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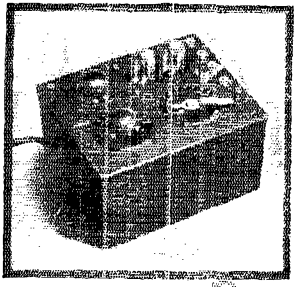

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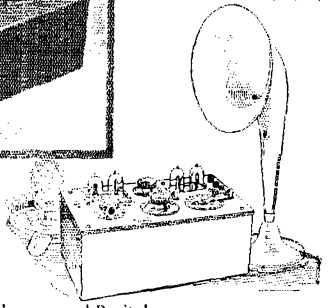

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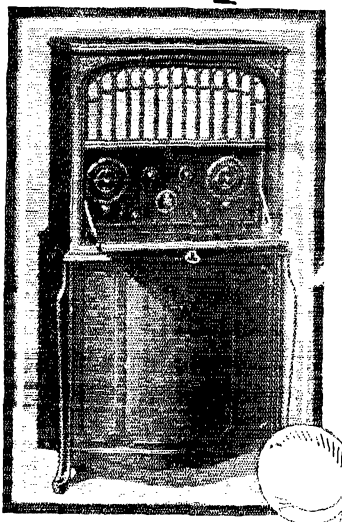

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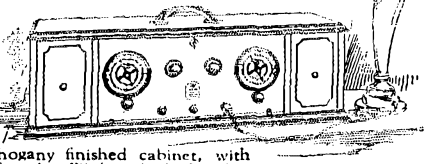

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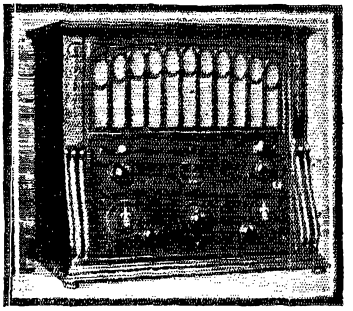

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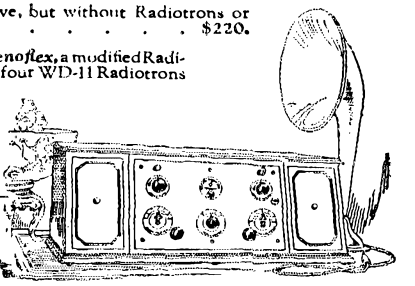

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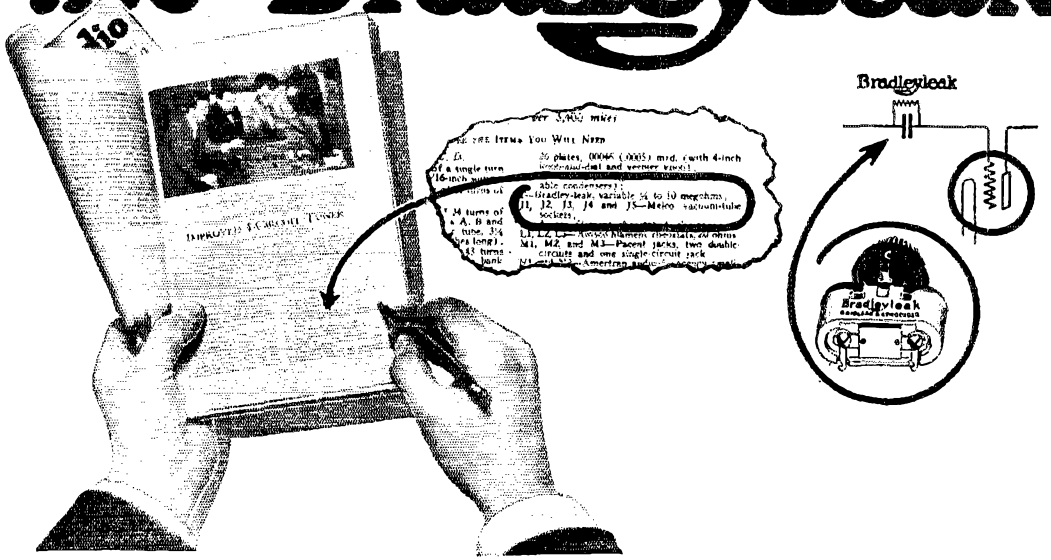

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C-301-A	½ Megohms
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UV-200	½ Megohms
UV-201-A	½ Megohms
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QST

The Official Organ of the A.R.R.L.

VOLUME VII MARCH, 1924 No. 8

QST is published monthly by The American Radio Relay League, Inc., at Hartford, Conn. Kenneth B. Warner (Secretary, A.R.R.L.), Editor and Business Manager
S. Kruse, Technical Editor; H. F. Mason, Department Editor
F. C. Beekley, Assistant Editor

Edwin C. Adams, Advertising Manager.

Subscription price in United States, Possessions, and Canada, $2.00 per year. Foreign, $2.50. Single Copies, 20 cents.

Entered as second-class matter May 29, 1919, at the post office at Hartford, Connecticut, under the act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103, Act of October 3, 1917, authorized September 8, 1922.

THE AMERICAN RADIO RELAY LEAGUE, Inc.
HARTFORD, CONN.

THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a national non-commercial association of radio amateurs, bonded for the more effective relaying of friendly messages between their stations, for legislative protection, for orderly operating, and for the practical improvement of short-wave two-way radio telegraphic communication.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a board of seventeen Directors, elected every two years by the general membership. The officers, in turn, are elected by the Directors from their number. 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 America and has a history of glorious achievement as the standard bearer in amateur affairs.

Inquiries regarding membership are solicited. Ownership of a transmitting station, while very desirable, is not a prerequisite to membership; a bona-fide interest in amateur radio is the only essential. Correspondence should be addressed to the Secretary.

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EDITORIALS
de AMERICAN RADIO RELAY LEAGUE

Our "Business"

WHAT'S happened to relay traffic? Here it is the height of the season, when things should be their busiest, and yet our volume of traffic handled is small. To be sure there are lots of messages moving, but their number is small in comparison with what it used to be. One can listen all night and hear only a few real cases of traffic handling, one can try all night to find some business and get only QRU's—it's a devilish hard job to find a dozen messages a night that need relaying.

As an organization we fellows never have become quite accustomed to the idea of mere rag-chewing. We've acted very much as if an actual excuse were necessary to work another station, and that "excuse" has been message-handling. Consequently the nights this winter are filled with fleeting and unsatisfactory contacts of just enough duration to find out that neither of us has any message traffic, and then we drop each other like hot potatoes. We are essentially an organization of doers, and we have nothing to do. And so we are running around in circles, calling our heads off, making the night hideous with fruitless CQ's, on our toes and looking for things to do but finding nothing, and always the air reverberates with the mocking answer "QRU". We have our tests and our stunts, it is true, and we enjoy them heartily and make a good showing every time such an occasion rolls around, but we can not exist on them—they provide us nothing in between the red-letter dates.

There may be danger in such a situation. Our organization has succeeded where all other attempts failed because, primarily, we had a method of keeping in close contact with one another. Message traffic required a network of good stations, and the network bound us together. Without the traffic will we hang together?

Perhaps we're a little down in the mouth on the subject—it snowed again today and we thought spring had come. Let's look at the other side of the picture: An elaborate traffic scheme was necessary in order to provide a place for every station, back in the days when we all used sparks. The range of a station in those days was more or less in proportion to its power. We had to have a system that would give interesting activity to the low-powered station. Today, with C.W., all that is changed, and the "5-watter" gets as many cards from the opposite coast as the big fellow with the two 250's. Power doesn't cut much ice any more. The 5-watter gets in all the tests and often as not grabs the bacon from his big brothers and goes home with it. Perhaps the day is waning when a big traffic system is a really necessary thing to bind us all together.

We heard one well-known amateur thank heaven the other day that the business of seeking mere volume in traffic handling was over, for now the air is less cluttered and there is a chance to get a really important message relayed. He regarded the period of voluminous message-handling as the "kid days" of American amateur radio, and was rejoicing in the knowledge that today it is increasingly more possible to get on the air and converse with a radio friend, or to do more useful work. Isn't that about right? Shouldn't we really be thankful that we are outgrowing the day when our sole thought is to get a bigger message-total than the other fellow? Isn't our present hectic ether attributable to the fact that we are just growing away from a system in which we were all automatons and into a new era in which we have not yet fully found ourselves as humans? Let's develop the *human* side of amateur radio a lot more in our work on the air—the possibilities are enormous.

Now, what are your thoughts about this big question? Do we need a "business"? We'd like your help in this, fellows. What do *you* think about it? Don't let George answer for you, but take your pen in hand and write your thoughts to A.R.R.L. Headquarters.

The Short Waves

IT is regrettable that the present radio regulations do not provide some really short waves for the amateur. We need some short waves for our special contact problems, and because of their demonstrated usefulness we think every amateur should be entitled to their use. We feel, too, that we amateurs are better fitted to develop them practically than any other radio group—yet at present these short waves are so carefully "reserved" for "development" that almost nothing is being done with them.

Consider 200 meters for a moment, and hark back to that day but twelve years ago when wavelengths below 200 meters were

assigned to the amateur more or less to keep him out of mischief: useless waves so short that nobody could ever do anything with them. Reflect then on our progress, our steady development of methods and apparatus unique to the amateur world, our growing successes, until today we in America have dumped our signals into every continent on the globe! And consider the trans-ocean communication work of the past few months, where on wavelengths in the vicinity of 100 meters good communication has been established with Europe using apparatus and methods exclusively of amateur origin. Are we not the folks to develop those waves?

We do not ask for their exclusive use, as obtains with the waves within our present band of 150 to 200 meters. We'd be content with them non-exclusively. At present the waves below 150 meters are used, apart from government use, only under experimental licenses. The Department of Commerce is increasing the restrictions on "X" licenses and the indications are that soon it will be almost prohibitively difficult for an amateur to obtain one. Only the few stations now in possession of X licenses are authorized to work on the short waves today, and unless some other regulations are arranged for we will soon be out of it.

What a pity that would be! Those waves do need developing, and we're the crowd to do it. Wouldn't it be fascinating to have an amateur band from 40 to 50 meters or even from 4 to 5 meters, where we'd have to develop totally new methods and brand-new apparatus to make them work? Real pioneering development, contributing something new to the art! And 70 to 90 meters or 110 to 125 meters, some band where our present knowledge will apply but still "short" waves as we know them today!

The big commercial companies are hard after these waves, fellows. Amateur work demonstrated their value, and that's why there is a reservation today below 150 meters, with only three-months X licenses operating below the fence. The Westinghouse Co. is building a chain of 100-meter stations to convey broadcast programs around the country for rebroadcasting; that's what KDKA's 100-meter set is for. The Radiocorp. is experimenting with 100 meters to see if commercial traffic can't be handled there satisfactorily. The A.T.&T. is developing special short-wave apparatus for small marine craft, harbor tugs and houseboats and such like. Somebody obviously expects to get the use of some of those waves under the present amateur band.

