point I would like you to consider is the adoption of a standard time throughout radio and in QST. The use of G.C.T. by hams throughout the world would considerably simplify matters.

I am sure that could any of you hear your own sigs you would be surprised at the consistent strength throughout the year that the W sigs are received here in both summer and winter. They are always strongest at about sunrise — R5-8 on detector and one stage L.F. amplifier! Every now and then when a QRO station stops, one hears about a score of weaker stations “underneath,” while even the powerful stations are one on top of the other. Hi.

In earlier days when we had from 35 to 40 meters, I worked U.S.A. at the above times with only 5 watts input — nothing wonderful for 20 meters, but quite good for 37. However, now with double the power and the better DX conditions prevailing on 7 mc., it is quite impossible to QSO with any W stations, undoubtedly because of the QRM that reaches us and must be so much more severe in the U.S.A. unless you are blessed with a skip of 1000 miles or so, as we are out here at this time of the year, which practically reduces our local QSO's to nil.

The only way to overcome this QRM would be to keep a night say once a week or fortnight open for DX only, all inter-W QSO's being banned. I am sure the inconvenience to traffic handling would be well rewarded by the DX contacts that would spring up all over the world with countries now cut off by QRM. These are merely suggestions from one who has no right to make them knowing nothing of the conditions in your country; so, therefore, if they appear absurd, kindly pardon me.

— W. H. Lucas, ZU6A

Chess By Air

Francesstown, N. H.

Editor, QST:

Several years ago there was a small epidemic of chess and checker playing among our country's hams. This noble sport seems to have died an untimely death, however, and it is now only rarely that we find somebody willing to play a game. It surely isn't possible that all the ham chess and checker players have died out. Perhaps the few players there are don't realize the added pleasure it gives to checkmate someone by air. There may be a few indeed that are held up, as I am, because no one seems to want to or to be able to play a game.

We have traffic clubs and amateur societies of all kinds, but there are no chess or checker clubs. Why not start a few “chess by air” clubs here and there in the country and have tournaments between the various organizations, and maybe, in time, a national tournament?

Think it over, all you chess and checker players. As an ardent devotee of both games I think we ought certainly to be able to get together in some way. Let me know your opinion of this scheme, and at least we have a game together.

— Bruce H. Billings, W1BBF

Those 56-Mc. Oscillators

42 N. White Hall Road, Norristown, Pa.

Editor, QST:

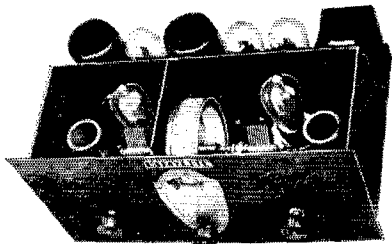
I have been reading about these trick 56-megacycle transmitters and the trouble experienced with them, and wish here to tell of my troubles with such a transmitter.

One morning I was inspired to throw together (carefully, of course) a 56-megacycle oscillator, and, upon hooking up the power supply, I was astounded to see “soup” in the coil — if one turn of tubing can be called a coil. Having heard of the likelihood of tubes going on the long journey in such oscillators, I did not experiment much, but shut down for the day.

At six o'clock that evening, while dressing to go out, I decided to turn the set on and see what the tubes sounded like when they gave that last sigh of despair and got black in the face. The tubes used were two 112-A's with 400 volts on the plate. I came home at near midnight that evening, and remembered the set had not been turned off before going out. Going to the trans-

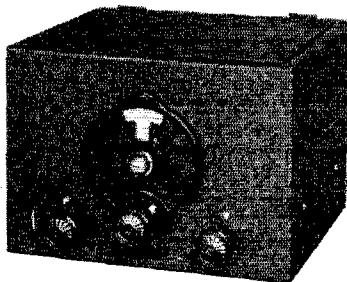
Bargains! Bargains!

LAFAYETTE WIDE WORLD SHORT WAVE RECEIVER

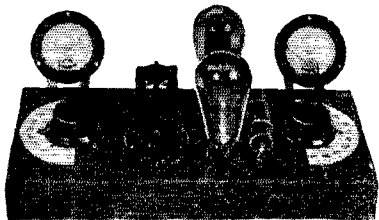


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NATIONAL SW - 3



This is the receiver fully described in the September issue of QST. Essentially, this new Ham receiver follows the same circuit as the S-W 5, but being for headset use only, omits the Push-Pull Audio. Your Cost (less tubes), complete with band-spreading coils for 20, 40 and 80 Meter Amateur Bands. (A.C. or D.C. Models)..... **\$32.34**
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mitter, I found the tubes glowing brightly (they had 7.5 volts on the 6-volt filaments) and the "soup" was still pouring into the 14-volt resonance bulb. They had been running for almost six hours greatly overloaded.

Yes, sir! I was greatly disappointed, so I tried a pair of 210's with 550 volts on the plates, and the result was more soup and no trouble. Again I was disappointed, so before I went to bed I put two 201-A's with 7.5 volts on the filaments and 400 volts on the plates, in the sockets, turned on the set and went to bed. Of all the hard luck — I found that darned transmitter working beautifully in the morning — at 11:30, to be nearly exact.

I am still disappointed, because as yet I have not heard that last sigh of resignation on the part of the tube. I am glad, however, that the outfit worked without any coaxing. The only thing that had to be changed was from a 10,000-ohm grid leak to a 5000-ohm grid leak. Then she perked beautifully.

There are two things that I can't straighten out. One is that when I touch one tube the indicator lamp glows a trifle brighter, but when I touch the glass on the other tube, the indicator lamp goes out completely. It makes no difference what combination of tubes is used as far as this phenomenon is concerned.

The other trouble is that I get only a beautiful R.A.C. note, and at times it is worse than that. However, I have found that keeping one tube in the socket and trying to match the other tube to it by using a ten- or 20-meter harmonic, inserting other tubes one at a time until the best note is heard, aids materially in getting a better note. Of course this matching of tubes is only approximate and guess work, and unless the transmitter is balanced perfectly electrically, it is impossible to match the tubes in a store tester and expect them to work above par in these crazy transmitters.

I have also found that although the transmitter may oscillate all over the band, there is only one place where the condenser-coil combination will peak, be this in the band or out. This peak should be brought into the band, as it means better output into the antenna or metal shoe-string, if that is what is used. This peak may be brought from around 54,000 kc. to 58,000 kc. simply by taking about one-half inch off the grid coil or an inch off the plate coil. Spacing the turns of the grid coil only controls the current drawn by the tubes.

Another way to bring the transmitter peak to various parts of the band, providing that it is not far off, is to try various tubes, as the spacing between the elements in the tube has a very decided influence on the frequency of the transmitter.

That about covers all I have learned over a space of two days, concerning these funny 56-mc. waves. The great drawback to experimenting on "5 meters" is the lack of other hams within a reasonable distance of myself. However, I can see no reason why anyone should have trouble on



Then
up and spoke
an Old Salt-



Officialdom, because of certain ethics involved, is sometimes rightly reluctant to express an opinion which might be construed as conferring favor. Not so, however, with those men who are less exalted. There, enthusiasm may find free expression.

So, a navy man writes—and out of deference to his position we withhold his name and that of his ship, for, after all, what he says is most important to condenser users.

The Allen D Cardwell Mfg. Corp.

3 August, 1931.

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I would appreciate literature or diagrams of a receiver using the 30 type tubes and one or two circuits of a good crystal controlled transmitter built around your condensers. For the present I shall use the '10 type screen grid tubes but wish to build so that later I can substitute 75 watt screen grids. Trusting that I may have a reply at an early date, I am,

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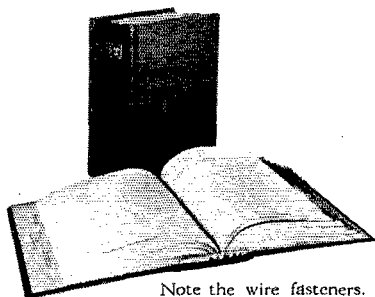
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— Clement C. Parker, W3JF

Lost—DX

19375 Hershey Ave., Detroit, Mich.

Editor, QST:

Although not a ham in every sense of the word, I am very interested in high-frequency radio. As far back as 1922, when I was pounding brass for the British Government, I remember holding a committee meeting of one and passing a resolution: that some day I would build a receiver and explore those high frequencies.

Well the resolution was carried out, but I have a kick coming. Articles in QST of recent date have reported the returning of DX, with the coming of winter, but around this location it seems to be the reverse. Last Easter Sunday I logged ten foreign stations on 14 mc. in about three hours; tonight at 8:00 p.m., E.S.T., I could only read two stations on 7 mc., W5PP calling CQ and W7AHO either calling or 'being called! The 14-mc. band is dead and buried as far as I am concerned, and has been for some time. Until the middle of August the 7-mc. band used to start thinning out about midnight, but I put it down to stations going off the air for the night. This last week or two, however, the deadline has been gradually getting earlier, and I am getting worried. I know that the receiver is O.K. and the aerial has not been altered since last fall, so I am left with two choices, location, and conditions.

I know that summer is not classed as the best DX season, and I can remember when we used to put from 3000 to 6000 volts at 12-15 amps into the aerial to reach seven hundred miles, but I have never known anything like this before. I would certainly like to hear from someone in or around Detroit having similar experiences, so that a check could be made.

Two stations on 7 mc. at 8:00 p.m.! Good Lord!

— John M. Crank

What Notes!

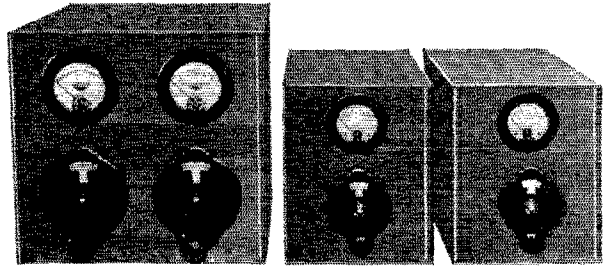
1148 East 17th St., Long Beach, Calif.

Editor, QST:

I wish to tender my resignation as Unofficial Attempter to Get Good Notes. As you probably don't know, I have acted in this capacity for the last three or four months, and, though my activities were confined to two or three local hams and one or two out of town, I thought that I was doing a good work.

I told them that the power company was going to sue them for misrepresenting their goods. The company was giving 50 cycles and the notes were 42 cycles. I told 'em that the monitoring station was listening for them. I bribed raffles so that they would win filters for their power supplies — in fact there was nothing that could be done that I didn't try. So far they haven't changed their

2 new JOBS



1—Crystal controlled Xmitter in unit form. The units you have been waiting for—Buy the units you need.

2—75 watt Hartley Xmitter— assembled kit— \$52.50. All parts assembled in place. wiring completes the set.

CRYSTAL CONTROLLED UNITS

Comprising: Crystal oscillator, doubler or amplifier, output amplifier stages for coupling to the antenna. Component parts of each unit are best quality available, carefully designed and constructed. Coils can be supplied for 20, 40 or 80 meters. *Specify choice when ordering.*

Unit	Price Assembled Kits	Wired and Tested
Xtall. Oscillator, uses 210 tube	\$23.50	\$28.50
Amp. or Doubler, uses 210 tube	23.50	28.50
Output Stage (with Ant. coil and Ant. meter), uses 210 tube	40.00	47.50
Output 50 W. stage (with Ant. coil and Ant. meter)	52.50	65.00
Output 75 W. stage (with Ant. coil and Ant. meter)	57.50	70.00

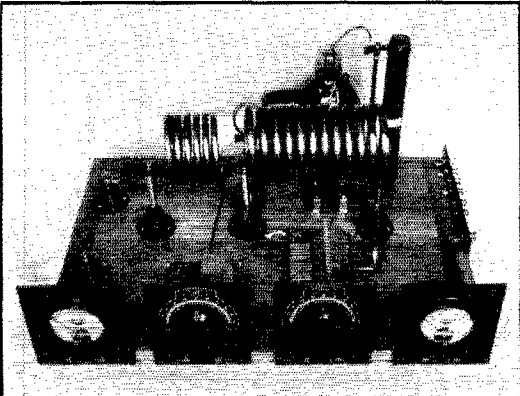
Units may be purchased separately

75 WATT TRANSMITTER

Popular layout. This type of design permits an unusually low price for a 75-watt transmitter, although constructed of the finest materials. You will recognize the Cardwell condensers and many other well known parts in the illustration at the left. Coils can be supplied for 20, 40 or 80 meters. *Specify choice when ordering.*

Watts	Price Assembled Kits	Wired and Tested
75 watt	\$52.50	\$65.00
75-watt Push Pull	65.00	80.00
7.5 watt	32.50	40.00

Power supply 2000-volt 250 M.A. wired and tested — \$67.50. For use with the 75-watt or 75-watt Push Pull transmitter. These transmitters are equipped with Jewell meters, Cardwell condensers, Ward Leonard leaks.



5-METER PHONE-KIT, SEE COVER AUGUST QST—\$20.00

All New National S. W. Receivers in Stock

ALUMINUM SHIELD CANS
assembled with slotted corner pieces.
Special sizes to order

Height	Width	Length	Price
5"	5"	5"	\$1.00
6"	5"	9"	1.85
6"	7"	9"	2.25
7"	6"	10"	2.45
7"	8"	10"	2.75
7"	6"	14"	3.25
7"	7"	12"	2.95
7"	8"	14"	3.95

SHEET ALUMINUM
cut absolutely square to any size specified.

Thickness	Price
1/32"	.6/10c per sq. in.
1/16"	.7/10c per sq. in.
3/32"	3/4c per sq. in.
1/8"	1c per sq. in.
3/16"	1 1/2c per sq. in.
1/4"	2c per sq. in.

RESISTORS
Grid Leaks and Bleeders
(All special Ward Leonard Resistors—200 watt)

5,000 ohm — For 204-A Grid Leak . . .	\$1.95
10,000 ohm — 50 Watter Grid Leak . . .	2.25
15,000 ohm	2.50
20,000 ohm	2.70*
30,000 ohm — For use on supply up to 750 volts	2.85*
50,000 ohm — For use on supply up to 1,000 volts	3.25
60,000 ohm	3.25
80,000 ohm — Double units 1500 volt supply	4.85
100,000 ohm — Double units 1500 volt supply	5.25

* For use as grid leak on 852.

10,000 ohm 40 watt resistor for 210 . . . \$90
200 W. units 3 1/2" long with brackets.

COPPER TUBING inductances
Wound and ends drilled FREE

Inside dia.	3/16"	1/4"	3/16"
1 5/8"	8c turn	9c turn	
2 1/8"	9c turn	10c turn	12c turn
2 3/8"	9c turn	10c turn	15c turn
3 1/8"	10c turn	12c turn	17c turn

MONITORS (Gross)
Gives foolproof check on note and stability. Hear your signal as the other fellow does. Aluminum case, completely shielded and self-contained batteries. With A and B batteries for 250 or 199 tubes. \$10.50

QUARTZ CRYSTALS, 80 meter band	4.95
QUARTZ CRYSTALS, 40 meter band	9.95
CRYSTAL HOLDERS	2.50
SOCKETS, 50 Watt, Limited Stock	1.00
R. F. XMITTER CHOKES . . . . .	.60
GROSS 866 RECTIFIERS, Unconditional Guarantee	5.00

FILAMENT TRANSFORMERS
Center Tapped
These husky transformers are built to stand the gaff

Voltage	Rating	Price
1-7 1/2	7 Amps	\$4.35
2-7 1/2	4 Amps each	6.25
3-7 1/2	3 Amps each	7.50
2 1/2	10 Amps	4.35
10	10,000 v. insulation	
	7 1/2 Amps	5.65

SPECIAL TRANSMITTERS AND RECEIVERS CONSTRUCTED. Any type job built to your own specifications.
No. 12 Solid Enamel antenna wire, per 100 ft. \$90
No. 10 Solid Enamel antenna wire, per 100 ft. 1.40
No. 18 Rubber covered stranded hookup wire on spool, 100 ft.90
.5 mfd. 300 v. bi-pass condensers, very compact30
8-inch Fleron Porcelain insulators30

CARDWELL TRANSMITTING TYPE CONDENSERS

Type	Capacity	Price
T-183	.00011	\$6.85
164-B	.00022	3.42
T-199	.00033	6.85
147-B	.00044	6.85

FREE ADVICE ON RADIO PROBLEMS
Write Jerry Gross

FREE CODE CLASS
Here is an opportunity to learn the code or speed up free. This will be supervised by a leading commercial operator, write or call for dope.



Complete Line of Standard and "Hard to Get" Parts

25 WARREN STREET, NEW YORK CITY

FOR EVERY FIELD OF THE ELECTRON TUBE



RESISTORS



WWI—PRECISION WIRE-WOUND

These dependable units have become a favorite specification wherever the electron tube is used.

Wire-wound resistors may look alike on the surface, but in performance the difference is marked. In the **winding**, in the **wire and its treatment**, and in the **contact**, weaknesses common to ordinary wire-wound resistors have been eliminated by IRC construction.

Complete wiring diagrams, supplied with these units, show you how to convert your meters into high-reading instruments. Capacity bridge meters, ohmmeters, voltmeters and high-reading milliammeters are easily made from IRC charts. Ask your jobber.

In Radio and Television Receivers

or wherever dependability is insisted upon, choose IRC Type "K" Metallized Resistors. They are rugged, noiseless, accurate and moisture proof. Humidity has no effect upon them. Used by leading set makers. Sold by all leading jobbers. Look for the IRC label.

INTERNATIONAL RESISTANCE CO.
Philadelphia Toronto



Metallized

notes, but I had hoped to accomplish this with a special device I was working on.

But I am through now. I find that I can not tell a good note from a poor one. My ears have gone back on me evidently. Those racking crash-bang noises I heard in my cans were really beautiful crystal notes, for all the five guys I was working on were reported in this month's *QST* (September) as having high quality signals. I resign.

— W. A. Adams, Jr., W5ANN

I. A. R. U. News

(Continued from page 54)

A considerable increase of interest in 3.5-mc. work is expected this winter, and it is hoped in our next notes to make an important announcement regarding the use of this frequency in England.

At the time of all writing all efforts are being strained to make our Sixth Annual Convention an even greater success than the previous five. Details of this important event will appear in our next notes.

The Society membership has shown a 15 percent increase in the first eight months of 1931. All overseas members are invited to apply to our headquarters for particulars and a copy of our bulletin. The address is 53 Victoria St., London, S. W. 1.

New Zealand Report

By D. Wilkinson, Vice-Pres. N.Z.A.R.T.

Due to a publicity campaign inaugurated at the beginning of the year by the new Headquarters Executive, it is pleasing to report that our membership has more than doubled itself during the past seven months. Of the new members not all are amateur transmitters, experimental receiving stations being admitted to membership, but the majority of these are prospective brass-pounders and already over fifty new stations have made their appearance on the air on the 3.5-mc. band, the training ground for new hams.

It might be stated that in New Zealand all new amateurs are required to put in at least six months' training on this band before being permitted to go to the higher frequencies, a scheme which has proven itself to be ideal.

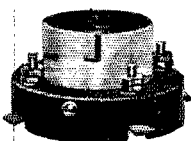
By the end of the year we hope to have a membership of five hundred. Our monthly magazine, "Break-In," thanks to our two editors, ZL2DG and ZL2BC, consists now of twenty pages, bigger and better than it has ever been before.

During our midwinter season, most activities have been centered round the 3.5-mc. band as conditions on 14 mc. have been almost impossible since the beginning of May, and on 7 mc. very erratic with bad fading. It has been noticed that reliable QSO's have been possible only when one station or the other is in a daylight zone.

DX continues to come in on the 3.5-mc. band, chief countries consistently heard being VK, W, VE, K6 and K7, and quite a few contacts have been made.

During July ZL stations participated in a mes-

LEEDS 50 WATT SOCKET



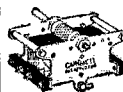
Heavy special porcelain base. Double phosphor bronze springs, high grade construction through-out.

Extra special price **\$1.50**

LEEDS

The Home of RADIO
45 VESEY STREET
NEW YORK

New York's Headquarters for
Transmitting Apparatus
When in Town Visit Our Store



Cardwell Condensers
153-B — 15 plate — .0003 capacity. List \$4.75. Special .. \$1.50
King Cardwell Dual Condensers
each section .00025 in series .0005 or parallel. Listed at \$4.25. Special \$1.50

ALUMINUM PANELS

Cut to size

1/16" thick.....7/10c sq. in.
3/32" thick.....1/4c sq. in.
1/8" thick.....1/2c sq. in.
3/16" thick.....1 1/4c sq. in.

SPECIAL SHIELD CAN

5" x 6" x 9", special.....\$1.85
7" x 8" x 14", special..... 3.95

Write for prices on many other sizes

Special 866 Filament Transformer.
2 1/2 v.-10 amp.-10,000 v. insul.. \$4.35

Special Filament Transformer 10 Volts. Center tapped — 7 1/2 amp. \$5.65

Filament Transformer. Has 3 separate 7 1/2 v. C.T. windings for crystal control transmitters, etc.
Special.....\$8.50

EVERYTHING IN

ACME JEWELL PYREX
BRADLEY FLERON
THORDARSON FLECHTHEIM
ELECTRAD NATIONAL
LYNCH SIGNAL
GENERAL RADIO WESTON
CARDWELL AEROVOX
SIEMENS CONDENSERS

IN STOCK

Complete line of transmitting Grid Leaks and Bleeder Resistances. Write us for advice on size bleeder required — state voltage and amount of mils drawn.



AMPLION HAND MIKE

Here's real value — a double button quality in a single button mike. Just 150 of them. List \$25. Special \$4.45



COPPER COIL

Make your own transmitting coils. Copper tubing transmitting inductance.

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

Prices per turn

LEEDS 866 Type 2 1/2 volt Filament Mercury Rectifier Tube

Many new features such as wire mesh filament, etc. Every tube rectifier tested before shipment insuring satisfaction.
Special, each.....\$5.00

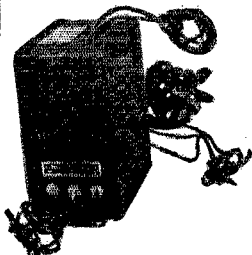
AIR GAP SOCKET

As described in May QST.
Special each **35c**

NEW — Filament Transformer. Has 3 separate 7 1/2 v. C.T. windings for crystal control transmitters. Special.....\$8.50

Special 866 Filament Transformer. 2 1/2 volts, 10 amps, 10,000 volt insulation. Special.....\$4.35

THORDARSON TRANSFORMERS



All Brand New
T-2124-A — has 2-7 1/2 volt filaments, 4 amps each — 1 center tapped; also 2 heavy duty 30 H. 150 mil chokes. Weight 12 lbs.; size 6 x 4 1/2 x 3 3/8" complete with mounting bracket and extension cord to socket.
T-2572 — same as T-2124-A only difference is — 1 single choke, 30 H. 200 mils.
2115 — 620 volts — center tapped. One 5 volt filament center tapped; two 30 H. 120 mil chokes; size 5 3/4 x 4 3/8 x 3", weight 8 lbs.

These transformers were made to sell from \$15 to \$20 each. Due to business conditions we bought them for a fraction of their value — all new — all guaranteed perfect — any one of them only.....\$3.45



General Radio 277
COIL FORMS

List \$1.25 each — at the price we are offering them they won't last long.
35c each, 3 for **\$1.00**



NEON TUBES

It has many, many uses.
G10 — 1/2 watt, 2" high, standard base. \$.55
S14 — 2 watt, 3" high, standard base. \$.75
S4 1/2 — 1/2 watt, 1 3/4" high, candelabra base. \$.75
Sockets to fit above 10c each

Siemens & Halske Condensers

Such opportunities come once only. High voltage condensers — unequalled for service — and at such prices. 50% off.

Operating Voltage 1000 Volts DC
Test Voltage — 3000 Volts DC

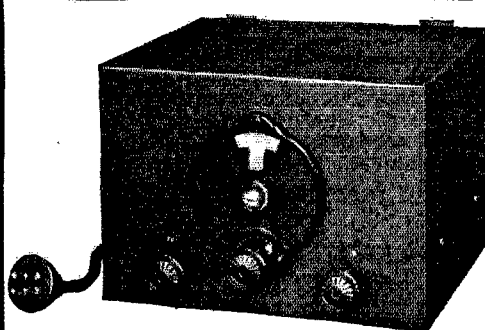
Type	Mfds.	Size	List Price	Special
187	1	6 — 1 3/4 — 2 1/4	\$4.50	\$2.25
188	2	4 — 2 — 6	8.50	4.25
190	4	4 1/2 — 4 — 6	14.50	7.25

Operating Voltage 1500 Volts DC
Test Voltage — 4000 Volts DC

Type	Mfds.	Size	List Price	Special
207	1	4 1/2 — 1 — 6	\$8.75	\$4.38
209	2	4 1/2 — 2 — 6	13.50	6.75
212	4	4 1/2 — 4 — 6	26.00	13.00

Operating Voltage 2000 Volts DC
Test Voltage — 6000 Volts DC

Type	Mfds.	Size	List Price	Special
227	1	4 1/2 — 4 — 6	\$20.00	\$10.00
229	2	4 1/2 — 8 — 6	32.50	16.25
230	4	9 1/2 — 8 — 6	60.00	30.00



NATIONAL Short Wave Receivers

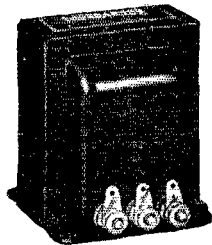
All National Short Wave models in stock — including the new S.W. 3 — described in Sept. QST. Write for our special prices. D.C.S.W. 5 for use with the new 2 volt tubes; all wired. A.C.S.W. 5 — National A.C. set, all wired. Type 5880 A.B. Power Supply for use with A.C. short wave Thrill Box.

LEEDS will not be undersold.
Write for our Quotations

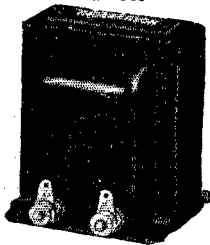
THORDARSON

Pentode output transformers

T-4831



T-4843



THE Thordarson T-4843 output transformer is designed to couple the new single power pentode tube to the voice coil of a dynamic speaker. The turn ratio of the transformer is 30 to 1 and the impedance ratio is 900 to 1. The Thordarson T-4831 for push-pull pentodes has a turn ratio of 42.4 to 1, and an impedance ratio of 1800 to 1.

These transformers are designed so that the reflected load on the pentode is 8000 ohms when connected with a speaker whose voice coil has an impedance of 8.9 ohms. Sizes $2\frac{1}{2}$ x $2\frac{1}{2}$ x 3 inches. Weight — 2 pounds. Each, \$6.00.

For sale at all good Parts Dealers.

THORDARSON

TRANSFORMER
SPECIALISTS
SINCE 1895 . . .

**THORDARSON ELECTRIC
MANUFACTURING COMPANY**
500 West Huron Street Chicago, Ill.
U. S. A.

sage-handling contest with VK stations on the 3.5-mc. band, and some excellent scores were registered.

The N.Z.A.R.T. QRP Shield Contest held in May was won by Mr. Harris, ZL4CA, of Dunedin. In spite of the power limitation of 45 volts input to the plate, ZL4CA worked all ZL districts and six VK stations. This contest was also staged on the 3.5-mc. band.

In the B.E.R.U. tests held last February, Mr. Sampson, ZL4AI, of Dunedin, was the winning ZL station. His points were all scored on the 14-mc. band.

On June 13th, during the Wellington Exhibition Program, a presentation was made by our president, Mr. H. P. V. Brown, ZL3CG, on behalf of members of the N.Z.A.R.T. to Messrs. G. Tyler, ZL2GE, and J. Mills, ZL2BE, in recognition of their emergency work during the Napier earthquake. Each received a silver-plated walnut mounted Morse key suitably inscribed.

The Annual Convention of the N.Z.A.R.T. is to be held in Christchurch, this year, during the last week of December. Preparations for an elaborate program are already in hand.

Making the Power Transformer Do Double Duty

(Continued from page 14)

correspondingly lower voltage drop under load. The point B is negative and C is positive. The filter consists of a 20-henry choke and three 1- μ fd. 1000-volt condensers. C_2 is 2 μ fd. and C_3 is 1 μ fd. With this filter arrangement the output voltage measured 725 volts no load, and with a load of 200 ma., 650 volts. This is only 75 volts drop, and as the required drain should never reach this value the system has very good regulation.

So much for the amplifier supply. The oscillator could, of course, be fed from the same supply with a resistance to cut the voltage, but there is some voltage drop, and any change in the supply to the oscillator is apt to affect the character of the signal.

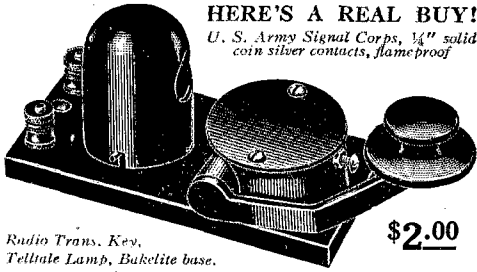
This voltage drop under load is almost entirely due to the resistance in the rectifier-filter system. The resistance of the secondary winding of the power transformer is comparatively low. From this standpoint, why not build another rectifier-filter system, and hook it onto the same transformer? We do not need so great a voltage for the oscillator, and we still have the center tap of the transformer winding, as yet unused. Therefore, take this center tap for the negative lead to the oscillator, and, to eliminate another filament winding, hook a Raytheon-type tube in the usual manner to provide the positive side of another full-wave rectifier system. Of course another Type '80 tube could be used as well, if another 5-volt winding were available. It may be wound on the same core as the other three.

The filter system for this part consists of a 20-henry choke, 2 μ fd. at C_4 and 3 μ fd. at C_5 . The

BARGAINS ARMY AND NAVY RADIO SURPLUS

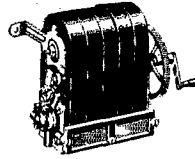
HERE'S A REAL BUY!