This is just to say that A.R.R.L. Headquarters believes that we amateurs ought to have some of them too, and to ask you to think it over. There is new radio legislation in prospect, and the opportunity will come soon. When we go down to Washington we will want you to give us backing if you want those short waves!

Multa Gratitudi

A VERY pleasant and helpful custom has crept into the business of renewing one's membership in A.R.R.L., all unsolicited on the part of Headquarters and quite spontaneous on the part of the individual. Many of our members in sending in their renewal send along the name of a friend who should be a member. This is as much the rule as the exception today.

It is helpful to A.R.R.L. because we follow these up, write the friend immediately and tell him about the League, and because he is good material to start with we almost always get him in with the rest of us.

A great many thanks, fellows, for your bully good spirit in helping thus. It's the spirit of A.R.R.L.

And the others of you who have not done so yet—wouldn't you like to do this for your League too? It helps a lot.

ELECTION NOTICES

To All A.R.R.L. Members Residing in the Central, New England, Northwestern (including Alaska), Roanoke, Rocky Mountain, and West Gulf Divisions:

1. You are hereby notified that an election for a new A.R.R.L. Director, for a term of one year, is about to be held in each of the above Divisions, in accordance with the new A.R.R.L. Constitution and By-Laws, which were published in the membership edition of February, 1924, *QST* for your information. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Sec. 2 of Article IV, defining their eligibility; By-Laws 12, 13, 14 and 15, providing for their nomination and election; and particularly By-Law 27, which especially for this election stipulates dates differing from those specified in the other By-Laws cited.

2. The election will take place during the month of April, on ballots which will be mailed from Headquarters in the first week of April. The ballots for each Division will list the names of all eligible candidates nominated for the position by

A.R.R.L. members residing in that Division. There will be one Director elected from each Division.

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

(Place and date)

Executive Committee,
A.R.R.L. Headquarters,
Hartford, Conn.
Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the ..... Division, hereby nominate ..... of ..... as a candidate for Director from this Division, for the election of April, 1924.

(Signatures)

The signers must be League members in good standing. The nominee must be a League member in good standing, and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the first day of April, 1924. There is no limit on the number of petitions that may be filed.

4. Under the former constitution of the League, Directors did not represent specific territories. However, those now occupying the office of Director from the above-named Divisions are as follows: Central: H. M. Anthony, Muncie, Ind.; C. E. Darr, Detroit, Mich.; M. B. West, Lima, Ohio. New England: A. A. Hebert, East Hartford, Conn.; S. Kruse, Hartford, Conn.; H. P. Maxim, Hartford, Conn; F. H. Schnell, West Hartford, Conn.; C. A. Service, Jr., Glastonbury, Conn.; K. B. Warner, West Hartford, Conn. Northwestern: K. W. Weingarten, Tacoma, Wash. Roanoke: none. Rocky Mountain: none. West Gulf: F. M. Corlett, Dallas, Tex.

5. This is your opportunity to put the man of your choice in office as the representative of your Division. Members are urged to take the initiative and file nominating petitions immediately.

For the Board:

K. B. WARNER, Secretary.

Hartford, Conn., Jan. 2. 1924.

ELECTION NOTICE

To All A.R.R.L. Members Residing in the Atlantic, Dakota, Delta, East Gulf (including Porto Rico), Midwest, and Pacific (including Hawaii) Divisions:

1. You are hereby notified that an election for a new A.R.R.L. Director, for a term of two years, is about to be held in each of the above Divisions, in accordance with the new A.R.R.L. Constitution and By-Laws, which were published in the membership edition of February, 1924, *QST* for your information. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Sec. 2 of Article IV, defining their eligibility; By-Laws 12, 13, 14 and 15, providing for their nomination and election; and particularly By-Law 27, which especially for this election stipulates dates differing from those specified in the other By-Laws cited.

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

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

(Place and date)

Executive Committee,
A.R.R.L. Headquarters,
Hartford, Conn.
Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the ..... Division, hereby nominate ..... of ..... as a candidate for Director from this Division, for the election of April, 1924.

(Signatures)

The signers must be League members in good standing. The nominee must be a League member in good standing, and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the first day of April, 1924. There is no limit on the number of petitions that may be filed.

4. Under the former constitution of the League, Directors did not represent specific territories. However, those now occupying the office of Director from the above-named

Divisions are as follows: Atlantic: H. A. Beale, Jr., Parkesburg, Pa.; G. L. Bidwell, Washington, D. C.; V. F. Camp, Brightwaters, N. Y.; C. H. Stewart, St. David's, Pa. Dakota: none. Delta: none. East Gulf: none. Midwest: none. Pacific: A. H. Babcock, Berkeley, Calif.

5. This is your opportunity to put the man of your choice in office as the representative of your Division. Members are urged to take the initiative and file nominating petitions immediately.

For the Board:

K. B. WARNER, Secretary.

Hartford, Conn., Jan. 2, 1924.

TO ALL A.R.R.L. MEMBERS RESIDING IN THE DOMINION OF CANADA, NEWFOUNDLAND, AND LABRADOR:

1. You are hereby notified that an election is about to be held for a new A.R.R.L. Canadian General Manager, in accordance with the new A.R.R.L. Constitution and By-Laws, which were published in the membership edition of February, 1924, *QST* for your information. Your attention is invited to By-Law 26, defining the policy of the League in Canada; Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors, of which the Canadian General Manager is a member; Sec. 2 of Article IV, defining the eligibility of Directors; By-Laws 23 and 24, specifying the duties and authority of the Canadian General Manager; By-Laws 20, 21 and 22, providing for his nomination and election; and particularly By-Law 27, which especially for this election stipulates dates differing from those specified in the other By-Laws cited.

2. The election will take place during the month of April, on ballots which will be mailed from Headquarters in the first week of April. The ballot will list the names of all eligible candidates nominated for the position by League members residing in Canada, Newfoundland and Labrador.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members living in the Dominion of Canada, Newfoundland or Labrador, have the privilege of nominating any Canadian member of the League as a candidate for Canadian General Manager. The following form for nomination is suggested:

(Place and date)

Executive Committee,
A.R.R.L. Headquarters,
Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Dominion of Canada, Newfoundland or Labrador, hereby nominate ..... of .....as a candidate for A.R.R.L. Canadian General Manager, for the election of April, 1924.

(Signatures)

The signers must be League members in good standing. The nominee must be a Canadian member of the League in good standing, and must be without commercial radio connection. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in Hartford, Conn., by noon of the first day of April, 1924. There is no limit on the number of petitions that may be filed.

4. Mr. A. H. K. Russell, of 234 Westmount Drive, Toronto, Ont., is the present Canadian General Manager.

5. This is your opportunity to put the man of your choice in office as the Canadian member of the A.R.R.L. Board. Members are urged to take the initiative and file nominating petitions immediately.

For the Board:

K. B. WARNER, Secretary.

Hartford, Conn., Jan. 2, 1924.

U. S. Civil Service Examination

THE United States Civil Service Commission announces the following open competitive examination:

Radio Engineer, $4,000 to $5,000 a Year.

Associate Radio Engineer, $3,000 to $4,000 a year.

Assistant Radio Engineer, $2,000 to $3,000 a year.

Receipt of applications will close March 11. The examinations are to fill vacancies in the Signal Service, McCook Field, Dayton, Ohio, and Camp Alfred Vail, N.J., at an entrance salary of $2,000 a year, plus the increase of $20 a month, and vacancies in the Federal classified service throughout the United States at the salaries indicated above.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D.C., or the secretary of the board of U.S. civil-service examiners at the post office or custom-house in any city.

Radio Frequency Amplification

*Stuart Ballantine**

This article is very much out of the usual. The editor does not remember seeing anything quite along the same line. A careful reading will give an understanding of four matters as follows:
The methods used in designing r.f. amplifiers.
The uses of regeneration in r.f. amplifiers.
The fact that regeneration does not make up for poor coils and condensers.
The prospects of a successful short-wave r.f. amplifier.

Tech. Ed.

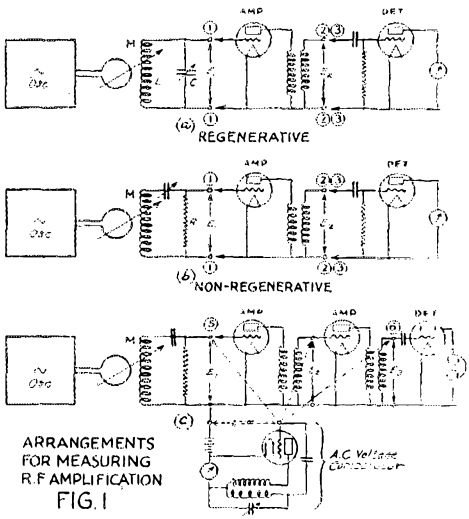
PRESENT-DAY methods of radio frequency amplification may be classified in the following way: regeneration, super-regeneration, cascaded repeaters (regenerative or anti-regenerative). The super-heterodyne is properly not a method of amplification but rather a method for lowering the signal frequency so that it may be more effectively amplified. The subject of super-regeneration has been worn threadbare so there is little excuse for any mention of it here.

It is of course necessary to admit that there is *no sharp distinction* between a cascade repeater in which no special precautions have been taken to eliminate feedback action within the tubes; and the regenerative method. Such an amplifier is *unavoidably regenerative and should be classified as of a combination regenerative and repeater type.* On the other hand, repeater systems in which the effects of intra-tube feedback are compensated or neutralized are clearly of the true repeater type, and to these I have applied the term *anti-regenerative.* My colleague, Dr. L. M. Hull, has summarized in a separate article (*QST*, January, 1924, p. 12) our work with the anti-regenerative methods. This leaves two subjects open to discussion: The design of an inter-tube coupling device, and repeater type amplifiers in which the effects of regeneration are not necessarily repressed or compensated.

A great deal of controversy has centered about the subject of tuned radio frequency amplification, in the pages of this journal and elsewhere. Our old friend Mr. C. D. Tuska has something to say in *QST* for October, and in the November issue Mr. A. L. Budlong has condemned the whole method at 200 meters with unmistakable severity. The case has, however, some merit and since I am going to present this side of it I will first briefly describe how this merit is quantitatively determined in the laboratory.

Methods of Measuring R.F. Amplification

Two methods of measuring the amplification have been used: The *non-regenerative method*, by which the straight repeater action alone is determined; and the *regenerative* method, in which the amplifier is allowed to regenerate and the contribution of this action appears in the results. Referring to Fig. 1, the regenerative method is shown schematically at (a). The amount of amplification is taken as the voltage-ratio, that is to say, the ratio of the voltage across the second tube (E_2 to that across the first tube (E_1). If a single stage is used, the comparison of voltage is made by noting the reading of a galvanometer in the plate circuit of the detector tube when the input terminals 3,3 of the detector are connected successively across the terminals 1,1 and 2,2, the accurately calibrated mutual inductor M being adjusted for the same deflection. For multi-



ARRANGEMENTS FOR MEASURING R.F. AMPLIFICATION
FIG. 1

stage measurements a *completely compensated voltage comparator* is employed as shown at (c). This comparator is so designed that its input-impedance is merely that of a very small capacity, and does not disturb the conditions of the circuit under measurement. In the *regenerative* method the amplifier tube is connected across the condenser of a *tuned LC circuit*, and all stabilizing methods that are to be

*Author of "Radio Telephony for Amateurs."

used in the practical operation of the circuit are added. In the *non-regenerative* method the amplifier tube is connected across a *non-inductive resistance* of such small value that the feed-back into the LC supply circuit is negligible, and the voltage-ratio so obtained represents the true repeater action of the tube with its associated inter-stage coupling alone. These methods permit a complete study of r.f. amplification; the second (i.e., comparator) method is useful in designing the inter-tube coupling device *per se*, and the first is useful in designing the LC circuit, studying the various methods of controlling regeneration, and of compensation in the case of anti-regenerative circuits. The full details of this work, circuit lay-out, shielding, etc. will be given elsewhere; I have briefly outlined the experimental arrangements in order that the reader may have some confidence in the results reported later, and feel that they are quantitative and not impressionistic.

(It is perfectly easy to build such setups of apparatus as are indicated by the wiring diagram but it is the most difficult job in all radio work to build them correctly so that one is sure that the input to the first tube is actually thru the coupling coil and not thru some accidental path by induction, capacity coupling or leakage. Only after years of this type of work did Messrs. Ballantine and Hull feel sure that they had devised an apparatus that would actually measure radio-frequency amplification with good accuracy. The writer has seen the equipment and was very much impressed with the fine attention to detail. A brief

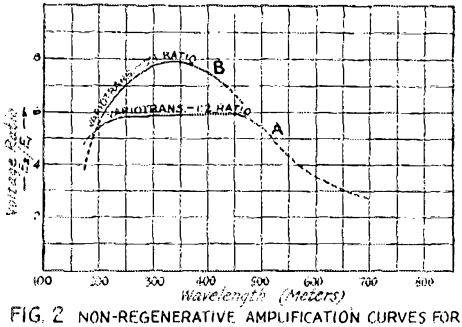


FIG. 2 NON-REGENERATIVE AMPLIFICATION CURVES FOR ONE STAGE, USING DIFFERENT RATIOS-OF-TURNS IN THE TRANSFORMER.

additional explanation of the method-of-operation will be worth while.

The vacuum tube oscillator "Osc." has its output conducted thru shielded leads to the primary of the mutual inductance *M*. This inductance is in a way the heart of the whole device. Both coils are carefully shielded and their shape is such that the secondary voltage can be accurately foretold when the primary current and the position of the moving coil are known.

In working the set the detector is first connected directly to the terminals 1,1 and the movable coil of *M* is rotated until the detector plate-current meter gives some convenient reading. Now the radio-frequency tube is cut in ahead of the detector and the movable coil of *M* turned until detector plate-current meter again reads the same. Evidently the voltage to the detector is the same both times. However, the voltage in the circuit LC was *not* the same and the difference is very evidently a measure of the amplification produced by the r.f. tube *and its transformer*. How large that difference is may be determined by noting the two positions of the movable coil of *M* and then calculating the voltages that were induced in the secondary of *M* in those two positions. This explanation applies to circuits 1A and 1B.

In 1C a complete r.f. amplifier is set up and the voltage across each grid circuit is measured by the voltage comparator" which is really a sort of r.f. voltmeter. The circuit of this device can readily be seen from the figure but its construction and use require skill.—Tech. Ed.)

Regeneration

The simple view of regeneration as a negative resistance, so current in radio texts, has been pretty well exploded—at least so far as its application to the calculation of regenerative amplification is concerned. It has been shown experimentally[1] and theoretically[2] that the regenerated signal strength *depends upon the initial strength, and furthermore is not independent of the resistance of the tuned LC circuit*, as the application of this idea would indicate. The ratio

$$\frac{\text{Voltage amplification with regeneration}}{\text{Voltage amplification without regeneration}}$$

may indeed increase with the resistance of the tuned input circuit but this should not mislead us; *the signal strength after regeneration certainly decreases with increasing R to a very marked extent.* In some cases this takes place in inverse proportion to *R*, as in Ohm's Law, but this is by no means a general law.

Now all this has a very definite bearing on tuned r.f. amplification, and in fact contains the kernel of the whole matter. It leads directly to the conclusion that for best results regeneration in such amplifiers should not be controlled by "lossers" (grid-potentiometer, series R, etc.) but should be controlled by some method of

[1] See the curves taken by W. G. Ellis, Fig. 117, Radio Telephony for Amateurs".

[2] The complete mathematical theory has been worked out by different investigators, including Dr. L. M. Hull, also independently by Dr. N. Little and by Prof. E. L. Chaffee at Harvard; I hope this work will soon be published.

anti-regenerative feed-back. I do not condemn such "losser" methods as heartily as Mr. Tuska has done, for measurements and universal experience have shown that they do indeed give pretty fair results, but for *best* results the case is perfectly clear. I shall have more to say about this later under "Regeneration Control".

Amount of Amplification Due to Regeneration

In amateur practice the most important methods of regeneration are those employing the tickler coil and the tuned plate circuit. The latter is of greater interest in this article because later we shall connect a second audion across the tuned plate impedance for the purpose of building up an amplifier. While there is some difference in the regenerative amplification obtainable by the two methods in a given LC circuit (on account of the difference in the forward currents, grid-to-plate), the figures to be given apply roughly to both types. Also the regenerative amplification depends upon the LC ratio and R of the tuned circuit, and I have already pointed out that a high amplification ratio may be obtained in a high resistance circuit and is not a measure of the best signal strength. The LC circuit should be carefully constructed to have minimum losses, for regeneration *will not completely compensate for the resistance.* As to the order of the regenerative amplification, Ellis' curves (Fig. 117, my book) for spark signals show a gain of about 25 for square-low detection, which means a voltage-ratio of 5. See these curves for the effect of circuit resistance on this ratio. Hull and Snow have recently completed some measurements at Boonton using an unmodulated (c.w.) signal, measuring the d.c. change in the detector (proportional to audio frequency output for radio telephone signals), and for an average single-circuit tuner in a 14-ohm antenna at 400 meters get the following results:

Non-regenerative detector.....1
Regenerative detector.....25

Assuming square-low detection this gives a regenerative amplification of about 5, which checks Ellis on spark signals. For a circuit of higher resistance the regen. amp. could be increased to 10 times, but in this case the non-regenerative signal is less than 1 so the final signal strength is proportionately lower. These figures will show how important and efficacious the regenerative method is, when it is considered that the average r.f. repeater amplifier amplifies about 4 to 6 times per stage when used non-regeneratively. I have summed this up in my book in the statement that 'regeneration alone is worth from one to "one and one-half" stages of repeater amplification. (implying the total absence of regeneration in the repeater).

Repeater Amplification

We pass now to the methods of cascade amplification in which a series of tubes are linked together thru appropriate impedances. The inter-tube couplings are of various types; resistance, choke-coil, variometer, fixed transformer, condenser-tuned transformer, and variotransformer. For operation over a band of wavelengths and for selectivity the tuned couplings are the only ones of importance. The tuning may be done by varying the inductance, as in the variometer or variotransformer methods, or by having the inductance element fixed and using a variable condenser, as in the tuned transformer or choke-coil methods. The schemes using condensers for tuning are employed in many commercial receivers. My own experimental experience favors the method of tuning with inductance, for two reasons. First, because the higher L/C ratio gives a tuning curve which is not critically sharp and the adjustment is not so tedious as that of condenser tuning. This is a great help if regeneration is also to be used, as Mr. Budlong has pointed out in his article. Also, provided certain other circuit matters are attended to, it permits the tuning controls of the several stages to be mechanically connected together so that the adjustment may be made with a single knob. In the second place a condenser of sufficient capacity to cover a 2.1 wave-length range reduces the voltage considerably in the upper part of the scale. Of the inductance tuning methods the variometer method has already enjoyed wide use and is described in my book. It

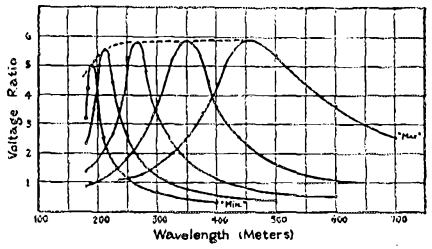


FIG. 3 NON-REGENERATIVE AMPLIFICATION CURVES FOR SEVERAL SETTINGS OF A MODEL 5 B.V.T.

Since each curve only shows results at one setting it is necessary to get a summary curve. This is done by first making curves as shown over the entire tuning range of the transformer, then running a line thru the peaks of these curves as shown in Fig. 3. At the upper end this line slants down the right hand slope of the curve gotten at the highest possible trans. tune; at the lower end it slants down the left slope of the curve gotten at the lowest possible wavelength adjustment of the transformer.

Note that this final curve is the same one that is marked "A" in Fig. 2.

has the disadvantage of requiring (in all stages except that immediately preceeding the detector) an extra isolation condenser and grid biasing resistance, and the voltage cannot be stepped up as with the transformer.

Several years ago it occurred to me that all the advantages of the variometer method

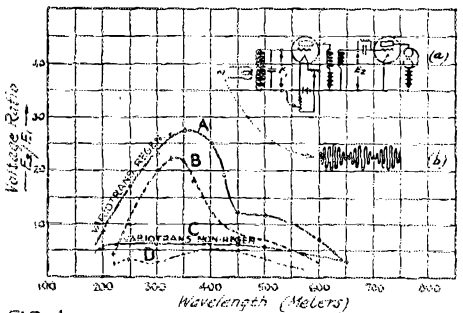


FIG. 4 COMPARISON OF REGENERATIVE AND NON-REGENERATIVE AMPLIFICATION CURVES

A—Tunable transformer regenerative.
B—Fixed transformer regenerative.
C—Tunable transformer non-regenerative.
D—Fixed transformer non-regenerative.
Note—Tunable transformer used was a Ballantine variotransformer.
The fixed transformer was an unusually good one.
The oscillator supplied sine-wave-modulated r.f.

could be retained, its disadvantages eliminated and the amplification considerably improved by replacing the variometer by a transformer whose primary, secondary and mutual inductances could be simultaneously and continuously varied over the range of wavelengths to be received. I called this device a *variotransformer*, and a witty friend supplied the abbreviation "BVT" to shorten a word which was unfortunately long. The separate windings of the BVT eliminate the isolation condenser and grid resistance which are necessary with the variometer; furthermore by providing a turn-ratio greater than unity the voltage may be stepped up. The device tunes in exactly the same way as the variometer, by means of a single knob.