U. S. Army Signal Corps, 1/4" solid coin silver contacts, flameproof

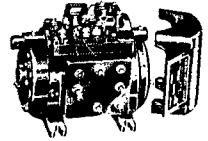


Radio Trans. Key, Teltulle Lamp, Bakelite base.

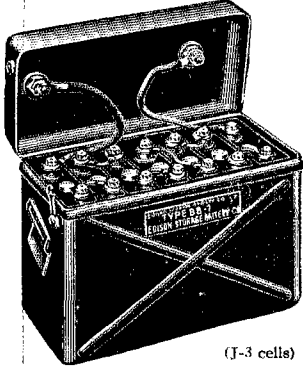
\$2.00



Magneto-Generator, 5 bar type, new surplus Army equipment, very powerful. Excellent test set. \$3.50

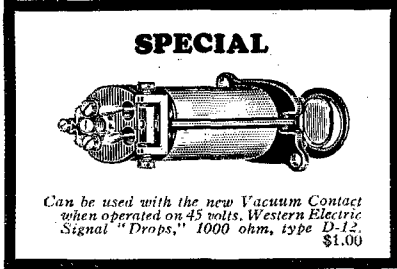


Motors, 1/30 HP, back geared, 110 AC, variable speed, auto reversible (Socony oil burner type) Has over one thousand uses, a very good buy. Regular price \$35. \$7.50



(7-3 cells)

NEW - Edison Storage Battery, Type BA-1, 10 volt, 37 amp., contains 7 cells. Complete in steel portable case. \$15.00
 Type A-4, 1.2 volts, 175 amps. Nickel alkali, per cell. \$3.50
 Type A-6, 1.2 volts, 225 amps. Nickel alkali, per cell. \$4.00
 Type M-8, 1.2 volts, 11 amps. Never used, per cell. \$1.50
 Type L-40, 25 amp., per cell. \$2.00



Can be used with the new Vacuum Contact when operated on 45 volts. Western Electric Signal "Drops," 1000 ohm, type D-12. \$1.00

500 cycle motor generator, U. S. Navy type, 1/2 KW, 120 volt DC input, 240 volt AC output, new, \$75.00
 Slightly used. \$0.00

Generator, airplane, Signal Corps, with shaft, can be used as motor, 12 volt, 33.6 amps. 5000 R.P.M. \$10.00

Generators, 12 volt, 60 amp., has automatic controls. \$20.00

Generators, Westinghouse 110 volt, AC 900 cycles, 200 watts, self excited. \$15.00

Dynamotor spare armatures, G.E. 24-1500 volt. \$12.00

Charging panel, Navy type, S.E. 899, 32 volt, Ward Leonard var. and fixed res., Weston voltmeter and ammeter, Sangamo ampere hour meter. Complete with all switches. \$30.00

Magnets, Army mine and ringer type, 4 large magnets \$1.00

Ammeters, DC, portable, new Weston model, 45, 3 scale 0-1.5-15-150 with 3 scale external shunt and leads 1/4 of 1% accurate. \$30.00

Ammeter, 0-10DC, Weston, model 301, flush mounting \$5.00

Milliammeter, 0-300, Weston, model 301, flush mounting. \$5.00

Relay West. Elec. low voltage, 2 upper and 3 lower platinum point screws, 3 contact arms. \$5.00

Extra platinum contact screws or arms. \$3.35

Sounders, Signal Corps, 120 ohm, adjustable. \$2.50

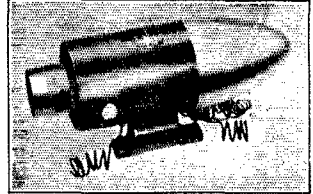
Microphone unit, Western Electric No. 326W, single button. \$1.50

Holtzer-Cabot, "Mike" wath type, carbon granular transmitter, Special. \$9.50

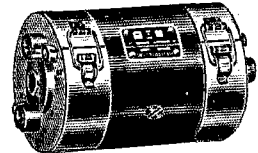
Variable Inductors, General Radio, type 190, 650 millihenries. \$15.00

U. S. Navy headphones, excellent for practice and instruction purposes, pair. \$7.50

Microphone Cable, 3 wire Shielded, Western Electric heavy duty. Per foot. \$0.06



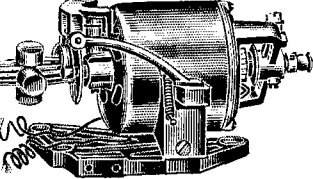
Navy Aircraft Dynamotor, Gen. Elec., new, 24-1000 volts, 1 amp, extended shaft with pulley, giving 24 volts output for filament and 1000 volts for plate or driven by its own input of 24 volts. Value \$250.00. Our special price. \$50.00



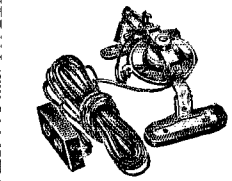
Western Electric Dynamotor System No. C.W. 927. Two 27-350 volt dynamotors in shock-proof hanger. May be used in parallel to give 100 mils at 350 volts, or in series, giving 80 mils at 700 volts. Can be used to operate transmitters up to 50 watts power from 32 volt D.C. mains. Ideal for Delco systems. Two dynamotors in hanger. \$15.00
 Single dynamotor without hanger. 9.00
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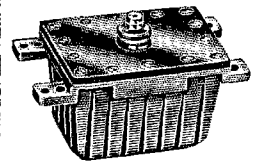
Condenser, Dubilier CD-1494 mica transmitting .0000 mfd., 35,000 volts, price \$10.00



Edison Universal motor 1-25 h.p. with governor and Regulator. Has over thousand uses. Price, each. \$3.50
 Rheostats for above.75



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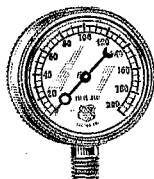


Condensers, mica, op. volts 12,500, cap. .004
 Dubilier, new. \$17.50
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Relay League
West Hartford, Conn.**

measured voltage across A—D is 335 volts no load so 500-volt condensers are satisfactory. The measured voltage across the filter output, no load, is 375 volts. The condensers marked C_1 are 1- μ fd. 750-volt rating, as they are across a.c. leads with 325 volts potential between them. They may be omitted, but slightly better regulation is obtained with them.

To see if the theory was correct a voltmeter was hooked across the high-voltage side and the load increased until a difference could be noticed on the meter. With 250-ma. drain on the high-voltage side, the voltage across the low side remained at 375. Then a load of 50 mils was placed across the low voltage side and the voltage dropped to 325. Removing the 250-mil load at the high side caused no noticeable change in the low side.

This supply will furnish sufficient power to operate a Type '45 oscillator feeding two '10's in parallel in an oscillator-amplifier circuit. Connections to a typical circuit (the one used at this station) are shown in Fig. 2.

Note that the negative lead to the oscillator *must* be kept separate from the amplifier negative, as the difference of potential between points A and B (Fig. 1) is the same as the difference between the low-voltage terminals, with A positive to B.

The circuit presents other possibilities also. Note that A is negative to C, with possibilities of another low voltage tap there. This might be used as a supply to a buffer stage, or a speech amplifier for a phone station. The potential across D and B is the total high voltage, with B negative. The point B might be used as a common negative with C a high voltage positive and A a low voltage positive. This arrangement would work very well if the load were constant as in a phone station, and the Raytheon side could be eliminated unless desired for another supply.

Experimentally I have hooked as many as five rectifier filter systems in parallel on one transformer and worked them simultaneously on different loads. As long as the rated output of the transformer is not exceeded no serious objections could be found.

Passing the Government Examinations for Amateur Operator's License

(Continued from page 19)

signals since it will not be affected by strong winds sufficiently to cause swinging signals.

Q. What is a counterpoise?

A. A counterpoise is a system of wires or other conductors elevated from and parallel to the earth, forming one "plate" of a condenser of which the earth is the other plate. It is used in conjunction with or to replace a direct ground connection with Marconi-type antennas.

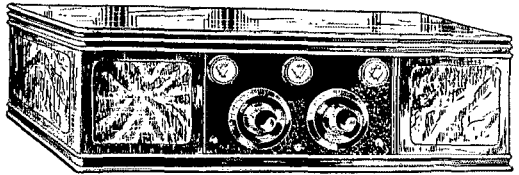
Q. What is a pure wave?

A. A wave may be said to be pure if (when the antenna is oscillating at two or more frequencies) the energy of the smaller wave is 10

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Phone and C. W.
In beautiful walnut
cabinet 15 to 30 watt.

\$39.50



Complete Phone and C.W. Transmitter 15 to 30 Watts, \$39.50. Including tuned plate, tuned grid oscillator with provision for crystal control. Wired for one or two UX 210 tubes. One or two UX 250's as modulators, two stages of speech amplification. Mounted in beautiful two toned walnut cabinet. Has ample space for AC power supply. Price includes one Stromberg-Carlson microphone.

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Aero HI Peak Audio Chokes for your shortwave receiver gives the peak amplification which is many times greater than you get with just ordinary transformer amplification. \$3.00

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10 Mfd. 800 volts Automatic Electric Condenser Block, values 4 Mfd., 2 Mfd., 2 Mfd., 1 Mfd., 1 Mfd. \$1.65

13 Mfd. 800 volt Condenser Blocks, values 4 Mfd., 2 Mfd., 2 Mfd., 2 Mfd., 1 Mfd., 1 Mfd. and 1 Mfd. \$2.35

Midget Power Transformer. 3-227 or 224 tubes, 1-247 or 245 and 1-280 tube, 700 volts C.T. Ideal for low-powered transmitters. \$1.95

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R.C.A. Raditron 210 Tubes \$2.75

Aero Pentode Auto Radio. \$20.00

Uses 5-236 tubes and one 238 tube. We guarantee a thousand-mile radius. Price complete with tubes, dynamic speaker, batteries and suppressors. \$39.50

World Wide 2-Tube Short Wave Receiver, \$11.75. A two-tube receiver in a beautiful shielded metal cabinet. An ideal all around set which will give loud speaker reception on many stations. Very flexible in tuning. Complete with set of 6 clip-in coils. Covers 14 to 550 meters. Can be used with any standard base tubes.

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Short Wave Sets, one tube complete with 5 coils, 14 to 550 meters. \$6.45

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B Eliminator, Dry, 180 Volts, will operate up to 10 tube set, with 280 tube, fully guaranteed. \$6.75

AG-A.B.C. Power Packs, completely assembled. \$8.75

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

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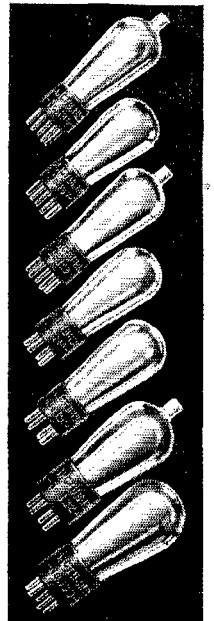
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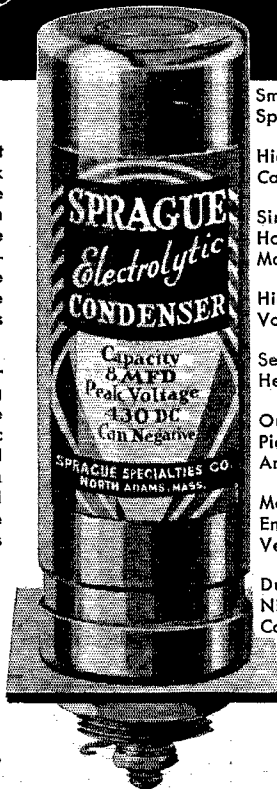
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Small Space
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per cent or less of that of the power of the larger wave.

This completes the series of articles on "Passing the Government Examination for Amateur's Operator's license." It is hoped that the questions and answers contained in *QST* last month and this will help some to acquire an operator's license. With this series of questions and answers as a guide, and with "A Simple 1750- and 3500-kc. Receiver" in the November, 1929, issue of *QST*, and "The Single Control Transmitter" in the December, 1929, *QST*, aiding in the construction of a receiver and transmitter, the beginner should be well provided with material to get his station operating satisfactorily.

The Midwest Division Convention

ALL previous attendance records had fallen when the Midwest Division Convention came to an end at Topeka, Kan., Sunday evening, September 6th, after two days chock full of food, information and fun. Five OWs and two YLs were listed among the 105 present, and honors for traveling the longest distance belong to Louis DeCastro, W3EP, of Bound Brook, N. J.

A bang-up discussion of television was given by G. L. (Jerry) Taylor, Chief Engineer of First National Television, Inc., Kansas City, Kan., at the special session at the Topeka Chamber of Commerce Saturday night. Up-to-the-minute dope was divulged in the three general sessions with a talk on operating procedure by H. W. (Grandpa) Kerr, W9DZW-GP, Division Director, A.R.R.L.; a talk on frequency measurement and A.R.R.L. operations by Assistant Communications Manager Battey; discussions by Lt. (jg) L. B. Laizure, W9RR-U.S.N.R., and the Rev. Romuald Fox, W9ESL, Army-Amateur representative; a talk on W.E. tubes by George Jones, W9AEK-WREN; one on crystals by J. Herbert Hollister, W9DRD; and a paper by Robert Kruse, editor of *Modern Radio*, on antennas, ably explained by William A. Beasley, W9FRC.

An honest-to-goodness ham auction was conducted under the direction of "Big John" Amis, W9CET. There were many good buys offered for auction but the so-called "depression" seemed to have taken its toll of the gang's pocketbook, and few sales were made.

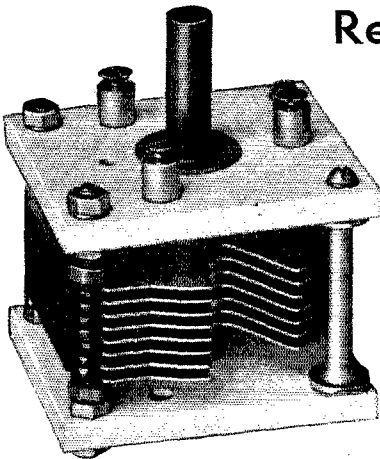
The round tables, with prominent hams leading discussions on all phases of 'phone and c.w., gave each a chance to parade his own troubles for all to batter into nothingness. A peppy traffic session presided over by the Kansas Route Manager, O. J. Spetter, W9FLG, added its bit to the program.

Senator Arthur Capper of Kansas, time-tested friend of the amateur, was host to all at a banquet in the Florentine room of the Hotel Jayhawk Saturday night, and visits to the Capper station, WIBW, and to local ham shacks followed. It was a riproaring evening, lasting well into the next day.

The annual banquet in the Florentine room was the climax. Those who took license exams the

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Requires a 5-meter condenser



Announcing Type 568 Condensers ■ Isolantite end plates ■ Bakelite shafts — Hollow rotors permit tandem mounting on long shaft ■ $R_w C^2 = 0.03 \times 10^{-12}$ ■ Maximum voltage 500 peak, minimum capacity 12 mmf. ■ Type 568-D S.L.C., max. 175 mmf. ■ Type 568-K S.L.F., max. 50 mmf.