Use of Iron in Radio Frequency Transformers

The effective permeability of iron at short wavelengths is small out of all proportion to the heavy hysteresis and faucault current losses. We have thoroughly studied iron cores of many types, in the form of thin steel sheets down to .001" thickness, in the form of small particles (oxidized particles, iron precipitated by hydrogen, rumbled with high resistance materials, etc.) molded under large pressure with an insulating binder, and ended up with a special core which was moulded of extremely thin "magnetic-oxide" sheets (.0002" thickness). Even the losses in this core were too great for use at such wavelengths (600 meters) although we expect to make some use of the material in long-wave radio transformers such as are used in a superheterodyne intermediate-frequency amplifier. The idea of using iron at short waves was immediately abandoned.

Coupling

Sometimes loose coupling is used between the windings of a radio transformer having a fixed primary and a tuned secondary. This broadens the range of wavelengths over which the device will amplify. (Within reasonable limits this range then depends on the tuning-range of the secondary. There is an incidental advantage in loose coupling; if the primary turns are kept down the tendency to oscillate is decreased without using any means of compensating for feedbacks.—Tech. Ed.) However, loose coupling lowers the height of the resonance peak.

When an adjustable primary is used and the amplifier is properly compensated for feedbacks there is no purpose in using loose coupling and in such devices as the Ballantine variotransformer the coupling is made as close as possible by winding the primary and the secondary coils together.

Turn Ratio

The best turn-ratio depends, among other things, upon the plate resistance of the tube and the amount of the capacitatively-reacting feed-back from the next tube. For ordinary tubes of resistances ranging from 10,000 to 30,000 ohms a turn-ratio of 1 to 2 is about right. The sharpness of the resonance curve increases with the turn-ratio, the effect being much the same as that of increasing the capacity across the primary winding.

This is illustrated by Fig. 2. The curves represent the non-regenerative amplification of one stage with a UV-201 (C-301) tube. As previously defined this is the pure repeater action of one stage into a tube detector (UV-200 or C-300) and excludes the effects of regeneration. The higher turn-ratio (2.1/1) gives more amplification but is harder to adjust on account of the greater selectivity. The ratio 1.2/1 represents a good compromise. In the case of a "Variotransformer" this ratio gives a pretty uniform amplification of about 6 times, over the entire range of wavelength adjustment.

It seems a trifle unreasonable to present broad curves like those of Fig. 2 with the statement that one of them was obtained from a sharp-tuning transformer and the other one from a moderately sharp one. The explanation for this is given in Fig. 3 which shows how Fig. 2A was obtained.

The operation of a tuned r.f. transformer cannot be represented by a single curve, since each setting of the transformer gives a different curve. The final curve for the

transformer is the "envelope" of the separate curves; in other words it is the line passing thru the peaks of all the separate curves. Fig. 3 shows how this idea was used in drawing Curve A of Fig. 2. The separate curves that went into the making of Curve 2B were much sharper.

A non-tunable transformer, to be useful, must be designed so as to have a much broader curve; that is, the ratio-of-turns must be kept down, giving less amplification.

Regeneration Control

When a tuned coupling impedance is connected in the plate circuit of an amplifier tube it will regenerate thru the tube capacity. As resonance is approached from either side, a point will generally be attained at which the circuit breaks into oscillation. If conditions are such that this occurs very far from the resonance peak, it is clear that we will not be able to make the best use of the high impedance that the coupling offers at anti-resonance, and the repeater amplification will be defective. Furthermore, the important selectivity advantages that the tuned coupling offers, can be realized only if we operate precisely on the peak of the resonance curve. In order to get on the peak, the regeneration must be controlled.

Losser Methods

I have already mentioned that "losser" methods of control are less preferable than those involving anti-regenerative feed-back, which gets at the root of the matter. Nevertheless "losser" methods will work, and are quite easily applied. See Hull's article for a summary of these. The method of series resistance in the LC circuit is as good as any, *certainly better than biasing the grid positively* because the latter runs down the "B" battery and shortens the life of tubes containing the new "XL" filament.

Figure 4 shows the results of measurement of the amplification (repeater plus regenerative) of a one-stage amplifier controlled by a "losser" method. An old style UV-201 audion was used, with a Model 5, BVT between this and a UV-200 detector. The dotted curves represent the corresponding performance of a good fixed transformer and by comparison show that the advantage of tuning extends to the regenerative circuit, also that the design of the transformer for good repeater action is justified also when regeneration is to be used. The amplification reaches a maximum; and since the non-regenerative (repeater) curve is flat, this seems to be a regenerative-amplification effect. Actually this maximum can be shifted somewhat by varying the L/C ratio of the tuned grid circuit. One of the important things brought out curves of this kind is the reality of the regenerative contribution, which I originally asserted in my book was of about the same order as that of the repeater action in properly arranged circuits. At the highest point (Fig. 4) the total amplification of the BVT (see curve A, Fig. 2) is about 6. Taking Figs. 2 and 4 and comparing them, this gives an amplification of 4 due to regeneration, which falls off as the ends of the range are approached. (Be sure to notice that the amplification scale is different in Figs. 2 and 4.—Tech. Ed.) This circuit was designed for broadcast reception; both the L/C ratio and the range of the BVT were poorly adapted for 200 meters, so that the regenerative effect here is only about 1.5 times. With a proper L/C ratio and Model 6 (DX Special) BVT, the whole curve is shifted to shorter wavelengths, with a general decrease in amplitude. Regarding the suspected failure of r.f. amplifiers at short wavelengths in amplifying very weak signals, I may mention here that I have recently completed some theoretical investigations which show that this is due to the construction of the present tubes, not to the circuit. Our experience in the laboratory with r.f. amplification at wavelengths between 100 and 200 meters, using, however the Model 6 and not the Model 5 BVT, has been very satisfactory.

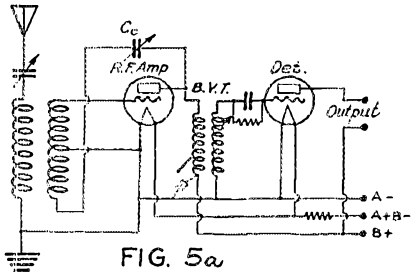


FIG. 5a

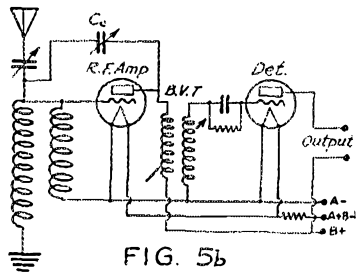


FIG. 5b

1 Stage R.F. Amplifier with Variotransformer Coupling and Regeneration Control.

Control by Anti-Regenerative Feedback

The really proper way to control the regeneration is to provide a controllable "re-

versed" feed-back. Several schemes are available. Mr. Tuska has already explained the advantages of the reversed tickler-coil method. He used this method in connection with a capacitatively tuned coupling; it is not so successful with an inductance tuned coupling. Effective methods in this case are those shown in Hull's article (Fig. 5a and 5b), and in the present Fig. 5. For control of regeneration (rather than complete compensation) the condenser C_c is made variable.

In Fig. 5a the coupling between the antenna and secondary coils should be close, but care should be taken to keep down the distributed capacity between the lower part of the coils if they are wound in the same direction, and between the upper parts if they are wound in opposite directions. This is very important in the case of Fig. 5b, in which the coils are wound in opposite directions. I have shown in these diagrams only one stage of r.f. amplification. Additional stages may be added, of course, and if regeneration in later stages should happen to be troublesome, the simplest remedy is a grid-potentiometer commonly controlling the extra tubes. Additional regeneration in the detector circuit is less effective than might be supposed (perhaps 20% increase) and hardly worth the extra adjustment. For c.w. work the autodyne oscillation should not take place in the tuned circuit, at least in a multistage amplifier, because succeeding tubes may become overloaded. *It will probably be better to let the circuit immediately preceeding the detector oscillate, or to provide a local oscillator coupled to this point of the circuit,* thus heterodyning the amplified signals. This also reduces or prevents the radiation of a "carrier-wave" by the receiver.

According to the measurements depicted above a single stage of r.f. amplification with variotransformer coupling and proper regeneration should give with square-law detection a telephone signal amplification of from 100 to 1000 times. Hull and Snow have actually measured amplification of 100 times at 400 meters, and there was some doubt here of the failure of the square-law detection so that with weak signals the 1000 mark might have been reached. At any rate the value and economy of tuned r.f. amplification is not all on paper.

How Antennaz Work

By John L. Reinartz, 1QP

Our idea of a really good radio amateur is John L. Reinartz.

Reinartz isn't connected with a commercial station, a factory, a laboratory, or a university, yet his name is internationally known and his articles have been reprinted in a dozen countries. Here's the explanation: Reinartz never believes that a job is done until he has had a try, and he never admits that there isn't something in an amateur station that will do the work.

For instance—all of us had dropped the Tesla Coil as an old-fashioned toy. Then when we wanted to find out how our filters worked we began to have dreams of $2000 oscillographs. But Reinartz resurrected the Tesla coil, put a bit of wire on it, and gave us the 10¢ "Modulascope".

Lately most of us have admitted that we don't know anything about antennaz at short waves. John admitted it, too, but he immediately got out the Tesla Coil again and—but that's his story and we will let him tell it.

—Tech. Ed.

IF you will follow these experiments with me you will find that they provide most interesting recreation and also a means of conveying to you, as they did to me, the need for properly proportioned circuits for transmission. It is not difficult or expensive to make the Tesla Coil and repeat these experiments, and a single "5-watt" tube will drive it. Be sure to try the things I will tell you about.

A look at Figure 1 will show the regular arrangement of apparatus used with my Tesla Coil. A simpler arrangement could be used but it is convenient to use the regular set at 1QP and simply shift the clips A and B to the Tesla primary. These clips ordinarily go to the antenna and counterpoise leads. When the set is running the current passing thru the Tesla primary induces a voltage in the Tesla secondary. Because the secondary has many turns this voltage will be quite high, especially when the primary is tuned to the natural wave of the secondary coil.

Obtain a Westinghouse "Spark C Pencil" or an Airco "Ignition Gauge". The little vacuum tube is a very good indicator for high voltages. When it is held near a wire or coil that is at high voltage the tube glows; we can get a rough idea of the voltage by seeing how near to the wire we must get before the tube will light up.

If you are ready we will proceed with the experiment.

Place a sheet of paper right back of the Tesla Coil, press the key of the tube set and adjust the variable condensers. If things are working right the upper end of the secondary coil will show a slight corona (or brush) discharge. Now hold the little vacuum tube as shown in Figure 2, putting it just close enough to the top turn of the

coil to get a slight glow. Make a mark on the sheet of paper to show the position of the tip of the "Spark C." Now move down an inch, slowly bring the tube toward the coil and again mark the place at which it began to glow. When you are done you will find that the curve traced in this manner will look like Figure 4. This curve, of course, shows the *voltage* along the coil.