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Name _____
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Occupation _____ Age _____

first day learned their date — and it was excellent news for nearly all. Contests were finished, prizes distributed, the entire group mounted the State House steps to look at the picture man's birdie, and the homeward trek began — weary, but happy.

The Kaw Valley Radio Club under whose auspices the convention was held, and that smaller group of men known as the "convention committee" deserve a world of thanks for their efforts in putting over such a splendid program. Those who were fortunate enough to get in on the fun will undoubtedly be present again at "Topeka in 1932."

— F. K. T., W9DEB + E. L. B.

The Upper Missouri Valley Convention

THE sponsor of the First Upper Missouri Valley Convention held at Sioux City, Iowa, on August 28th and 29th may justly boast of the unquestionable success of that affair. And those who attended will agree that the sponsor, the Tri-State Amateur Radio Club, "did the job up brown."

Activities started early Friday afternoon, the 28th, when George D. Hansen, W9FFD, Pres. T.S.A.R.C. and A.R.R.L. SCM, introduced the Hon. W. D. Hayes, Mayor of Sioux City, who gave an address of welcome. This was followed by talks by Fred Schnell, W9UZ, Director Kerr, W9GP-DZW, and E. L. Battey from A.R.R.L. Hqs. Upon adjournment of the afternoon session some of the gang made a visitation to the Sioux City Gas and Electric Co., while others utilized the opportunity to chew the rag with their "friends of the air." The early part of the evening was spent in hamfesting, some congregating at ham shacks and others at KSCJ, the *Sioux City Journal's* station, and KGPK, the local Police Station (this was just a friendly visit!). As the evening progressed the gang returned to the Hotel Martin, convention headquarters, for the special entertainment arranged by W9DFZ. Ask the boys who attended about the movies!

Saturday was the big day. Holders of temporary tickets and other aspirants for First Class amateur licenses got their chance to show the R.I. that they knew their radio. W. T. Gallagher and E. S. Heiser, the R.L.s from Chicago, had one of the Radio Division's test cars in Sioux City and the convention delegates had an opportunity to look it over. The afternoon session with Dick Pitner, W9FZO, in charge was crammed full of good dope on all phases of amateur radio. Fred Schnell brought the gang some excellent dope on antennas based on his actual experiences. Director Kerr spoke on proper amateur operating procedure and discussed many things of interest to all. E. L. Battey, Asst. Communications Manager, A.R.R.L. talked on frequency observance and the October Frequency Measuring Tests, and outlined the activities of the Communications Department. G. E. Smith, W9AHQ, told of his work on 14 mc. SCM Hansen brought the gang some dope on the problems of a

Amateur's Bookshelf

GOOD TEXTBOOKS and operating manuals should be on every amateur's bookshelf. We have reviewed practically all the books in which the amateur would be interested, and have arranged to handle through the *QST* Book Department at A.R.R.L. Headquarters those volumes which we believe to be the best of their kind. Take pride in a small but good radio library; buy a few good books and get into the habit of reading them.

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

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

Principles of Radio Communication, by Prof. J. H. Morecroft. An elaborate general textbook, and one of the recognized standards on theory for the engineering student. A working knowledge of mathematics is desirable for the reader who expects to get the greatest benefit from this work. 1001 pp., 5¼ x 9. . . . \$7.50

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

Experimental Radio, by Prof. R. R. Ramsey. Revised Edition. A splendid book for the experimenter. This is a laboratory manual, describing 128 excellent experiments designed to bring out the principles of radio theory, instruments and measurements. 150 illustrations, 229 pp., 5¼ x 7. \$2.75

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

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

Radio Telegraphy and Telephony, by Duncan and Drew. Still another work along the lines of a general practical handbook. In size it is approximately the same as the two listed just previously, and the subject matter generally follows along the same lines. A good book in this class. 950 pp., 463 illustrations. . . . \$7.50

Practical Radio Telegraphy, by Nilson and Hornung. Written particularly for the student training for a commercial license, and covering theory and apparatus. A practical handbook. 380 pp., 223 illustrations. . . . \$3.00

Radio Data Charts, by R. T. Beatty. A series of graphic charts for solving, without the use of mathematics, most of the problems involved in receiver design. 82 pp., 8¼ x 11. \$1.50

Thermionic Vacuum Tube, by H. J. Van der Bijl. For many years this has stood out above all other works as a theoretical textbook and treatise on the vacuum tube and vacuum tube circuits. A knowledge of higher mathematics is required. Not a book for the beginner, but for the laboratorian and engineering student it is without a peer. \$5.00

Radio Operating Questions and Answers, by Nilson and Hornung. Revised Edition. This is intended as a companion volume to "Practical Radio Telegraphy" by the same authors. In conjunction with that work it should leave the commercial license applicant well prepared for his examinations. There is a chapter on amateur license questions and answers, too. 267 pp., 5¼ x 8. \$2.00

How to Pass U. S. Government Radio License Examinations, by Duncan and Drew. Intended as a companion volume to "Radio Telegraphy and Telephony" by the same authors, as a guide to the applicant for commercial licenses. It is not a text in itself. The chapter arrangement follows that of the sections of the commercial theoretical examination, each being made up of typical examination questions and their answers. 169 pp., 92 illustrations. \$2.00

Theory of Radio Communication, by Lt. John T. Filgate, S.C., U. S. Army. An excellent book on the theory of receivers, transmitters and associated equipment for those familiar with elementary electricity and magnetism. 250 pp., 180 illustrations. \$2.00

Radio Traffic Manual and Operating Regulations, by Duncan and Drew. A book for students, amateurs or radio operators who contemplate entering the commercial field; it will enable you to learn quickly and easily all the government and commercial traffic rules and operating regulations. 181 pp. \$2.00

ABC of Television, by Raymond F. Yates. A practical treatment of television with particularly complete chapters on photo-electric cells, amplifiers and scanning methods. 205 pp., 78 illustrations. . . . \$3.00

Manual of Radio Telegraphy and Telephony, by Commander (now Admiral) S. S. Robison, U.S.N. Published by the Naval Institute. Covers both the theoretical and practical fields. 895 pp., 6¾ x 9. . . . \$4.00

Prices include postage

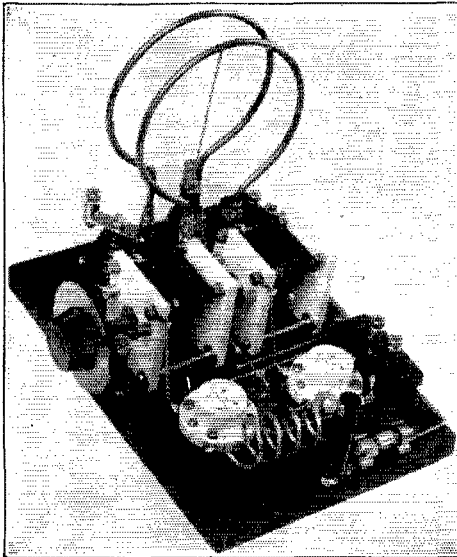
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2 G. R. 568 K. Condensers @ \$4.	\$8.00
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2 G. R. 274 K. Binding Posts and Strips	1.30
4 G. R. 138 V. Posts @ 20c.80
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1 Special 10,000 ohm leak65
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1 Special Plate coil65
1 Baseboard	1.00
Misc. parts	1.70

Total \$21.70

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This 5 meter transmitter, fully described in Oct. 1931 General Radio Experimenter.

Write for **FREE folder giving complete data and hook up**

Section Manager, and urged all to take their amateur radio seriously.

The Banquet in the Ball Room of the Hotel Martin was enjoyed by all. "Grandpa" Kerr "did the honors" as Toastmaster. The R.I. announced the results of the exams, and Kimberley of Lincoln, Nebr. walked off with the frequency meter given as a prize to the one making the best grade. The three SCMs present, W9CTW, W9AIR and W9FFD, told of their plans for the coming season. The general prize distribution and a showing of the "Cleveland Air Race" film wound up the affairs of the convention. Every one expressed his appreciation of the excellent work of the convention committee, and we wish to extend our thanks to the T.S.A.R.C. for putting over such a fine meeting.

— E. L. B.

Book Review

The Regulation of Amateur Radio Communication, by Paul M. Segal. A paper appearing in *Air Law Review*, Vol. II, No. 2, official journal of the American Academy of Air Law. Reprints available as a 56-page pamphlet, 7 x 10, from American Radio Relay League, West Hartford, Conn., at 25 cents postpaid.

Mr. Segal, a Washington radio attorney, for many years has been the general counsel of the American Radio Relay League. A radio amateur himself and a former director of the League from its Rocky Mountain Division, it is but natural that he has made the combination of radio and law his life work. He is a former assistant general counsel of the Federal Radio Commission, the present secretary of the American section of the International Committee on Wireless Telegraphy, and a member of the advisory council of the American Academy of Air Law. To the journal of the last-named organization, *Air Law Review*, he has contributed this paper.

The radio amateur who is any student of his art will find this document intensely interesting. Here is a complete account of amateur radio regulation, by one who thoroughly knows his subject. The development of radio regulation has been very rapid in this country. Changes are so frequent that it is easy to forget the vastly different regulations of a few years ago, and often it is difficult to recall by just what complicated process of trial and error a certain current regulation has come into being. Mr. Segal traces it all most skillfully. Far from the boring appearance which characterizes most such articles, it will prove fascinating reading for the radio amateur who has a normal and healthy curiosity about such things.

The author sketches the early development of amateur radio and then follows its growth and regulation under the successive laws and treaties which have governed radio in this country — the old 1912 law, the Radio Act of 1927, and the international radiotelegraph conventions. He is particularly concerned, of course, with the evolution of our regulations and carefully interprets the effect of every change of law, every court decision and every interpretation in a high quarter. The gradual crystallization of amateur rights and status, and particularly the regulation of amateur communication, are developed in splendidly understandable style. Copious quotations from official sources are unearthed to show the high regard in which the amateur has ever been held. Extensively annotated, the paper is a gold mine of reference information to those interested in the amateur side of radio — in fact, the only thing of its sort in existence.

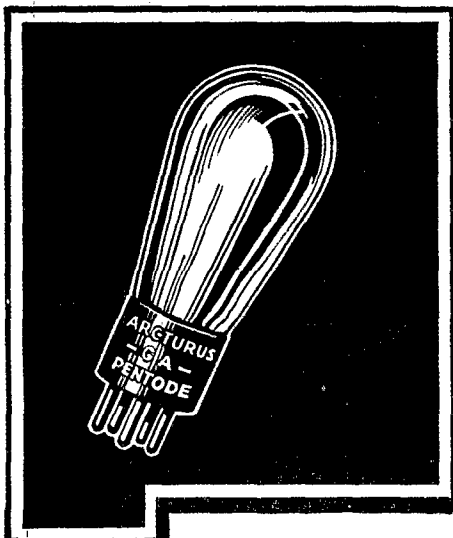
We wish that it were possible to induce every amateur in the country to possess himself of a copy and read it. A.R.R.L. Headquarters has a very limited number of reprints which will be distributed at cost, 25 cents, to those interested, as long as the supply lasts.

K. B. W.

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Amateur Radio in a New Field

(Continued from page 32)

and forth between the airport and the hills, providing contact whenever it was needed, handling innumerable messages and generally making themselves indispensable. Twice, the normal routine was broken to send emergency ambulance calls, clipping an hour or more from the delay which otherwise would have had to be tolerated. We can say it was a mighty fine job all round; we were there to witness it. We can understand why the Association received such splendid tributes from officials of the National Glider Association and from all others concerned. Elmira may be out of the earthquake zone but its amateurs, like those of any other center, can rise to meet the emergency — though it be just a glider meet.

— R. A. H.

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

State of Connecticut }
 County of Hartford } ss:

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

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The American Radio Relay League, Inc., West Hartford, Conn.; Editor, Kenneth B. Warner, West Hartford, Conn.; Managing Editor, Clark C. Rodimon, West Hartford, Conn.; Business Manager, Kenneth B. Warner, West Hartford, Conn.

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

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

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear on the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; and 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 28th day of September, 1931.

Alice V. Scanlan.

(My commission expires February, 1934.)

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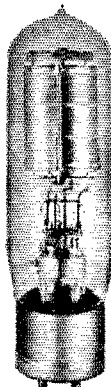
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CONTENTS

Foreword
Regulations Governing the Issuance of Radio Operators' Licenses
Commercial and Broadcast Transmitters
Radio Receiving Apparatus
Motors and Generators
Storage Batteries and Auxiliary Apparatus
Radio Laws and Regulations
Appendix

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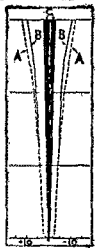
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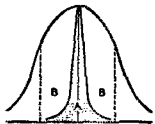
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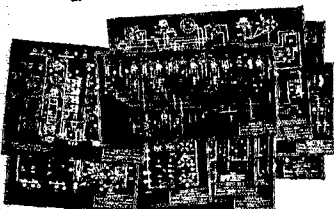
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"IF IT ISN'T A STENODE IT ISN'T A MODERN RECEIVER"

W3KW

(Continued from page 39)

used for antenna insulation and the lead-in insulators are Pyrex.

The receiver on the operating table at present is an old Grebe CR-18 with a band spreading condenser in place of the vernier. On the right end of the table is an Aero monitor. To the left is a General Electric push-button box which controls the relays in the transmitter. A relay under the table interconnected with the transmitter line turns the plate current off the receiver when the power is turned on the transmitter. Back of the



THE OPERATING TABLE AT W3KW
The receiver is a revamped Grebe CR-18

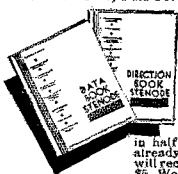
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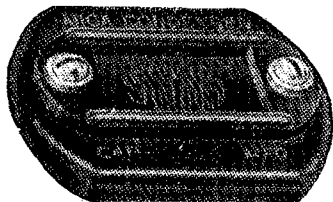
keys, to the right of the receiver, is a box with green and white lights. The green light burns when the receiver relay is down, showing plate current, and the white light is connected to the amplifier filament transformer in the transmitter showing white when the transmitter is on, and at the same time the green light goes out showing the relays have functioned properly. There has never been a delay of any kind in operating since the station has been installed.

On a table by the transmitter is an a.c. receiver for short waves and a combination receiver that goes from 200 to 3000 meters with one tuning unit and then shifts to honey-comb coils for longer waves.

No exceptional work has been done at the station but the chief endeavor has been toward consistency. All districts have been worked on both 3.5 and 7 mc. New Zealand, Hawaii and France have been worked, and since December a very reliable schedule has been handled weekly with YS1FM. Regardless of weather conditions the schedule has been kept and considerable traffic handled.

In a recent Station Contest held by the South Jersey Radio Association W3KW was awarded a cup for having the best all-around station in the southern New Jersey region.

A station of some sort has been in operation in the same location since 1914. 3QX was the call before the World War, W3KW being assigned immediately following the reopening.