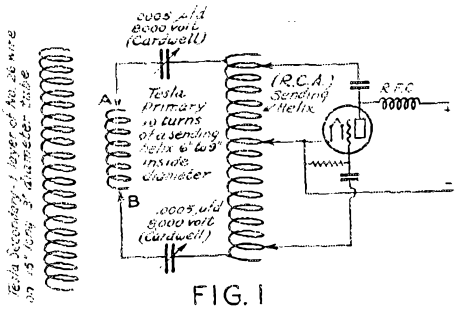
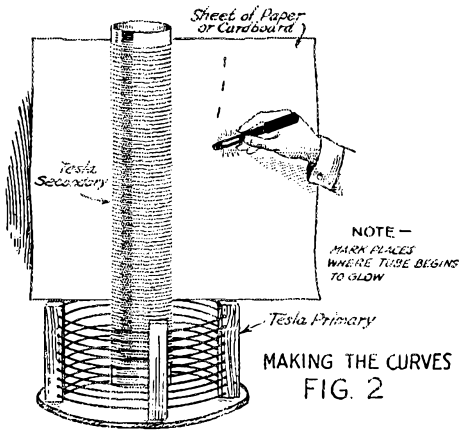


FIG. 1

there is zero voltage at the ground and it rises all the way up the coil. This is just what happens on an *antenna* working with a ground connection.

Now tune down the primary and keep trying the top of the coil with the vacuum tube. Soon you will strike a wavelength at which there is high voltage at the top of the coil again, but when you make a curve as before it will *not be the same curve at all* but one looking like Figure 5. This means that you have 1½ wavelengths along this coil instead of ½ wave-



MAKING THE CURVES

FIG. 2

length as before. This can be checked with a wavemeter; if the curve of Figure 4 was obtained with a wavelength of 300 meters the curve of Fig. 5 will be found when the primary is tuned to 100 meters.

Tuning down some more will give the 5th harmonic with a voltage curve as shown in Fig. 6. The tune will be 60 meters if we started with a 300-meter coil.

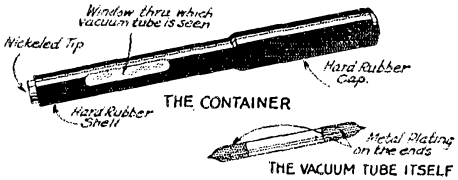
Always we will have the high voltage at the top of free end of the coil and a *node* or zero voltage at the bottom, or grounded, end.

The Important Point

Wherever there is a ground connection there is a node—but that isn't all. When we are working as in Figure 5 or 6 we can purposely ground the points 0, 0_1, 0_2, 0_3, and *no current will flow thru these ground leads.* Neither will this have any effect on the high voltages at the other parts of the coil.

Working An Antenna With Three Grounds

The 5th harmonic is of interest to us. Using it we can transmit right at the antenna fundamental with *both ends and the center of the transmitting helix grounded.* This is done as in Figure 7, the voltages



VACUUM TUBE HIGH VOLTAGE INDICATOR

FIG. 3

being such that there is a node at the center of the helix and one at each end; in other words we have one wavelength along the helix.

To explain this, refer back to Figure 6. Suppose that the part above the highest node 0, is the antenna, and the part below that point is the helix. This has already been found to work just as we have said that the sending set will, but there are entirely too many turns of inductance below the point 0_1, and the resistance of the circuit is accordingly very high. In order that the number of turns for this inductance may be small we will shunt a variable condenser across a portion as shown in Figure 7. This allows us to tune this part so that it will oscillate at the natural frequency of the antenna. This scheme will work and it is a good indicator of the natural wavelength of the antenna, but it does not permit easy change of wavelength, so we will pass to other experiments, using a counterpoise instead of a ground.

The Open-End Tesla Coil

With the same arrangement as in Fig. 1 but *without* a ground connection on the Tesla Coil secondary, press the key and tune to resonance. You will find that high voltage now appears at *both* ends of the secondary coil but that there is a node at the center as shown in Fig. 8. If we

started with a 300 meter wave in Fig. 4 the wave is now 150. Tuning down to the 2nd harmonic (one half wavelength) will

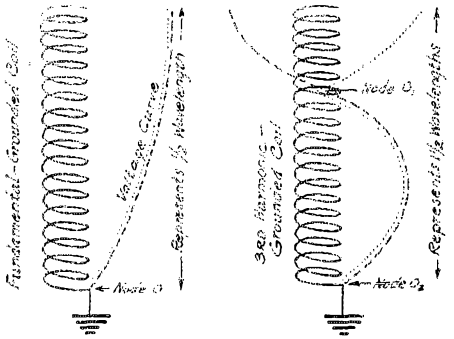


FIG. 4 FIG. 5

give us two voltage nodes; pass this by and tune down to the third harmonic (one third wavelength) which has three voltage nodes, one in the center of the coil and

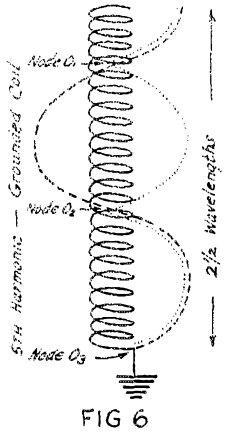


FIG 6

one near each end of the coil. This is the wave we are going to study. The voltage curve is shown in Fig. 9.

The Antenna With Counterpoise

As in our other experiments we will assume that the part of the coil above the node 0_2 is the antenna and the part below the node 0_3 is the counterpoise. As before, this leaves too many turns in the helix (the part between 0_1 and 0_3) and we will shunt a variable condenser across the inductance so that the number of turns can be made small. In Fig. 10 this has been done and the tube set has been connected to the helix so that the filament tap comes at the node 0_2 and there is *zero voltage at both the antenna and counterpoise lead-in insulators, thus reducing the losses at these points. At the same time we have taken care of the need for a nodal point at the filament clip.*

The whole system is again working at the antenna fundamental, and of course

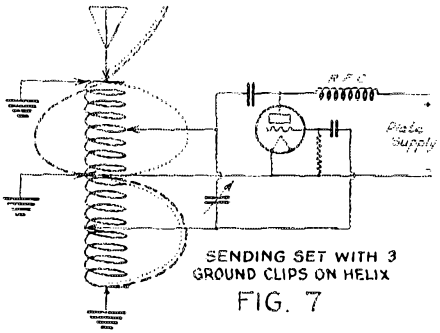


FIG. 7

the part of the system inside the station is also working at that wavelength. It might be well to say this in another way. If the antenna-and-counterpoise system works at 200 meters when their leads are connected directly together, then the thing for us to do is to set the antenna and counterpoise clips at the end of the helix, set the condenser clips about half way in toward the center and then turn the condenser until the helix system oscillates at

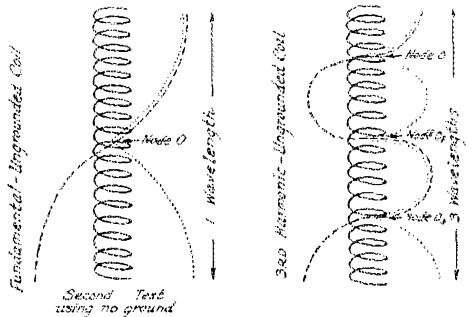


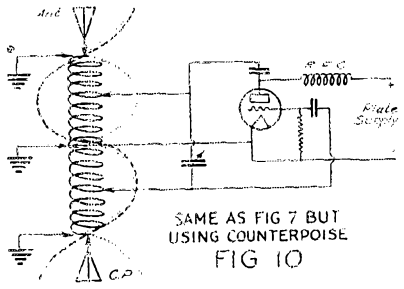
FIG 8 FIG 9

200 meters. This is much the same thing as in Fig. 7.

Series Condensers

In order that we may be able to work on any wavelength within the amateur band (and below it if we have an X license), the next step is to insert two series condensers, one in the antenna lead, and another in the counterpoise lead. We will

take off the condenser that is connected across the center part of the helix and also remove the two ground connections that we put at the ends of the helix. This leaves exactly the circuit of Fig. 11, which is the one used at 1XAM and other stations for transatlantic work on short wavelengths. (This circuit was described

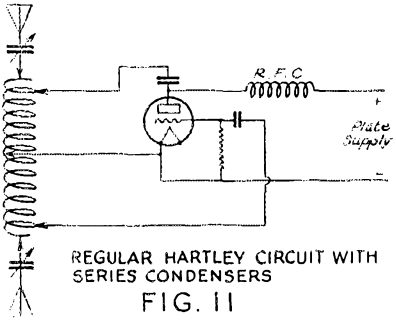


SAME AS FIG 7 BUT USING COUNTERPOISE
FIG 10

in detail on page 26 of our January number.—Tech. Ed.)

What happens in *this* sort of a circuit? Where are the voltages now? This too can be shown by the Tesla Coil. Supposing that we take the secondary used in the original experiment and remove two bands of the winding as shown in Fig. 12a. We now have a three-part winding. The short central part represents the helix, the air gaps represent the series condensers, and the end sections of the winding represent the antenna and the counterpoise.

Now if this coil is set into the primary just as before we will find that there is a brand new voltage curve. At first we will try to find out what this curve looks like by using the vacuum tube just as before. This will give us the curve shown in Fig. 12b. The curve here goes *straight* across the airgaps and pretends that the voltage is the same on both sides. *This is not correct.* To find this out make a test as shown in Fig. 13, using an inch of wire at the end of a glass or wooden rod. A nice little arc will take place, showing



REGULAR HARTLEY CIRCUIT WITH SERIES CONDENSERS
FIG. 11

that the voltage is *not* the same on both sides of the gap and that curve 12b is *not* correct.

Very well then, what *is* the curve like, what really *is* going on? The fact is

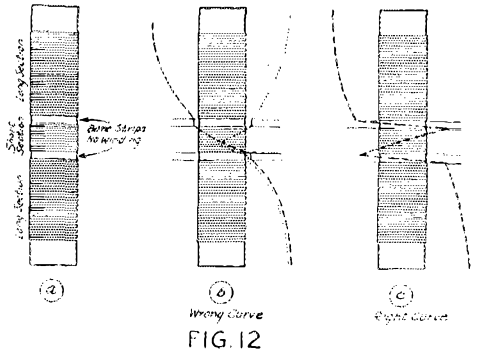


FIG. 12

that the voltage is about the same on both sides of this airgap but is reversed—or opposite in sign, a positive voltage at one side and a negative one on the other side. The real curve is the one shown in Fig. 12c.

The Onward March of Transocean Communication

JANUARY saw a great increase in the amount of two-way amateur trans-atlatic communication, many new stations on both sides of the ocean "getting over." In fact it has become such a commonplace now that it's going to take something a little unusual in the way of international communication to make us give up much space to it in *QST*. All in all, at least 13 Europeans have worked to America and we have record of as many as 17 Americans, several of them Canadians, tying up with Europe.

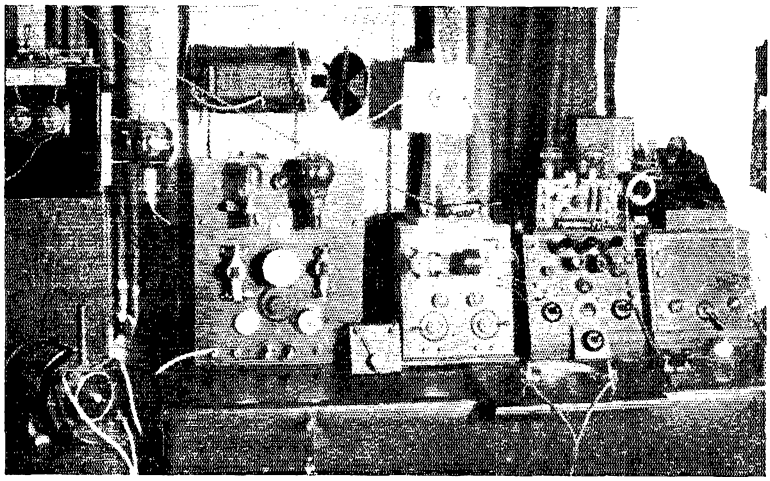
A point worthy of much speculation is that, as far as we know, all of this work has been done on waves below 150 meters, and most of it around 110 to 115 meters. As far as we have any record, no amateur

station on either side has yet succeeded in working over on 250 meters or thereabouts. This is indeed food for thought.

The big incident of the month was the arrival on the air of Italy. iACD, Mr. A. C. Ducati, of Bologna, exchanged calls and Q-signals on the morning of Jan. 25th with 1XW and 2AGB, and the following night with 1XAQ. His wave was 114 meters. He is in nice communication with England, and of course with France. Mr. Guilio Salom, i1MT of Venice, is now trying to reach this country on 200 meters, using 42-cycle A.C.C.W., 500 watts. He has worked g2HF in North Birmingham nicely. We expect to hear much more of these two men.

The Dutchmen have been very active, too, about a half dozen of their stations getting over in the Tests. PA9 is the N.V.V.R. station at the Technical High School at Delft, Holland, has worked easily to u1XW, sending us greetings from our Dutch contemporary, *Radio Nieuws*, and we believe he has worked 8AVL and 2AGB too. PCII, which we gather is a "moonshine" call, is operated by Messrs. Jesse and Tappenback in Lieden, and has one of the best European signals. 2AGB, 1XW and 1KC report working him. The Dutch have unusual calls. PA9 is the only regularly-licensed one, we understand. Most of the others "roll their own" calls by using the numeral 0. An odd one well heard during the Tests was NAB2, the QRA of which is Dr. M. Nellingman, Reeweg O. 110, at Dordrecht.

No new Frenchmen have been reported worked, altho Deloy keeps up his good work with f8AB. The British hams, however, have been hard at it and have done beautiful short-wave work. g2SZ tears in on the east coast and has worked u1XW and c1BQ. g2OD, in addition to working 2AGB with 30 watts input, increased power and has worked 9AZX in Marion, Ind., 8ZAE in Pittsburgh, 2BSC, 2AWS, and 1CMP. He is the first Englishman to work a "9" and gave 8ZAE the chance to be the first "8" to work any European country. Burne of g2KW finally tied up one night with u1KC, g2NM speared u2BSC and c1BQ, g2KF added u3XAO to his string; and g5NN, the Burndept test station, is working u1BDI in Orono, Me., regularly, on 150 meters, we believe.



ONE OF THE MOST EFFECTIVE OF THE BRITISH STATIONS—g2OD, operated by E. J. Simmonds, Meadowlea, Queensway, Gerrards Cross, Bucks. With 1 ampere in a 6-wire cage aerial 42 ft. high and an input of 35 milliamperes at 900 volts in a single small tube, this station worked u2AGB and was reported QSA! With increased power, 75 m.a. at 1200 volts from a 50-cycle synchronous rectifier into a 250-watter, he has worked two-way with u3AZX, u8ZAE, c1BQ, u2AWS, u2BSC, and u1CMP. The receiver is a superheterodyne. F.B.

We are sorry to have to "bust" the report of f8AB at u7WT, which appeared in our last issue. It wasn't 7WT's fault. On the first night of the T/A Tests he reported a low-note modulated C.W. signal sending "PIX". It happened that f8AB's code group for that date was "PIXAK" and the time was at least close. It looked great. Then several logs drifted in reporting u9AUW, Rocky Ford, Colnal sending "PIX". It happened that same time and inquiring what it was all about. 9AUW verifies his transmission at

the time reported; we didn't ask him what it meant. Sorry, 7WT.

Australian Activity

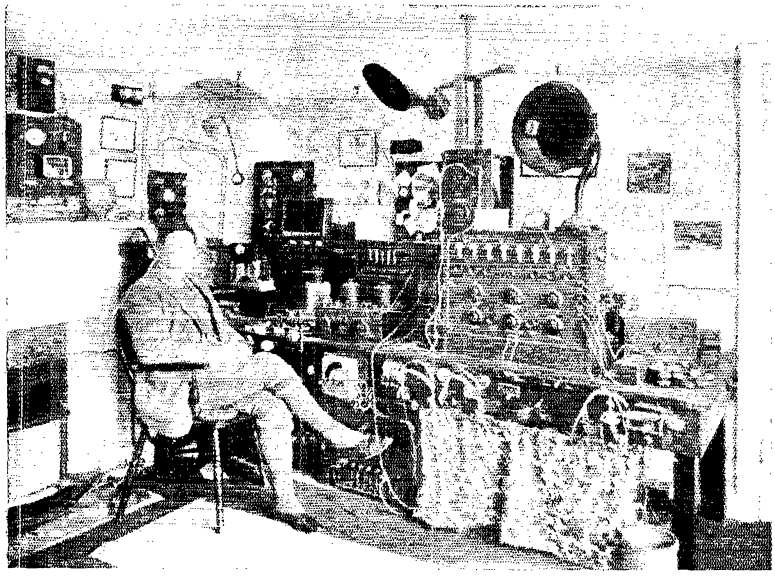
Vague rumors continue to float around that an Australian or two have been heard in America, but we can't find a thing definite about it. Can anyone give us any light?

Did you read "Australian Amateur Radio Puts to Sea," in February *QST*? Mr. C. D. Maclurcan, a2CM, Strathfield, Sydney, sails with Master Jack Davis on the S. S. "Tahiti" for San Francisco in early March with an amateur station on board having the call 2CDM, to conduct low-power experiments en route. Here is a good chance to listen for an Australian signal: a2CM will be calling a2CDM nightly from 8 to 9 P.M. Sydney time from March 11th to April 8th, wave 210 meters, 5½ amperes in the aerial, sending an unknown 3-letter code with the calls continuously. The wave of a2CDM is expected to be 220 meters.

Reports

A.R.R.L. members are asked to drop us a line on international amateur news coming to their attention, foreign stations worked or heard, etc., so that we may keep everybody posted by publishing the information.

What about working transatlantic on 200 meters? 7HG did it across the Pacific! —*K.B.W.*



WHAT IT MEANS TO BE AN EXPERIMENTER INSTEAD OF A RELAYER—Mr. Gerald Marcuse at his station g2NM at Caterham, Surrey, which has been heard in America on 200 meters and which has worked u2BSC and c1BQ on 115 meters. In the photograph, the 200m. transmitter is at the left and uses a 250-watt Mullard in a Meissner circuit, D.C. supply. In the center is a Marconi type 55D 7-valve r.f. amplifier for long waves. On the right is a home-made 8-tube superheterodyne on which any wave length may be received. The 115m. transmitter is in a separate house directly under the aerial.

Antenna Series Condensers---Good and Bad

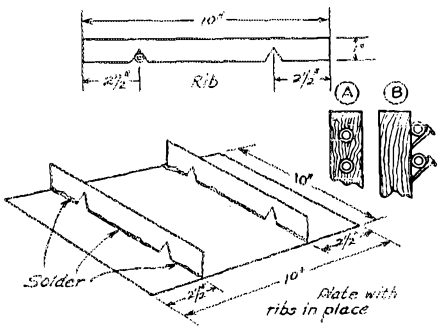
By S. Kruse, Technical Editor

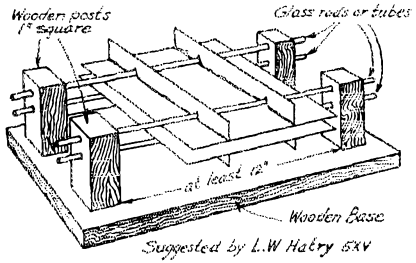
THE amateur sending station today is headed toward the universal use of antenna series condensers. Now there are good series condensers, and there are very bad ones; it is worth while to know the difference.

There are several good reasons for using series condensers in the antenna system but the best one is that one can use a large antenna and still work at waves between 150 and 200 meters. Many stations that are today operating at 200 meters could improve their output by using a series condenser and more antenna turns in the helix.

What Is a Good Condenser?

A good condenser must be used. If the condenser has high resistance the antenna efficiency will be lower and the tuning will not be sharp. The best condenser of all would be a thing insulated with air entirely, but how would one hold the plates in place? Any one can see that some solid material must be used. Now solid material always causes some losses; therefore we must build the condenser in such a fashion as to *keep the solid material out of the space between the plates, and to make all leakage paths as long and narrow as possible.*





AN EXCELLENT $1.98 LOW-LOSS FIXED CONDENSER

FIG 1

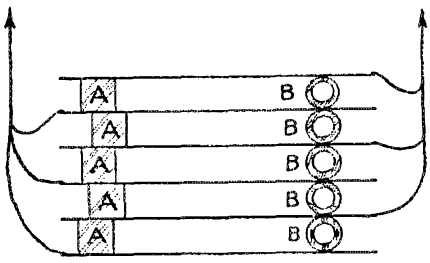
There is not space to go into detailed descriptions on this point, it will become clearer on looking at the descriptions of the following condensers.

Factory-Built Condensers

We have just said that an air condenser will give the lowest losses. That does not mean that all condensers with solid dielectrics are bad. They may be quite good if the best mica or quartz or pyrex glass sheets are used. For small sets mica series condensers with taps at .0002, .0003 and .0005 microfarads are made by the Dubilier Condenser Co. and also by the Radio Corporation of America. These condensers are quite satisfactory at antenna currents below 2 amperes; above that they heat rather badly. Good glass condensers are made, in the form of copper-plated leyden jars, by the Stahl Rectifier Co. These jars were described briefly on page 65 of the November issue; their capacity is .00019 microfarads. These jars are low priced and extremely hard to puncture—the antenna current probably will never harm them.

When it comes to variable series condensers the proper one to choose depends on the antenna current. Sets using two or three "5-watt" tubes will usually operate perfectly with a *good* .0005 microfarad variable receiving condenser. The best condensers for this work are those with a fair amount of spacing and with rubber or thin *molded* bakelite ends. Condensers insulated with "moulded mud" are not good, neither are those with most of the sheet insulating-materials, especially fibre. Generally condensers with insulation in the form of a bushing around the shaft (or around the bolts) will not work well in the antenna.