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CITY OF ORIGIN HARTFORD CONN.	STATION OF ORIGIN W1AKC	NUMBER 304	DATE MARCH 26	CHECK 5/	
TO CARL FRANK ROGOS 14 ELSTER STREET N W SHELTON, WISCONSIN		THIS MESSAGE WAS RECEIVED AT ANALYST RADIO STATION THRU STREET ADDRESS CITY AND STATE			
<p>STRICTLY ADVISE PRESENT STATUS OF THE ORIENTAL TRAFFIC ROUTE RUNNING FROM THE EAST COAST TO THE ORIENT STOP IN WOOD STILL A MEMBER OF THIS CHAIN QUOTE LATEST ROUTE MANAGERS BULLETIN MAILED TODAY TO E. L. BATTET</p>					
Rec'd	FROM STATION	LOCATED BY	DATE	TIME	OPERATOR
Scot	W1AKC	SMITHSON, PITTSBURGH, PA.	3/26/31	8:54 P.M.	RP

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

Communications Department

(Continued from page 52)

appointed Technical Advisor. W3AAJ is working the hams in the Virginia state net on Sunday afternoons. W3HL would like schedule with western section of state. W3BBX was in camp during summer. W3AGH is substituting for W3WO on schedules with W3BWT and W4DW. W3AVR will work on 7-mc. band this winter. W3BGS has a few schedules. W3BZ is building new receiver. W3WO has about finished the new transmitter. W3BEP is a new station at Norton. W3BLE is also a new station. W3BAD visited W4AAD and the gang at Bristol. W3ZA is still on with his 'phone. W3BUR had to change location. W3BDZ reports the arrival of a new junior operator. The hams in and around Rosnoke are trying to organize a short wave club.

Traffic: W3YD 420, W3NT 35, W3BRK 8, W3BRQ 33, W3BRA 25, W3AUG 4, W3APT 29, W3FE 2, W3ZU 132, W3AMB 100, W3BUY 211, W3BJX 62, W3BAZ 25, W3ARW 420, W3FJ 102, W3CFL 11, W3HL 62, W3BBX 9, W3AGH 323, W3BGS 17, W3WO 106.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — W4TN has returned to his study of law. W4DQ gets out with his new crystal outfit. W4TR's rig has recovered from the lightning's stroke. W4ABW says his QST subscription has expired, and he is broke. W4IF has been appointed OBS. W4ZN worked HH7C. W4ABF is back on the air with his 50-watt crystal-controlled outfit. So is W4OG. W4AGO is studying E.E. at U.N.C. W4AWP is the new ham in Gastonia. W4AKC built a '10 crystal oscillator, a '10 doubler, and a '03A amplifier. W4MR has been on 14 mc. chasing DX. W4RE has been off the air searching for health at Virginia Beach and Baltimore. W4AIS, W4AKC, W4ACY, W4AVT, W4AA, W4AXX, and W4UI were visitors at W4DW during the month. W4LD has been experimenting with 'phone. W4ACA has gone to Davidson College. W4EG attended the convention in Jacksonville, and reported a very nice time. W4LY says that W4NJ has moved to Philadelphia. W4CC is on the air for A-A drills.

Traffic: W4DW 42, W4ACA 33, W4ABW 9, W4TN 9, W4AKC 7, W4AGO 7, W4IF 5, W4TR 4, W4DQ 2.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ-W6ZZZ — W6EWW mixes traffic with DX and experimenting. W7AWZ has a schedule with W9FWW. W6CNC will be away all winter. W6APM has a schedule with W6UO on 3.5 mc. W1ZZA is staying in Wyoming this season. W6BTX is back after spending the summer in California and the Northwest. W6DPJ was on the West Coast two weeks with the portable, W6ZZZ, from where he kept daily schedules with W6APM, W6BSE and W1ZZA. A type '10 tube keeps W6EXL busy. W6BSE reports traffic scarce. W6DPO had more transmitter trouble. W6DWH and several others from Utah were present at the Pacific Division Convention. W6DAM is on regularly.

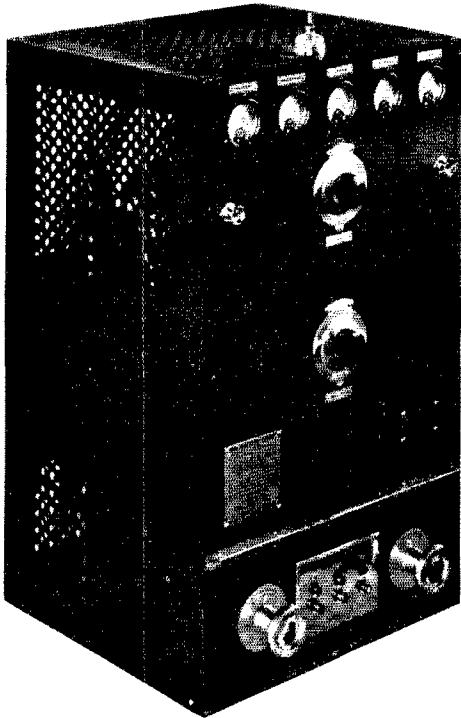
Traffic: W6DPJ 138, W6EWW 63, W7AWZ 61, W6CNC 40, W6APM 29, W1ZZA 19, W6ZZZ 14, W6BTX 12, W6EXL 2, W6BSE 1.

COLORADO — SCM, E. C. Stockman, W9ESA — W9GNK reports U.S.N.R. Unit being organized at Durango. W9EFP has portable license, W9HYX, W9CSR says pentode TRF receiver FB. W9ZZH has returned from Northwest and is working W9BJN again. W9BTO has National SW5AC receiver. W9DQD reports W9BRZ at Palisade and W9GCM at Grand Junction will be ready to go soon. W9DNP is installing crystal. W9GBV has been having trouble with rectifier and filament transformer. W9APR is appointed Official Broadcast Station. W9DQD is appointed Official Relay Station. Several ORS applications pending and the SCM would like to receive applications from more fellows.

Traffic: W9HJS 169, W9FCK 61, W9EAM 26, W9ZZH 15, W9DNP 11, W9GNK 7, W9DQD 6, W9JB 6, W9ESA 5, W9CSR 1.

SOUTHEASTERN DIVISION

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS — E.M., W4ACB. 14,000-ke. band: W4FV has been stepping out FB. W4ARD returns to the West Coast, this month, where he will be W6FCY. 7000-ke. band: W4AXQ is a newcomer. W4AGS is another new one. W4ART says nil his way. W4ARV has been busy working.



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W4FV leads the traffic men this month. W4ADV is trying to join the Navy. W4AWJ shot all his receiving tubes. W4UW lost a pair of tonsils. Hi. W4AFT is about to bust out on 'phone. W4ABJ has returned from the North. W4ALJ has been grinding crystals. W4ACB has been pounding out regularly this month. W4QR got QSA R4 out of a Russian. W4AQY says he is in a dead spot. W4ANP is another new ham in our midst. W4AUW and W4ASG visited the SCM. W4AUV is on now. W4ASV is getting better and better. W4QU was heard in Russia. W4QK is moving into a new home. W4ATN has a new lattice mast. W4YR is still silent. W4PN has renewed his license. W4ADC is still keeping himself hid. W4RK has been silent since his marriage. Hi. W4KB has been busy teaching W4AGS and building transmitters for W4AQY. W4MX was on the air a few minutes, but the "YLS" have him for sure now. W4SZ is another new station in Pensacola. W4MS has his crystal perking. W4AWC is leaving us to move to West Palm Beach. 3500-kc. band: W4HQ has been keeping the air hot, Sunday afternoons, with U.S.N.R. work. W4UA is trying hard to get his unit in shape. W4SC still keeps the Army well represented. W4AX has his 'phone on again. W4AXF says that she hasn't enough power to be heard yet. W4A00 has been on very little due to work. W4KB is increasing power. W5AXD was a recent visitor to the Pensa stations. W4LEH is now chief of the "Hydrographer." Fellows, I expect a lot of renewed activity to follow the convention in Jax. And with the coming of winter we should begin to turn in larger traffic totals. How about these O.E.S., O.B.S. and O.O. applications, gang?

Traffic: W4FV 33, W4ARD 6, W4ALJ 3, W4QR 5, W4SC 3, W4HQ 9, W4ASG 2, W4AGS 3, W4ANX 7, W4AR 1, W4ATN 4, W4ACB 18, W4AUW 2, W4ASV 5, W4MS 10, W4AXF 1.

EASTERN FLORIDA — SCM, E. M. Winter, W4HY — R.L.M.s: W4NN, W4AAB, W4CI, W4OR. W4CI has been appointed Route Manager for the Tampa territory. W4RU is attending college at Young Harris, Ga. W4TK spent his vacation at Miami. W4AJX has been working Europe, Asia, South America and Australia. Your SCM received 34 report cards from the gang this month. Thanks for the cooperation, fellows. W4HC, W4ABJ, W4FM, W4AEG, W4ABE, W4AWS and W4ACS are attending college at Gainesville. W4WW has a new a.c. receiver. W4GD is now a Junior Radio Inspector for Uno' Sam'l at Atlanta. W4AGN is now crystal-controlled on 3960 kc. W4TQ has been rebuilding a tractor! W4AAB hooked up with W1BDI last RM nite. W4SY, W4AWS, W4AIO and W4AR visited the Plant City Radio Club. W4AQT is using a WE 211-D. The Plant City Chamber of Commerce is donating QSL cards, which is a mighty good way to advertise! W4ZV was heard in England. W4ZU is off the air. W4CK is on 7240 kc. W4AEM worked a K6. W4ABL is on 'phone 100%. W4GS reported by 'phone. W4AJD is on 7100 with crystal-control. W4AIV is on 'phone. W4ALI is on 7 mc. W4FF worked YE. W4GM worked XIAD. W4AKV got storm reports from YIBA. W4FM blew his power supply. W4AHK is rebuilding. W4FZ handled storm traffic from Belize, Honduras, keeping sked with Z2BA, W4AR and W4FP every 15 minutes. W4ASA blew his power transformer. W4JO is putting in new antennae system. W4ZV handled a message from U.S. in the Caribbean. W4AFV has rebuilt the rig. W4WS built a new speech amplifier for his 'phone. W4BN had tough luck with his mike and speech input. W4AWD is on 3545 with 'phone. W4MF is on 'phone and handled A.A.R.S. traffic. W4ATG is on 3521 kc. with 'phone. W4DU is on 3540 with 'phone. W4SK has gone back to college. W4PI gets DC reports at last! W4UJ has Y.Litlis. W4JH worked VK, ON and FM, and heard YK2NS at 11:45 a.m.! W4NC is attending Georgia Tech. W4ABZ received a visit from Old Man Lightning — result, rebuilding everything! W4WS is Master Oscillator of the Knights of the Kilooyles; W4ABL is First Assistant; W4ACZ, Second Assistant; W4ASQ, Power Amplifier; W4DU, Modulator. W4AIV has a new crystal. W4UJH is on 'phone. W4AMW has been operating a peanut tube with .6-watt output. He has been heard a distance of at least 110 miles! Well, gang, the Official Southeastern Division Convention is over! Those who attended can tell you what kind of a time they had. We had Treasurer Hebert of the A.R.R.L. with us, and he was kept busy renewing old friendships made back in '25. Miami had nine hams present; Tampa had a whole flock, as did Tallahassee, Pensacola and Jacksonville. Georgia was well represented; North Carolina sent W4EG; Alabama sent W4LT and W4AAQ; W4IH came all

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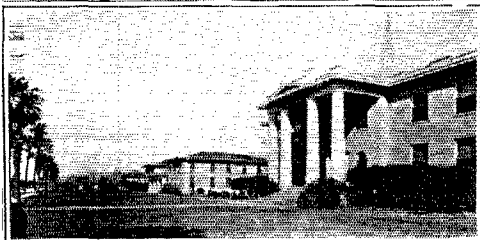
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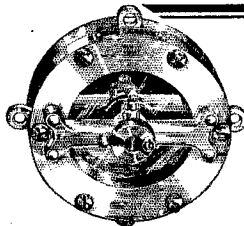
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the way from Milwaukee to attend, and he took back a prize!

Traffic: W4CK 19, W4AEM 14, W4ABL 6, W4GS 46, W4AJD 5, W4AIV 40, W4ALI 9, W4FP 17, W4GM 15, W4AKV 13, W4FZ 37, W4ASA 2, W4JO 2, W4ZV 13, W4WS 49, W4AWD 2, W4MF 21, W4ATG 22, W4DU 21, W4SK 6, W4PI 9, W4HY 1.

ALABAMA — SCM, Robert E. Troy, Jr., W4AHP — W4AP has a new midget receiver. W4JX came back with a good traffic total. W4KP leads the state in traffic. Ex-W4AHY is Radio Aide in Port Omaha, Nebr., at W9BNT. There's another 50-watt crystal-control station in Birmingham, W4AJP. Here's something from South Alabama, thanks to W4AV. W4AIZ is fooling with 3.5-mc. 'phone. W4LI has a new 75-watt 'phone. W4AV is in new quarters. Welcome to a new ham at Townley, W4ADJ. W4ASM is still held up by the F.R.C. forgetting to change his QRA. W4AAQ went to the Jacksonville Convention. W4AHP has a new shack. W4AJR couldn't pound brass because of a severe case of poison ivy. Hi. W4RS is head man in the Alabama A.A.R.S. Net. W4DS visited Montgomery. W4AKM is putting a new crystal set on the air. W4LM is in storage.

Traffic: W4KP 64, W4JX 54, W4AP 13, W4AJP 7.

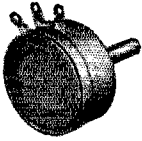
GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS — SCM, J. C. Hagler, Jr., W4SS — W4IS leads the traffic gang this month with W4APX second. W4PM paid the SCM and the August gang a visit last month. More of you drop in. W4ACQ has schedule with N.C. W4APK is Ga. NCS on 'phone in the A.A.R.S. W4ADD received QSL from Berlin. W4AUO is now W4AJI. W4GB's signals were reported in Australia. W4ALX and W4AIQ are new hams in Adel, Ga. W4AHT worked NY1AA. W4AOX has new TNT transmitter. W4WM worked SK3RG, an expedition in Central America, on Sept. 15th. W4MO is Secy-Treas. of Atlanta Radio Club. W4QQ is new ham in Decatur, Ga. W4AMA has schedule with Z2BA in Belize, Honduras. W4AHT received card from SP1AH. W4DL has new MOPA. W4YC at Tech. High in Atlanta will be back on air. W4WQ is back from Okla. W4AEK thinks that his hay fever scared the traffic. Hi. W4CL is at WTFT in Athens, Ga. The EARLY BIRDS, the Ga.-S.C. 'phone net, is on the air again and wants new members. Write to W4HN. W4AOC is going to Ga. Tech. NDJ, the U.S.N.R. station in Atlanta, is expecting a new 500-watt outfit soon. W4AUT has new 3500-kc. 'phone outfit. W4PD has crystal rig with '03A P.A. W4SM is the new 250-watt rig of the NCS, 4th CA. Brother Jones, W4IR, is head op. W4ACH is working in Atlanta with new call of W4ALL. W4NT reports good DX. W4PJ is back on. W4IJ, at Ridgeway, S. C., worked Chicago with 135 volts on '01A. W4ACQ blew a 50-watter. W4AEV was at Camp Jackson for two weeks as radio op. W4AAZ is putting in a 50-watter. CM2JM reports that all CM stations were closed on the 13th of August. W4DX sends in a nice list of news. W4MN is NCS of S.C. W4KI is playing with motor boats. W4VL is back from vacation. W4OC must have a YL. W4ATZ is working a new transmitter. W4AMG has a new Jr. op. W4GT went to Atlanta to visit the bunch there. W4AQN has a new 50-watt 'phone. W4AJH is on the air at Milledgeville, Ga. All of you men who are reporting traffic should be ORS. Send in your application at once.

Traffic: W4IS 35, W4APX 21, W4PM 18, W4AAV 15, W4ACQ 12, W4APK 10, W4ADD 7, W4AJI 7, W4APW 6, W4MA 6, W4GB 5, W4AOX 4, W4HN 4, W4AEK 4, W4MO 3, W4AHT 3, W4DL 3, W4ATI 3, W4AEK 2, W4AEG 2, W4ST 2, W4TL 2, W4QZ 2, W4JD 1, W4BW 1, W4SS 11, W4JL 3.

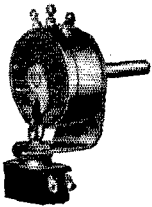
WEST GULF DIVISION

NORTHERN TEXAS — SCM, Roy Lee Taylor, W5RJ — W5AUL has been appointed Chief Route Manager, and is in a position to furnish schedules to the gang. Please get in touch with him in regards to same. He is offering a new Handbook to the one making the BPL under the new rules. W5RJ won the grand prize at the West Gulf Division Convention. W5BII has been appointed Assistant Route Manager. W5AYX worked his first VK. W5UO has two VK's and one CM to his credit for the month. W5AVA is rebuilding. W5BOI has applied for membership in the League. W5BJX is still pounding out a few. W5RH has a new receiver, monitor, transmitter, and power supply. W5WW is with us after an absence of several months. W5HY is teaching journalism at T. C. U. W5BZT is a new ham at Jacksonville. W5CF is resuming schedules with

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No. 20 Series Single Control with A. C. Switch

Why is this new unit completely noiseless?

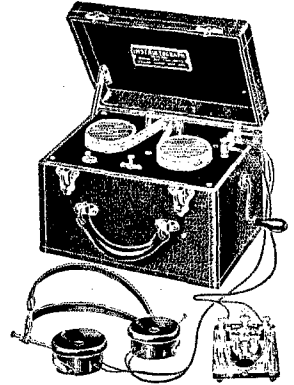
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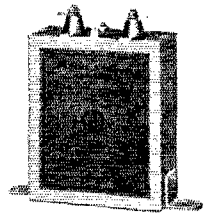
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UX199.....	65c	232.....	85c	250.....	1.45
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B	250	750-0-750	4.95
C	350	1000-0-1000	6.25
D	500	1500, 1000-0-1000, 1500	9.35
E	800	2000, 1500-0-1500, 2000	12.85
F	250	750-0-750, 7 1/2 ct. & 7 1/2	5.75
G	400	750-0-750, 7 1/2 ct. & 7 1/2 ct	7.45
H	150	350-0-350, 5, 2 1/2 ct, 2 1/2 ct	3.75
K	100	285-0-285, 5, 5 ct, 2 1/2 ct	3.45
M	150	400-0-400, 5, 2 1/2 ct, 2 1/2 ct	3.95
N	150	300-0-300, 5, 1 1/2, 5 ct, 2 1/2 ct	3.75

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Voltages	12 watts	25 watts	50 watts	100 watts
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2 1/2 & 2 1/2	1.50	2.25	2.75	\$3.75
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10			3.40	4.50

BRISTOL double button microphone transformers. May also be used for single button. Special — \$1.40.

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W5AUL and W5VQ, and wants schedules east and south. W5AUJ hooked his first K6 on 14 mc. W5AAO has a push-pull MOPA rig. W5BXW reports for the first time. W5BUH has a new MOPA. W5BHK complains of business, QRM, and rebuilding. W5LY wants DX reports. W5QU is back at Dodd City after attending A. and M. College. W5QY rebuilt for 7 and 14 mc. W5BQN has obtained his second-class commercial ticket. W5BXV is building a new rig. W5GZ of Ennis is moving his rig to Austin where he will attend Texas U. W5AKA has moved to Brownwood. W5BGV is building a new receiver. W5AMW has moved to Holland (Texas) Hi. W5KA is back with new MOPA. W5APM and W5AEP are getting FB. W5LM and his '45a in push-pull 3500 kc. (phone) has heard cards from ZL205, D4ESM and OK2CC. W5AKU of Brownwood is back. W5AQO is a new 'phone ham. Don't forget the prize for most traffic handled starting Nov. 1st. We can use several traffic men who desire to be ORS. Let's have more reports next time, gang. The sixth annual West Gulf Division Convention will be held in Ft. Worth next year. W5AGQ is working plenty of DX. W5ARK is on occasionally. W5BA is operating on 3.5, 7 and 14 mc. W5BWH will soon have a 50-watt job. W5AAM and W5BYO both have 50-watters. W5BNO will have his new crystal job on air soon. W5KI has returned from his vacation. W5AVS is Control Operator at WBAP. W5AEM is on 14-mc. 'phone. W5AT7 has re-entered A.M. College. W5AIW is attending night school (radio). W5BGW is still trying to get a ship job. W5QY and W5RJ passed the U.S. Naval Reserve test. W5BG is rebuilding. W5BYV is a new ham in cow town. W5YS is on air now. W5BQT is finally getting over the back fence. W5PO is a new reporter in Abilene, and expects to have a '10 in TPTG on the air soon.

Traffic: W5AUL 54, W5RJ 35, W5BII 28, W5AYX 26, W5RHI 23, W5WW 21, W5HY 20, W5BZT 11, W5AUJ 9, W5CF 9, W5AAO 8, W5BUH 9, W5BXW 7, W5KA 5, W5BJX 7, W5UO 2, W5AEQ 4, W5APM 6, W5LAM 5, W5BKH 5, W5QY 4, W5QU 2, W5LY 2.

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — Every one is over the effects of the convention by now, I hope. Hi. W5BPM is down on his batting average. W5AMC has rebuilt his rig. W5BRD is in the Naval Reserve now. Our Babe Ruth of the air is still W5VQ. W5OJ had W5AQY and W5ATZ visiting him. W5ALF's new crystal 'phone rig is perking FB. W5BOR was sorry he couldn't make the convention. W5QL is busy on 'phone. W5SW hopes to be more active from now on. W5ALQ hopes to shoot in some traffic soon. W5APG intends to report his Naval Reserve traffic. W5PL hopes to have more traffic. W5ALD is one of our fine new ORS. W5GA is still pounding away. W5APY is off due to receiver trouble. W5AAV wants some report cards. W5CB is still pumping water for the city of sulphur. W5ABO had a great time at the convention. W5GF is DXing on 7 mc. W5ASQ is perking away now. W5AYF has his rig going good on Route Managers Nite. W5BEE is President of the Tulsa Radio Club.

Traffic: W5VQ 634, W5OJ 91, W5AMC 21, W5PL 21, W5ALF 16, W5BOE 3, W5GF 2.

NEW MEXICO — SCM, Leavenworth Wheeler, Jr., W5AHI — W5AUW has a new transmitter. W5BQE is QRL as editor of his school's paper. W5AIE has new portable station working. W5BRV took part in the A.A. QSO party. W5AOE is back in school. W5AJR says work keeps him too QRL to operate. W5AXV and W5BPJ have merged their stations. This is the last report of your present SCM. W5AIE will carry on as Acting SCM. It has been a pleasure to work with you, fellows, and I wish you all luck in the future. I'll be signing W5ZTZ until a W6 call is assigned. Hasta la vista.

Traffic: W5AUW 50, W5BQE 31, W5AHI 10, W5AIE 7, W5BRV 6, W5AOE 2.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr., W5ZG — As was announced last month, facilities are being provided by W5LB in the 7000-kc. band and W5BHO and W5BKW in the 3500-kc. band for the handling of reports sent to the SCM by radio. These stations are on the air on the 18th and the 19th of each month calling "CQ South Texas" for station reports. If these stations are not heard the SCM may be reached through any of the following stations in Houston: W5AMJ, W5AFC, W5AFV, W5VA, W5TD, W5BUB, W5BTD, W5CA, and W5EI. These stations operate in the 7000-kc. band. W5ON, W5AMX, and W5ANW are operating in the 3500-kc. 'phone band. Send your report by radio. Houston: W5AMJ reports for the first time. W5AFV has been QSOing YK and ZL con-

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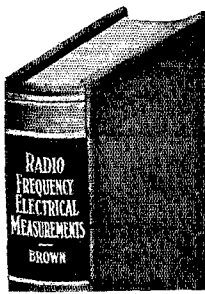
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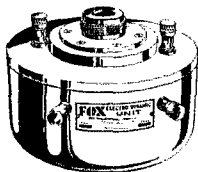
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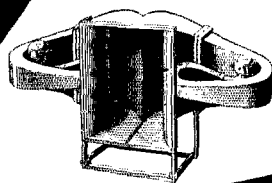
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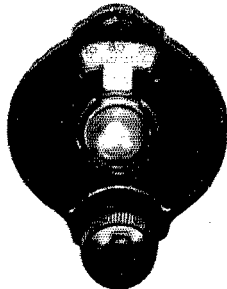
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sistently. A most welcome line is received from W5WL. W5BHO is still on 'phone. W5BKW promises to be heard more regularly during the coming month. W5ANW has a beautiful new 3500-kc. 'phone. W5TD is returning now that the weather is getting cooler. W5GS has been moving. At the election of officers held by the Houston Amateur Radio Club, W5BHO was elected Secretary and Treasurer, and Chinski, W5CA's second operator, was elected Vice-President. Flatonia: W5AJD, our RM, reports by radio. Baytown: W5DS sent a nice 'photo of his rig. Bohannon reports that Groves, W5NW and Ex-PK5NW, is returning from Sumatra. Newton: W5ACR wants some reliable schedules. Jasper: W5CK is heard frequently. San Augustine: W5BSB is working schedules with W5ACR. Austin: W5CT reports the following: W5BB is back from Maine. W5VV will return shortly. W5KA has been regularly QSO sixes on his 3500-kc. 'phone. W5GZ and W5OV will soon be on at W5CT. W5AON is completing an AC receiver. W5RXH is getting out well. Same goes for W5BWQ. W5ATW is back at KUT. W5BVW of Marshall is coming to Texas U. for the school term. W5CT wants schedules with all of the larger college towns in order to clear the coming accumulation of college traffic. Bryan: W5AEB will shortly be an ORS. Port Arthur: The sole representative for this city reports from Honolulu. HI. W5BRM is now K8LVZ-K6MB. He can be heard almost any morning from 6 to 7 a.m. C.S.T. San Antonio: W5BYG sends in a nice report. The S.A. Radio club is getting along FB. W5EU is on consistently. W5BUV is on intermittently. W5BWM reports the following: W5AYL is on consistently. Another YL is coming along in the person of Miss Chloe Boyles. Suggest you QSO Mrs. W5BKG, Miss W8ADU, Miss W8AHP, and Mrs. W5GS for the latest recipes, etc. W5CAS is a new ham. W5RV is using '52s in MOPA. W5BWM and W5CS are going to do experimental work on 28 and 56 mc. W5JC is not on often. W5BWM will attend S.A. Jr. College. W5AUC is operating under the call W5CBC until its license is returned from the commission. W5CBC has been QSO VK consistently. El Paso: W5FW of Ft. Bliss saves the traffic total for the month. Ex W8BNO is pounding brass at W5FW. All foreign traffic should be routed either through W5FW or W5AUC. Well, fellows, that's all for this month. Address your SCM, 1906 Wheeler St., Houston, and give him the dope on what is going in your particular neck of the woods. The operating month is from the 16th of one month to the 15th of the next. Let's hear from you.

Traffic: W5FW 444, W5AUC 23, W5BWM 10, W5BYG 19, W5AEB 50, W5CT 42, W5ACR 12, W5AJD 4

CANADA MARITIME DIVISION

NOVA SCOTIA—SCM, A. M. Crowell, VE1DQ—VE1AX reports the addition of new double-button microphone and National receiver. VE1BL's 250-wattier is kicking out to the VK's and ZL's. VE1CC reappeared in the picture with 3.5-mc. 'phone. VE1AG, VE1BC, VE1BT and VE1CL are still rag-chewing on 3.5 mc. VE1DQ has again revamped his receiver. Let's have the reports gang.

Traffic: VE1DQ 17, VE1BV 15, VE1AX 7, VE1AG 3.

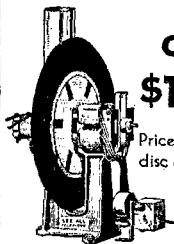
NEWFOUNDLAND—Acting SCM, E. V. Jerrett, VO8Z—VO8AE is having receiver trouble. VO8AW is laying the foundation for high power. VO8MC is our star DX man. VO8J and VO8C promise to be on this season. VO8WG is on again. VO8M, VO8A, and VO8O have not recovered from summer weather. VO8Z keeps regular schedule with VO8WG in Labrador.

ONTARIO DIVISION

ONTARIO—SCM, H. W. Bishop, VE3HB—In commencing my first term as SCM I wish to thank all members in this Section for the honor conferred on me, and hope to enjoy the same spirit of cooperation from them as has been given in the past. Our worthy RM, VE3GT, will soon be home from the O.F.B. VE3QB is going to be QRMed by school in Ottawa. VE3JA is a new ham. VE3DB expects to be on the air soon. VE9AL keeps daily schedules with VE3AU and W8DAW. VE3TT had a visit from W2AEU from Brooklyn. VE3ID and VE3HY visited VE3HW and VE3BG. Mrs. VE3BG will soon be second op to the OMI. FB. VE3HN is back on air. VE3IH is a newcomer. VE3IE has been rebuilding. VE3AU, our latest ORS, caps the message total for this month. FBI VE3DW is on 3.5 mc. VE3HB lost two '10s. VE3GK is still on the job. VE3CM is on 7 and 14 mc. with crystal. VE3AD is building new dynatron.

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THORDARSON T-3321 175 Watt Power Transformer, gives 1150 volts c.t., 7.5 volts in two c.t. windings and 3 volts. Cat. No. 1002. \$ 3.25
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DUBILIER PL 571; 4 mfd. at 600 D.C. Wkg. Voltage.

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866	2.5		5	7500	.6	\$2.95	
866B	5		5	7500	1.2	\$8.00	
281	7.5		5	7500	2.0	\$4.50	
872	5		10	7500	2.0	\$14.00	
875	5		12.5	15000	2.5	\$25.00	
869	5		20	20000	5.0	\$165.00	

Odeon Mercury Vapor Rectifiers are guaranteed to reproduce a lower AC ripple than any other Mercury Vapor Rectifier in



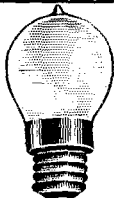
the present market, and to have an operating life in excess of 1000 hours.