For larger powers there is only one condenser on the market, as far as I know: the Allen D. Cardwell type 147B. This condenser stands up well with powers as high as four 50-watt tubes or a single UV-204. Keying surges jump across at times but the antenna current does not, and no harm at all is done.



A-A-A Narrowest possible strips of glass as spacers

Glass Tubing may be used as at B-B-B.

CHEAP METAL AND GLASS FIXED CONDENSER *Suggested by Brown, Darne & Basimof 3BWT.*

FIG. 2

Home-Made Condensers

In Fig. 1 is shown a condenser suggested by L. W. Hatry of 5XV. As there are only two plates they must be large to get the required capacity; in fact the design calls for plates 10 inches square. These should be cut from a good heavy sheet of tin on the square shears, *not* by hand, as it is necessary to have the plates flat. It is not possible to cut them with a pair of tinsnips without bending them more or less.

To the back of each plate is soldered a pair of stiffening ribs as shown. These ribs are cut from the same heavy tin and must be absolutely straight to keep the main sheets flat. Lay one of the 10" x 10" sheets on a perfectly flat table or board (be very sure that it is flat), and make two lines on the back of the sheet, using a sharp scratch-awl or needle and marking lightly so as not to bend the sheet. Now set one of the ribs in place and solder it carefully. Do not put the solder on in spots but run it evenly along the entire strip, using a good clean copper and an acid flux, or Nokorode. If you cannot do a good job of this, let the tinner do it.

When both plates have been fitted with ribs they are assembled in a wooden frame as shown in Fig. 1, using glass rods or tubes to hold them in place. The insulation is excellent as the leakage paths are very long and very slim. The exact size of the glass does not matter; it may be anything from ¼" to ½". Suitable tubing generally can be bought from a drug store or from the chemical laboratory of a school or college. The finished condenser may be mounted flat as shown or it may be tilted forward, so that the plates run up and down.

If the rods are long enough the condenser capacity may be varied by sliding one of the plates along the rods. In that case the glass rods had better be at least ⅜ inch outside diameter.

See Table B for capacities of such condensers.

A Hurry-up Condenser

When a condenser must be built in a hurry the variety shown in Figure 2 is often useful. The losses are not as low as those in the 5XV condenser, but the main objection to this sort of condenser is that it is more likely to spark over because of the pieces of glass between the plates.

One advantage is that more than two plates can be used and almost any capacity gotten. Using plates 7 inches square and spacing them with pieces of ¼ inch glass tubing the capacity will be as shown in Table A. This condenser will flash over at about 8,000 volts.

Capacity of Air Condenser shown in Fig. 2.

Plates 7" x 7", spaced ¼" apart.

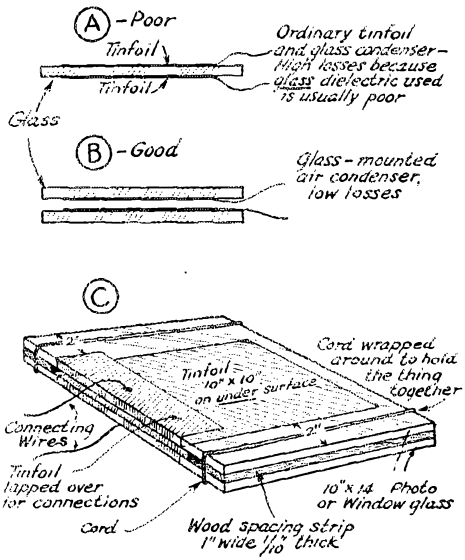
Number of plates	Capacity in microfarads. (Approximate only)
2	.000045
3	.00009
4	.000135
5	.00018
6	.000225
7	.00027
8	.00032
9	.00036
10	.000405
11	.00045

Table A

Glass-Mounted Condensers

The ordinary glass-plate condenser is pretty poor for the antenna circuit, especially when home-made. It would not be quite so bad if Pyrex or some similar glass were used but that is not generally handy. A glass-mounted condenser with the glass *in back* of the metal sheets is perfectly good, however. The difference is shown in Figs. 3a and 3b.

A good fixed condenser for use in the antenna can be built as shown in Figure 3c, using a pair of 10" x 14" photo plates or sheets of window glass. *Don't* try to carry the idea beyond three plates; you will then have glass where it does not belong and the losses will go up. In a three-plate condenser of this sort the center plate must have tinfoil on both sides.



A CHEAP LOW-LOSS FIXED CONDENSER
Suggested by H. F. Hastings, 5ALN

FIG. 3

Capacity of Glass-Mounted Air Condensers.

Glass plates 10" x 14", tinfoil 10" x 10".

Spacing between plates	Capacity in microfarads for two-plate condenser (This also fits the Hatry Condenser)	Capacity in microfarads for three plate condenser (Does not fit Hatry Condenser)
1/4"	.00009	.00018
1/8"	.00018	.00036
1/10"	.00022	.00044
1/16"	.00036	.00072

Table B

Home-Made Variable Condensers

A variable condenser that costs just-about-nothing and still gives good efficiency was suggested by F. C. Beekley of 1WC-1AEL. It is shown in Fig. 4 and needs

no explanation. If the rig is tilted slightly there is no need for the rubber and the condenser action will be smoother.

The capacity obtained may be found from the second column of the table above, the capacity going *down* as the movable plate is slanted further away from the fixed plate.

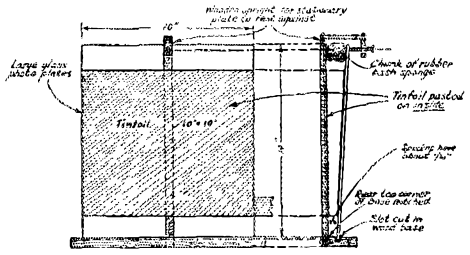
Another Home-Made Variable Condenser

When two plates do not give enough capacity the idea of Fig. 4 can not be used. For such occasions the three-plate condenser of Fig. 5 will do excellent work, even if it is a blood-brother to the old "come-and-go" condensers that used to have tin plates and wooden insulation! If the same size of plate is used the capacity of such a condenser may be found from the last column of Table B just given above. Here the capacity is cut down by sliding the central plate out.

Some General Rules

All of the home-made condensers are rather "big for their size." To keep down bad capacities leave 6" between the condensers and *any* other part of the set. To prevent heavy induction losses keep the condensers *at least a foot* from the helix.

In making any of the glass-plate condensers be sure to stick to the number of plates given. More than that will put glass into the field and the losses will go up very fast. Stick the tinfoil on with *beeswax or paraffin*, not with glue or shellac or anything that contains water, alcohol,



VARIABLE CONDENSER *Suggested by F. C. Beckley / A.E.L.*
FIG. 4

ether, turpentine or the like. Wide margins have been shown on all of the glass plates. Do not cut down these margins; in moist weather there will be leakage, even if you do not see anything happening.

If you can get hold of it use thin copper foil or aluminum foil instead of tinfoil; these materials do not tear so easily. No matter what you use it is possible to solder light flexible leads to the sheet after it is on the glass if care is taken to drip the solder on when it is just hot enough to "take". Everything must be perfectly clean first, tho, and a bit of Nokorode will help: wash it off afterward with gasoline or alcohol.

Current-Rating of Condensers

If the wavelength is known it is possible to give a current-rating for fixed condensers. This current rating is good for that particular wavelength only. For a variable condenser one cannot give a current rating unless the wavelength and the setting of the condenser is known.

Current ratings do not mean much in the case of air condensers: the only important thing is the *voltage rating;* that is, the

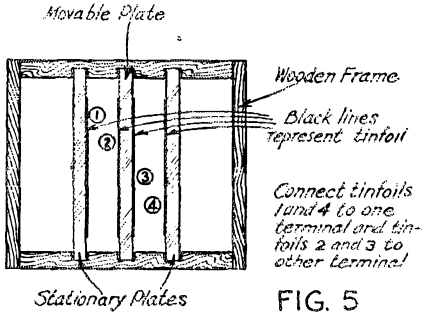


FIG. 5
FIXED OR VARIABLE CONDENSER GIVING HIGHER CAPACITY

voltage needed to spark thru the air space. This can be calculated as follows:

$$\text{Peak Voltage} = \frac{\text{Current in Amperes} \times 1.41}{2\pi \times \text{Frequency} \times \text{Capacity in Farads}}$$

Other formulas that amount to the same thing are

$$\text{Peak Voltage} = \frac{\text{Amperes} \times \text{Wavelength}}{1340 \times \text{Capacity Microfarads}} \quad \text{or}$$

$$\frac{.00075 \times \text{Amperes} \times \text{Wavelength}}{\text{Capacity in Microfarads}}$$

Spacing of Air Condensers

With most amateur sending sets the flashovers that take place in the antenna condensers are not caused by the antenna current at all, but by the keying surges—the things your neighbor hears on 400 meters (or anywhere else). Cut these out and there will be little trouble along this line.

It is hard to say just what will be the flashover voltage with a certain spacing, because it depends on the sharpness of the edges of the plates, also the moisture of the air. The following are safe values.

Flashover Voltages for Air Condensers.

Conservative Values from Practice

Spacing of Plates inches	Voltage (peak)	Current that produces this (peak) voltage at .0002 mfds. and 200 meters	Current that produces this (peak) voltage at .00005 mfds. and 100 meters
1/4	15,000	21.	10.5
1/8	8,000	10.7	5.35
1/10	7,000	9.4	4.70
1/16	5,000	6.7	3.35

Table C

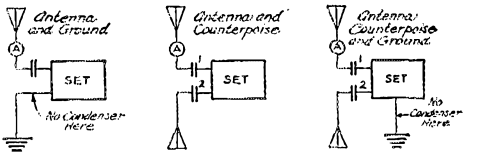
The table is made for *C.W.* To allow for A.C. plate supply divide the voltages and currents by two—another reason for D.C. To allow for a set that lets keying thumps get into the antenna—throw the table away and try it; anything can happen.

Correct Capacities for Various Jobs

When antenna and ground are used it is convenient to have a single fixed condenser of .0002 microfarads in the *antenna* (not ground) lead when working between 150 and 200 meters. A variable condenser of slightly larger capacity is a bit handier.

When using a counterpoise two series condensers are needed. As they are in series their capacity had better be a little larger and something near .00035 or .0004 microfarads is convenient.

For working on the "X" waves below 150 meters smaller condensers are needed. The variable condensers are handiest here



WHERE TO PLACE ANTENNA-SERIES CONDENSERS

FIG. 6

and values as low as .00005 microfarads are commonly used.

For such work the Hatry condenser will give the lowest losses of those shown.

WWV At Home

By M. Adaire Garmhausen, 3BCK

The Third Radio District is inclined to get "uppity" about its performance in cornering the *supply of femine brass-pounders in the* A.R.R.L. *We can't blame the gang, especially right after* we have gotten a new story from Miss Garmhausen or have heard her giving lessons to some ambitious young cuss who thot he could copy fast sending. If this doesn't sound reasonable, just call 3BCK some evening.