UNIVERSAL MICROPHONE MODEL QRO



This is an exact replica of the standard Broadcast Model. Size 3½ inches high. Single button, 200 ohms, furnished with 3 ft. phone tip cord.

Price \$3.95



Rectifier Charger Bulbs

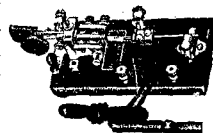
2 AMP.
WITH TOP
OR BASE
CONTACT
\$2.65

5-6 AMP. \$4.65
Extra Discount to
Dealers

Speed-Bug Telegraph-Key

This Key has been made for and approved by the U. S. Signal Corps.

CLEAR —
SHARP
SIGNALS



Price \$10.50

20% With Order — Balance Shipped C.O.D.

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NEWARK, N. J., U. S. A.

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POWERTYPE CRYSTALS



Crystal Mountings Quartz Crystals
 Constant Temperature Ovens Quartz Bars
 Frequency Control Equipment Quartz Resonators

COMMERCIAL BANDS

Crystals and Mountings calibrated and furnished for following bands, at accuracies of plus or minus 1%, .03%, .01%:
 50-200 kilocycles, Low Frequencies.
 200-550 kilocycles, Intermediate Frequencies.
 1500-4000 kilocycles, High Frequencies.

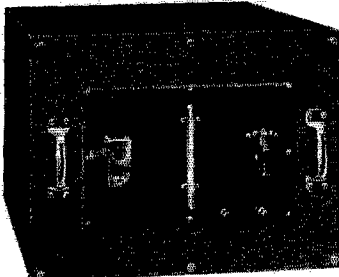
AMATEUR BANDS

Ground by experts and calibrated from precision standards. Crystals for amateurs ground to approximate frequency and calibrated to better than 1/10 of 1%.
 1715-2000 kilocycle band \$10.00
 3500-4000 kilocycle band 12.50
 Plug-in dust proof mounting as illustrated above, 5.00
 One inch oscillating blanks 4.00
 Grinding instructions furnished with crystal blanks.

BROADCAST BAND

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

HEATER OVENS



Model C-7-A
 35 to 65 Degrees C. Accommodation for two crystals
 \$125.00

You may order direct from this ad C. O. D.

FREE

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

AMERICAN PIEZO SUPPLY COMPANY
 1101 Huron Building Kansas City, Kansas

Traffic: VE3AU 571, VE9AL 43, VE3GK 36, VE3GT 32, VE3IH 17, VE3AD 17, VE3DW 15, VE3HN 14, VE3IR 3, VE3HB 2.

QUEBEC DIVISION

QUEBEC — SCM, Alphy L. Blais VE2AC — The big news this month: Alex, our CGM, has been nominated candidate for reelection as our Canadian General Manager. VE2AY takes the job of ALN station. VE2CA is anxious for the cool nights to come back. VE2AM is in line for ORS. VE2CX and VE2CU worked on schedules through summer. VE2CO tried 28 mc. VE2CF goes on the air at the McGill University. VE2BE has some good plans for this Division's activity this fall. VE2AP is on all bands. VE2BB promises us plenty to do next month. VE2AC is going strong on 28 mc. VE2BF is picking up. Quebec city has a new amateur. Favorable comments from many points coming in about a convention. The SCM will be in Montreal soon to discuss plans for a grand affair, a real convention like they have in other divisions.

Traffic: VE2BB 35, VE2BE 17, VE2AC 12, VE2CO 10, VE2CU 8, VE2CX 8, VE2AP 4, VE2DF 4, VE2CA 1.

VANALTA DIVISION

BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — Well, the big convention is over and it surely was a great success, thanks to the efforts of members of the B.C. Amateur Radio Association. Next year we hope to meet you in Victoria. VE5AN is on again with high power. VE5GF gives things a chirp once in awhile. VE5FF is anxious to line up some traffic schedules with Alberta or Sask. VE5BC has a pretty note on 3500. VE5DD is putting in crystal. VE9AJ got going again after the burglary. VE5AG is holding down schedules with Victoria. VE5AL has another heap ready. VE5EW has a poor location. VE5AC says things are rather slow. VE5AM is handling most of his traffic on 14 mc. VE5HP holds the traffic honors this month. VE5EC hopes to get on 3500 soon. VE5CO is on at his new shack. VE5DV is adding a 211D power amplifier to his 7-mc. heap. VE5DR is doing nicely with his '10. VE5DQ boasts a fine signal.

Traffic: VE5AM 12, VE5AL 11, VE5BC 9, VE5AN 9, VE5FF 7, VE5HR 13, VE5DV 2, VE5HP 30.

PRAIRIE DIVISION

MANITOBA — SCM, J. L. Green, VE4BQ — VE4IS is our star traffic and DX station. VE4DK just returned from the Flying camp and is setting up crystal-control. VE4FN is now on 7 mc. with a 1931 signal. An "Aussie" reports hearing VE4IU on 7 mc. VE4GQ's new transmitter is completed. VE4FT is at present up in Churchill. VE4KL has been heard on quite often. VE4GL is playing around with a Belgian 75-watt bottle. VE4AG rebuilt to Hartley Push-Pull. VE4AE's note has lately turned to RAC. ExVE4GG is experimenting with receivers. VE4DJ has been on 14 mc. each night, at 9:45, with code practice for beginners. VE4BQ's outfit has been confined to QRP lately.

Traffic: VE4IS 22, VE4DJ 8, VE4IU 1.
SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — VE4CV has a sure-fire sked with Winnipeg. VE4BB expects to have a 'phone outfit this winter. VE4JG is rebuilding. VE4BA won the Saskatchewan University Scholarship. (Congrats.) VE4DI is puttering about with modulators and speech amplifiers. VE4IL has a '66 and a pilot AC Super-wasp. VE4AT says nothing doing with him. VE4AV is on again.

Traffic: VE4CV 24, VE4BB 16.

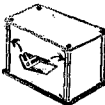
Late and Additional Reports

W7RT has installed crystal control using '45 osc., '10 doubler, '10 amplifier.
 Traffic: W7RT, 27.

Traffic Briefs

W3SM will accept traffic for the West Indies to be routed through his regular four-day-a-week schedule with CM8YB.

ALUMINUM BOX SHIELDS



Genuine "ALCOA" stock, silverdip finish. 5 x 9 x 6 \$1.89 — 9 x 14 x 7 \$4.65. 10 x 6 x 7 Monitor size \$3.25. 5 x 5 x 5 Shield (like picture on the left) \$1.00.

ANY SIZE TO ORDER

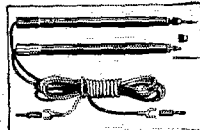
Coil Shields, Coil Hole Covers, Shielded Wire. Resistance wire for shunts and ovens.

Shallcross Resistances
 Hedgehog Transformers
BURGESS VACUUM CONTACT
WESTON and JEWELL METERS

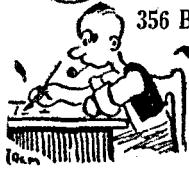
C.R.L. IMPEDANCE COUPLED
 1 STAGE AUDIO AMPLIFIER for
 Short Wave and Television.....\$2.95

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 BLAN, The Radio Man, Inc.
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 New York City

"BUDDY" Test Prods
 Always sharp pointed, using phonograph needles, 4-ft. wires, spade or phone tips. Colored nipples identify each lead. \$1.50 pair.



UNCLE DAVE



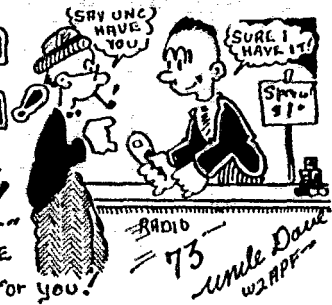
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Albany New York

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Elkon 2000 microfarad dry A condensers, each	\$1.50
Peerless dynamic speakers in foll. ratings. Spec. which wanted, 6 volt or 110 volt, d.c. Also 2500 tapped. Largest cone 12". Special, \$10.00. 9" cone, \$8.00, 8" cone	
Radio Receptor 25,000 meter super het transformer	.90
New K.E.L.L. Isolantite 50 watt socket	1.75
2 only Janette Panatropo d.c. to a.c. rotary converter kva.3. New condition, special	32.50
Arco 10,000 ohm, 100 watt transmitting leaks	.69
Arco 35,000 ohm, 100 watt bleeder resistors	.95
G.E. 3 henry 300 mill 20 ohm resistor chokes, special	1.75
Mershon 8 mfd. electrolytic condensers, each	.69

Special This Month Only. Free. Dustproof Bakelite Crystal Holder with each Crystal Purchased.

National Short Wave Three a.c. or d.c. Wired and assembled with three band spread coils, special	\$31.50
Hammurid midget balancing condensers, special	.25
New Signal bug. Real Job. Special	10.25
Thordarson transformers. Latest type. Plate supply transformers. All fully mounted.	
Thordarson T-2098—1100 c.t. to a.c. two 7 1/2 volt c.t. fil. wind.	7.00
Thordarson T-2950—1350 center tapped and two 7 1/2 volt c.t. fil. wind.	13.00
Thordarson T-2382—850 and 750 volts each side of c.t. List \$16.50, net price	9.25
Thordarson T-2387—1000 and 1500 volts each side of center tap. Special	12.70
Thordarson T-2388A—1500 and 2000 volts each side of center tap, special. 500 watt.	17.00
Thordarson T-2489A—1500 and 2000 volts each side of center, special. 1000 watts.	23.00

Filament Supply Transformers

Thordarson T-2230—one 7 1/2 volt c.t. fil. wind. 35 watt	4.25
Thordarson T-2382—12 volt c.t. 80 watts, special	5.70
Thordarson T-2383—12 volt c.t. 175 watts, special	8.75
Thordarson T-3680—2 1/2 volts 10 amps, 7000 volt insulated, designed for UX mercury vapor 866 tubes.	7.00

Thordarson Microphone Transformers

Thordarson T-3457 single button to match all mikes	2.35
Thordarson T-3458 double button microphone transformer of the highest quality obtainable for use with Western Electric, Kcllogg and other high grade mikes, special	8.75

Thordarson Choke Coils for Xmitter, Etc.

Thordarson T-2376—key click choke, 1 1/2 henry 200 mill	2.95
Thordarson R-196—30 henry 80 mill	2.35
Thordarson T-2071—30 henry 150 mill 3000 volt, ins.	8.25
Thordarson T-2027—30 henry 300 mill 3000 volt, ins.	10.75
Thordarson T-2073—30 henry 500 mill 3000 volt, ins.	11.85
Thordarson Line and Tube, Line to Line Coupling Trans.	
Thordarson T-3474—tube to line, special	7.50
Thordarson T-3475—line to tube, special	7.50
Thordarson T-3476—line to line, special	7.50
Weston new type three No. 566 set analyzer, special	82.00
Arco UX 852 sockets	250.00
Slightly used 860 RCA	1.35
Purymon UX280 mercury vapor	22.00
Zenith 30 henry 85 mill choke	1.45
Receiver type r.f. chokes, unmounted	.89
R.E.L. plug-in coil forms. \$1.50. Base	.25
W.E. single button microphone trans. Head only	1.50
G.E. 1/2 watt neon bulbs. \$55.2 watt	1.95
Thordarson 2 1/2 volt 16 amp. trans. mfrs. model	.75
Flechheim 2 mfd. 1500 volt cond. pigtail leads	3.75
Hardwick-Hindle 10,000 ohm 60 watt trans. grid leak	4.00
G.E. oil immersed 40-45 mfd. 2000 volt working	.60
Arco new UX860's guaranteed 1000 hours	20.00
	3.35

INCLUDE POSTAGE WITH ALL ORDERS AND 20% DEPOSIT AGAINST C.O.D. SHIPMENTS

Visit Uncle Dave's New Radio Shack When in Town. Good Time Assured, his Four Story Building with over 35,000 square feet of space, devoted to nothing but parts. For Goodness sake, what do you need? We sure got "it."—What have you for sale or trade? Wants: Used Teleplexes and Omnigraphs.

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Arco fil. transformer, wire leads, two 7 1/2 c.t. 2 1/2 amps windings and 1 1/2 and 2 1/2 fil. windings, special	\$3.00
Arco calibrated monitors with batteries, three coils and individual calibrated charts	9.35
Arco calibrated wave meters	6.25
Arco r.f. transmitter chokes	.50
Arco 50 watt sockets	.95
Arco 75 watt sockets	1.95
Arco 204-A sockets	1.95
Arco sockets for 212-A or D tubes	3.50
Arco 2 mfd. 1000 volt condensers	.70
Arco 3 1/2 mfd. 1000 volt condensers	.90
Arco 4 mfd. 1000 volt condensers	1.00
Arco 2 mfd. 1150 volt condensers	1.50
Arco 4 mfd. 1250 volt oil impregnated condenser, working voltage, special	3.25
1 mfd. \$.30	3 1/2 mfd.50
2 mfd.40	4 mfd.60
Above coil unmounted but sealed in paraffin	
Arco 1 mfd. 3500-volt transmitting filter condensers	9.50
Arco 2 mfd. 3500-volt transmitting filter condensers	14.00
Arco 1 mfd. 3000-volt transmitting filter condensers	8.50
Arco 2 mfd. 3000-volt transmitting filter condensers	12.50
Arco 4 mfd. 2000-volt transmitting filter condensers	9.50
Arco 8 mfd. 2000-volt transmitting filter condensers	12.50
Arco 16 mfd. tapped at 8 mfd. 1250 volt d.c.	8.50
Arco 1 mfd. 1500-volt condensers	2.00
Arco 2 mfd. 1500-volt condensers	3.50
Arco 4 mfd. 1500-volt condensers	5.50
All above transmitting condensers are working voltage. Arco high voltage condensers guaranteed unconditionally one year.	
Universal Microphones model BB	14.50
Universal Microphones model KK	28.00
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Universal Baby Mikes, QRQ	2.85
Universal Baby Mikes, with switch, 25 ft. cord	4.35
Universal hand-mikes, single button	5.85
Universal hand-mikes, double button	8.85
Sanson Pam Amplifiers New and in Original Cartons Pam 19-20 uses two 281, two UX 250, two UY 227. List \$175.00, net price	46.50
Pam 16-17 uses 1-281, 2-210, 1-227, list \$125.00, net.	35.00
Genuine R.C.A. UX852 tubes, new, original cartons	25.00
G. E. five watt, 602 navy tubes	.50
UX230 or 231 non microphone R.C.A. licensed tubes	.90
UX232 screen grid tubes	1.25
Baldwin type G phones, list \$11.00, net.	4.95
Tested and functioning, 250 tubes	.95
UX or UV sockets, each	.12
Crystal blanks, finished and oscillating	2.75
Crystal blanks unfinished	1.75
Crystals, specify anywhere in the 80 meter band	4.75
Stand-off insulators, each \$3.10, dozen this month only for	\$ 7.50
Sangamo 09025, 0005, 002, .001 5000 volt condensers	\$1.12
Enameled aerial wire No. 12, 100 ft. solid	.90
Enameled aerial wire No. 12, 200 ft. solid wire	1.65
20-40-80 meter band spread coils for the National sets, per set, special	3.75
National precision dials, type N	3.75
Cardwell 00023 mfd. 3000 volt insulation	3.25
Aerovox 8 mfd. 500 volt dry elec. condenser	1.18
Victor ABC power transformers for that November 1930, 245 transmitter, special	2.45
Crescent double chokes 175 miles	1.75
Ward-Leonard transmitting grid leaks for 210, 211, 303-A, 10,000 ohm	.90
Monitor cans 5x6x7 drilled with removable cover	1.20
New UX860 tubes, R.C.A.	29.00
Telex with three tapes	13.00

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15c per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7c per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7c rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15c rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

PLATE power for your set, the very heart of its performance. For quietness, DX ability, life-long permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate transformers for the new 872-866 rectifiers, complete plate power units. Rectifier Engineering Service, 4537 Rockwood Road, Cleveland, Ohio.

The finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophone CW transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designs, built to order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Ennsall Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

WHOLESALE discounts. Approved parts. \$50,000 stock. Over six pounds, catalog, circuits, data — 50¢, prepaid (Outside U. S. — \$1.00). Weekly (new items, test reports) bulletins — 20 weeks — \$1.00. Experimenters 56-page house organ — 25¢, prepaid. Kladag Radio Laboratories (Established 1920 — over 4000 radiowave customers), Kent, Ohio.

TRANSFORMERS made to your order. High quality, moderate prices, quick service. Write for quotations. Specify voltages, currents (or wattage) and frequency desired. Baker Engineering Laboratories, 2131 Curdes Ave., Ft. Wayne, Indiana.

LEARN Wireless (Radio) and Morse telegraphy. School, oldest, largest, endorsed by telegraph radio and government officials. Expenses low. Can earn part. Catalog free. Dodge's Institute, Wood Street, Valparaiso, Ind.

QUARTZ, direct importers from Brazil of best quality pure quartz suitable for cutting into Piezo electric crystals. Write us for full details. The Diamond Drill Carbon Co., 720 World Bldg., New York City.

CRYSTALS: Highest quality quartz crystals scientifically manufactured. Designed for greatest power. Steady single frequency. Guaranteed. Power-type inch square to approximate specified frequency. 0.1% calibration: 1750kc — \$5.50; 3500kc — \$5.50; 4686kc (14mc tripler) — \$7.50; Plug-in holders — \$2.50. Build your own 100kc Standard Frequency Meter! Easily tuned to 100,000 cycles. Quartz Bar — \$9.00 including data; Holder — \$3.00. Crystals manufactured from 25kc to 6000kc. Highgrade Constant-Temperature Oven Equipment; Thermostats, Thermometers, Ovens, Heater wire, Honeycomb coils. Relays. Write for further information, Billey Piezo-Electric Company, Masonic Temple Bldg., Erie, Penna.

CONDENSERS: Oil impregnated. Fully mounted. 4 mfd. 1500 d.c. working voltage. Guaranteed. Individually tested 2000 v.d.c. \$2.25. Five for \$10.00. W1VC, Richard Baer, 70 Ontario St., Pittsfield, Mass.

CRYSTALS: Powerful oscillators. Your specified frequency. Money back guarantee. 80 meter, \$4.50. W1VC.

GENERAL Electric 24/1500 volt 350 watt dynamotors \$37.50. 24/750 volt 150 watt \$27.50 with filter. 375 volts on 12 volt battery. Westinghouse 27.5/350 volt 80 mills \$7.50; 6-15 volt 500 watt aircraft generator \$15. 500 watt 500 cycle aircraft \$7.50. Complete 900 cycle aircraft spark transmitters \$25. W. E. Helmets \$7.50. Henry Kienzie, 501 East 84th St., New York.

SELL transmitter complete, 40 meters, 15 watts, guaranteed. \$35.00 cash, no offers. Hardy, 24 Hedgeway Court, Hempstead, N. Y.

SELL National AC5SW and Velvet AB complete all tubes, \$55. Teleplex with eleven tapes \$15. J. A. Schmidt, 532 Twenty-first St., Irvington, N. J.

FOR sale: Complete 7½ watt xtal controlled phone transmitter cheap. Write for data and pictures. Must sell at once. W1GJ, 135 Marvelwood Drive, New Haven, Conn.

HARTLEY CW transmitter with power pack, new monitor. Ready to go. Best offer. Bill Dahnke, Neosho, Mo.

SELL or trade, easy terms. A. C. superwasp, new, complete. Four 50 watt tubes, one Kodak 5 x 7, two Television Kinolamps, new. W5IV, Argyle, N. Y.

SELL — parts for 250 watt transmitter. Power supply minus rectifier. 212D. 75 berries. Robert Freeman, Adel, Iowa.

3000 V. 2 ampere double commutator motorgenerator with filament generator \$750; 3000 V. 1 ampere double commutator motorgenerator \$450; 1000 V. ½ ampere two commutator motorgenerator \$125. C-Bias motorgenerators, 1 ampere, \$85. Motors, generators, rotary converters, etc. Queen City Electric, 1734 Grand Avenue, Chicago.

NEW DeForest 510 15 watts, \$520. Write for information. Other parts cheap. Ralph C. Pivonka, Timken, Kansas.

TRADE — A #1 Radiola 26, portable superhet. Want ham equipment. W9DFS, 1504 14th Place, Chicago.

SELL — REL231 short wave set complete with 2 volt tubes, \$25. R. G. Loud, Plymouth, Maine.

MARTIN new Vibroplex, \$11, new DeForest \$30, \$18, crystal. 3576-ke. \$3.50, 2000 volt a.c. filter condenser, \$2, two 7½ volt, 35 watt Thordarson filament transformers, at \$2, 12 volt 80 watt Thordarson filament transformer, \$2.50, new DeForest 866, \$3.50, 0-15 volt Jewell voltmeter, \$2.50. Write C. G. Atkinson, Milbank, S. Dakota.

GREBE CR18 special new \$50. General Radio 193 decade bridge new, \$75. T. Ralph, 855 Oakdale Ave., Chicago, Ill.

PARTS and tubes cheap. Stamp for list. W9DWA.

ALL Parts for October QST beginner's receiver in stock. Six coils wound per QST \$4.20. Hatry and Young, Hartford.

ATTENTION: Opening sale. Power crystals. Value \$15. Precision, quality, and beauty. Liberal guarantee. 1715 Kca. \$4.50, 3500 Kca. \$5.00, 7000 Kca. \$8.50. Dust-Proof holders \$3.00. Sale closes December 16. Ellis Radio Supply Company, 1627 East 31 St., Kansas City, Mo.

UY245's tested for oscillation in a crystal oscillator. Limited quantity at a special price 55¢ each. 227's 35¢ each. 7x18 solid walnut cabinets just the thing to house your short wave receiver in \$1.00 each. UX or UY sockets only 10¢ each. Plug-in crystal holders \$2.25 each. 3500 to 4000 kc crystals, guaranteed 1/10 of 1% accuracy \$4.40 each. Milliameters 0-50, 0-100, 0-150, 0-200, 0-300, 0-400 each only \$1.00. Flush panel mount, black flange. DIALS all sizes 5" for your transmitter 15¢ each. 4" 15¢ each. 3¼" knobs with arrow indicator. Dandy for 5¢ each. 1¼" knobs with arrow indicator for all those small trimmer condensers 2 for 5¢. UY tube bases 5 prong for plug-in coils 5¢ each. All types of jacks fully nickel plated 15¢ each. 6½x7 bakelite plates 17¢ each. Grid leaks all sizes from 1 to 10 megohms 15¢ each. .00014 short wave variable condensers 60¢ each. 35 milhenry chokes 15¢ each. Stand-off insulators 9¢ each, 90¢ doz. Neon tubes in neat carrying case, for wavemeters 50¢ each. We have in stock all sizes of bakelite tubing, aluminum panels, magnet wire, etc. Send in your list for lowest quotations anywhere. All merchandise guaranteed. Sent C.O.D. United Radiobuilders, 1236 Springfield Ave., Irvington, N. J.

TRADE QST's, etc. David Vinikoor, 445 Roselyn, Philadelphia, Penna.

TRADE or sell, portable broadcast radio and clarinet for Pilot a.c. superwasp. Complete. Francis J. Churchill, 229 Charles Ave., Solvay, N. Y.

HAMS: Get our samples and prices on printed Call Cards made to order as you want them. W9APY, Hinds, 19 S. Wells St., Chicago, Ill.

ANYBODY want \$10 for a copy of the first issue of QST? If in good condition mail it and I will send check. Clair Foster, W6HM, Carmel, Calif.

NEW WE212A, \$36. 6000 volt blocking condenser \$2. Factory guaranteed 866s \$4.25. Peppy crystals \$5, dust-proof plug-in holders, silver plated plates, \$2.75. Other parts. Trades. Want burned out 50 and 250 watters, W. E., G. E., RCA. W9DOQ, Route 1, Duluth, Minn.

SELL — new 852 \$15, new 212D \$27.50, used 212D \$20. Condenser microphone complete, \$20. List. W. C. Newman, 423 S. Estelle, Wichita, Kans.

COIL forms, Y-base, 22¢ each; 6, \$1.25; 8, \$1.60; 12 or more 19¢ each. Postpaid, Stecher, 605 Wenonah, Oak Park, Ill.

SELL superwasp with tubes, \$24. Aero converter with coils, \$9. Box B, Jackson, Wyo.

W2ZC-1000 watt short wave tube A1 condition ideal for final stage of a ham superpower set using xtal control with a.c. on final to get that metallic ring. Sacrifice at five dollars. Want 861s. Harold Churchill, 580 Park Ave., N. Y. C.

TRANSMITTERS, receivers or other equipment designed and built to specification. Facilities to handle any job from simple baseboard layout to full rack mounted commercial type. Will use your parts if desired. Engineering and construction guaranteed. When requesting estimates give your full specifications. Holmes C. Miller, Radio Engineer, P. O. Box 105, Palo Alto, California.

LET me build your station equipment. Performance guaranteed. Perry S. Jones, 2551 Grafton St., Dallas, Texas.

SILVER — Marshall 1931, 714 tuner, guaranteed perfect. With tubes, \$25. W9AXH, 4130 N. Meridian St., Indianapolis, Indiana.

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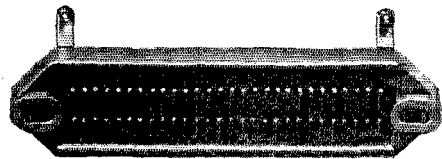
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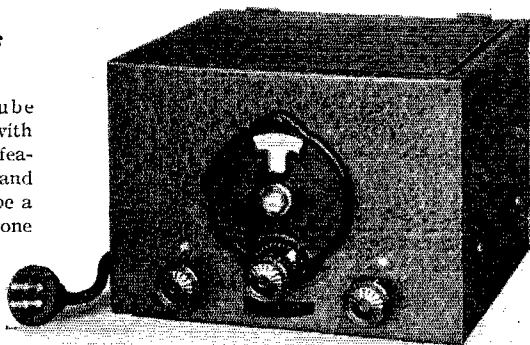
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QST'S INDEX OF ADVERTISERS IN THIS ISSUE

American Piezo Supply Co.	88
American Sales Company	87
Arcturus Radio Tube Company	69
Aurifera, Inc. Ad.	81
Ashe Radio Company, Walter	78
A.R.R.L. Apparatus	94
A.R.R.L. Application	71
A.R.R.L. Bookshelf	66
A.R.R.L. Emblem	<i>Con. II, 81</i>
A.R.R.L. Log Book	<i>Con. III, 89</i>
Blan, The Radio Man, Inc.	88
Browning-Drake Radio Corporation	75
Burgess Battery Company	<i>Con. IV</i>
Canatsey Neon Tube Co.	75
Candler System Company	77
Capitol Radio Engineering Institute	79
Cardwell Mfg. Corporation, Allen D.	69
Central Radio Labs.	67
Columbia Specialty Company	84
Cornell Elec. Mfg. Co.	75
Cunningham, Inc., E. T.	82
DeForest Radio Company	1
D & T Products Co.	79
Electrad, Inc.	69
Federated Purchaser	83
Feron & Son, Inc., M.	81
Fox Engineering Company	85
Frost, Inc., Herbert H.	83
General Radio Company	69
Greben, F.	77
Gross Radio Company	81
Gulf Radio School	83
Harrison Radio Company	80
Hollister, Herbert	75
Hoodwin & Co., Chas.	67
Instructograph Company	83
International Resistance Co.	62
Jewell Radio Company	74
Leeds Radio Company	63, 72
Manhattan Electric Bargain House	85
Massachusetts Radio School	77
M & H Sporting Goods Company	86
Atlas Reproducer Company	89
Morrill & Morrill	83
McGraw-Hill Book Company	85
National Company	86, 95
Odeon Mfg. Company	87
Port Arthur College	81
Powell & Co., R. C.	79
Precision Crystal Labs.	77
Premier Crystal Labs.	93
<i>QST</i> Binder	60
Radio Engineering Labs.	2
Radio Supply Company	79
RCA Institutes, Inc.	70
Regulation of Amateur Radio Communication	81
Rooney, John T.	79
Sangamo Electric Co.	77
Scientific Radio Service Co.	85
Shallcross Mfg. Company	89
Sprague Specialties Company	68
Stenode Corporation of America	76
Teleplex Company	84
Television Mfg. Co. of America	87
Thordarson Electric Mfg. Co.	64
Uncle Dave's Radio Shack	90
United Motors Service	73
United Radiohobbyists	88
Universal Microphone Lab.	81
Van Nostrand Company, D.	96
Vibroxplex Company	89
Ward Leonard Electric Co.	93
Weston Electrical Instrument Corp.	4
West Side Y.M.C.A.	85
Wholesale Radio Company	57
Wiley & Sons, John	75

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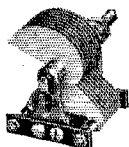
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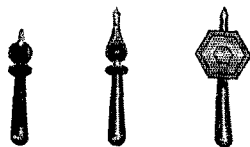
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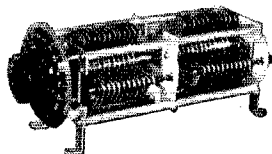
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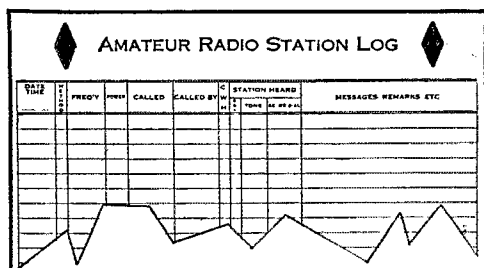
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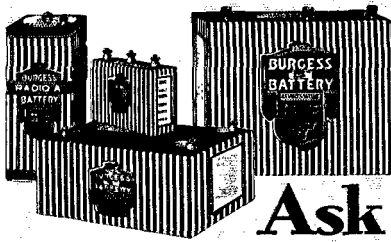
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