PLUNK, plunk, plunk, plunk—that's us, trudging up the boardwalk on our way to the Bureau of Standards Radio Laboratory. We felt a thrill of pride because we had found the place all by ourselves—barring the assistance of four traffic cops, two conductors, and an occasional pedestrian—and our heart was light as we plunked up the walk, admiring the rough-and-tumble woodland which surrounds the Bureau. At the gate-house our thots were brought to an abrupt halt. Damon and Pythias, the twin St. Peters who guard the gates, were coming out to inquire our business, but we only said "How do you do?", after the manner of old acquaintances, and marched boldly past, leaving the somewhat mystified guardians gazing after us, trying hard to establish our identity.

There are several buildings, of assorted shapes and sizes, in the enclosure, but the tall aerial masts gave us an immediate clue to the one we sought, and following the path, we came, in time, to the Radio Laboratory itself, tucked neatly away over the hill, and overhung with an intricate network of wires and knobs and like paraphernalia peculiar to aerial systems. It is a long flat building of remarkably clean red brick and white stone, one story high above ground, and a railing around the top suggesting a roof garden. There are three aerials—a peachy flat-top for long waves, a peachier cage for short waves, and we think the single wire must be for receiving. These—and a counterpoise to bring tears of joy to the eyes of the city cliff-dweller. The presiding genii, having realized that the visiting ham approaches with eyes aloft, have arranged the curb so that the unwary cannot miss falling over it. This we did with the finesse of a master, and glancing up at the darkened windows, we could imagine those within rocking with silent laughter. We entered the building in a bad humor.

Inside dim, shiny, silence. An atmosphere fairly reeking with cerebration. We stood still in something like awe. The lobby's two walls are lined with glass cases, one containing reference books and pamphlets; the other, the Museum—pieces of extinct or unusual apparatus. Before us is the stairway, leading upward to the roof, and downward to the basement, where the Navy and the Signal Corps conduct a radio laboratory in brotherly harmony. To each side is a long narrow hall. A neat colored stenographer directed us down one of these halls, and there we found our guide.

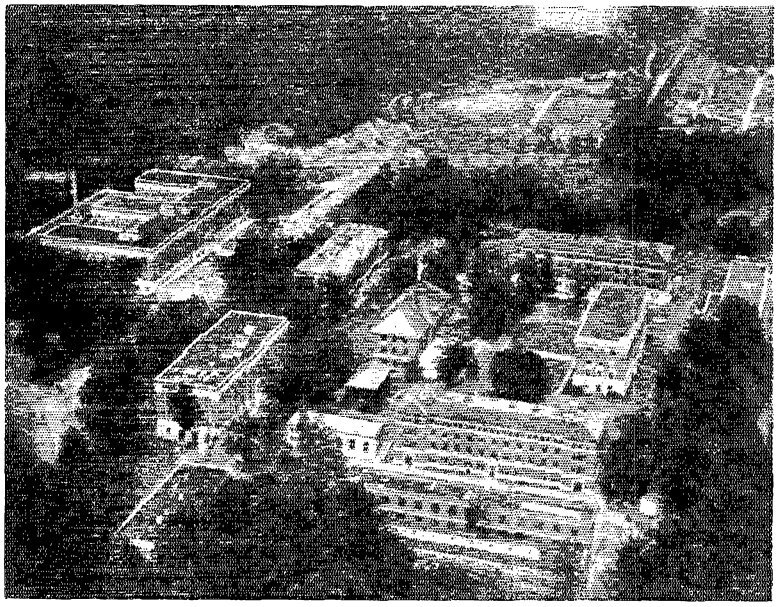
Directly across was the room which contains the big transmitter. A good looking young man with curly hair was winding a coil, or maybe he was shining a shoe, we don't know. The young man smiled. He had nice white teeth. We took a sudden frenzied interest in WWV.

This, then, was the big noise that calibrates our receivers. It is mounted in a rack at least eight feet high by about three feet wide, containing four shelves. On the

top one is the speech amplifier with its associates. Next come three 250-watters, reputed to be doing the work of four, and a few other mysterious but necessary parts. The third shelf contains several immense antenna inductances, and the bottom shelf holds two mammoth condensers and a row of B batteries, with more on the floor beneath. The walls of the rack are covered with meters and switches. On a table nearby stands a formidable looking receiver, while the rest of the room is littered with receivers and wavemeters, tubes and condensers, apparently ad infinitum. Everytime the young man smiled we felt our interest in WWV mount, whereas our curiosity regarding the rest of the Laboratory dwindled to nothing. We must have asked the same questions a number of times, lacking new ones. It may have been mere chance, of course, or perhaps our guide had ulterior motives, but we were unceremoniously bundled out of the room after only the fourth explanation of the transmitter, and were forced to inspect the other rooms. They all looked pretty much alike to us—all strewn with radio apparatus of every description, and apparently all in use for one test or another. One room contains dozens and dozens of tubes of every kind. They let you look at them from behind a railing.

In the lobby is a model of the dashing waves breaking high on a stern and rock-bound coast which is guarded by two cun- far away as possible from the racket, and ning little lighthouses, equipped with aerials after the fashion of BCK's first one. The idea seems to be to make the tubes in one lighthouse squeal intermittently, then the other takes up the wail, and a ship operator, approaching, tries to get as so steers clear of the treacherous rocks. We can't blame him. It seems like a pretty good idea. Our guide all this time was Miss Elizabeth M. Zandonini, "OW of DC". How that girl manages to keep all that information in one head is a mystery to us. We'd have to carry a few spares, with a little card index showing which facts were filed in which head.

Coming out from that atmosphere, heavy with profundities, into the bright sunshine, brought back our buoyant spirits with a rush. We leaped lightly onto a little hillock by the road, preparatory to racing down the path, but it turned out to be a cinder pile, and we sank in up to our knees, getting our shoes full of cinders and our head full of blasphemies, and blessed if we'd swap BCK for the whole Bureau.



Airplane View of the Bustands.
The Radio Lab. is located at the extreme right center.

Concerning the 1BGF Tuner

We don't know how it happened but the number of secondary turns was omitted from the description of the tuner on page 9 of the February issue. The correct values are 24 turns for amateur work and 40 for broadcasts. The excitement displayed about that omission certainly indicates a tremendous interest in low-loss tuners.

MacMillan Expedition Nears Arctic Daybreak

IT was rather a hard job to keep the MacMillan Arctic Expedition schooner "Bowdoin," WNP, in communication with the U.S.A. during January. In spite of the fact that this month is accounted one of the best radio periods of the year, WNP's signals have been very faint and fading violently; so that, altho more reports have been received than usual, actual communication has been carried on with difficulty. It is quite perplexing to us why this should be so. Nor, indeed, have we any idea why it should be that, ever since c9BP and u7DC first broke thru the barrier and linked their

The 88-ft. schooner "Bowdoin", frozen in the Arctic ice off a barren shore. Is radio a comfort *in such a location? Write your own answer.* (From a photograph made by MacMillan on a previous expedition.)

respective countries with WNP, the northwestern states should hear the "Bowdoin" with more or less regularity while it is seldom that the signals are heard east of the Mississippi. One reason of course is that Operator Mix does most of his work with c9BP at a time favorable to the latter, midnight to 3 A.M. Pacific time, or 3 a.m. to 6 a.m. Eastern time when but few eastern operators are listening, but at that it seems the signals simply are not getting thru to eastern points except on rare occasions.

Again we record c9BP, Prince Rupert, B.C., as the best contact point, working Mix seven reported times in January and handling almost a hundred messages. Again u9DKB, Minot, N. D., has been second only to c9BP, working WNP four times and handling about 25 messages. u7CO and u6XAD worked him twice each, 7CO handling 3 messages; and u7OM and c4HH once each, the latter handling a dozen messages.

WNP was heard by W. L. Shiel at Dunedin, New Zealand, while working u9ZT on the night of Nov. 25th, N.Z. time. That is splendid DX. Mix also has succeeded in copying numerous European amateurs during the Transatlantic Tests, reporting the following: French 8BM, 8ARA, 8BF, 8AZ; Dutch PCII, NAB2, PA9; British 5AT, 2ON, 6XX, 2OD, 2NO, 5KO, 6NI, 6YA, 2NM, 2KW, 2NI, 2IN, 2SZ, 2ZU. As far as we know he doesn't know anything yet about the new short-wave work, as his tuner only goes down to about 145 meters.

That Coolidge Message

As we described in our last issue, the A.R.R.L. handled President Coolidge's message of holiday greetings to the Expedition. The unknown "5" station which participated turns out to be c5GO in Vancouver, B.C., so the routing of the message was u1HX-u8ZZ-c5GO-c9BP-WNP. Barnsley handled the reply too, but as time was short he wired direct to A.R.R.L. headquarters, where it was turned over to the Radiocorp for delivery to the President, the original message having been filed with the R.C.A. Permission has been received from the White House to publish the text:

MEMBERS OF MACMILLAN EXPEDITION IN NORTH GREENLAND DEEPLY APPRECIATIVE OF YOUR HOLIDAY GREETINGS AND WISHES FOR NEW YEAR ALL'S WELL ON THE BOWDOIN IN THE MIDDLE OF LONG ARTIC NIGHT.
MACMILLAN

Some Pretty Relaying

Station WOAW, operated in Omaha by the Woodmen of the World in co-operation with the Omaha "World-Herald" has been one of the best-heard broadcasting stations at WNP. It occured to the station management to put on a special Christmas program for MacMillan and his men, and so the "World-Herald" asked 9DXY, Quinby, Omaha City Manager to forward a message to WNP asking for their selections. Then enused a pretty bit of relaying. Unable to raise a 7 on the night in question, 9DXY gave the message to 9BOF in Salem, S.D., who forwarded it to 9CAA in Denver. Thence it went to 7ZU in Polytechnic, Mont., to 7ABB in Everett, Wash. 7ABB was unable to hear WNP during this particular week, so broadcast the message under a QST. It was received OK by WNP and a program immediately selected by the members of the crew and transmitted by WNP as a message to 9DKB, Minot. As 9DKB has difficulty in working into Omaha, he mailed the message to the "World-Herald." And thus a special Christmas program of their own selection was broadcast to the MacMillan party by WOAW.

The "Bowdoin" is now approaching the end of the long Arctic night. Already

they have a little daylight every noon. Soon their days will be as long as their nights, and in a few months more they will be having almost all daylight and the chief difficulty will be to get the traffic off during darkness. Then when the ice breaks up in midsummer the little "Bowdoin" will turn her nose towards home, expecting to return to Main in September. That means that you fellows who want the fun of working WNP had better try hard right now.

January reports on WNP follow; unless otherwise shown, calls listed report hearing WNP.

Jan. 1, 9CDO-6BUH; Jan. 2, 1ER, c9BP sent 18 msgs., 9ASC, 9AFM; Jan. 4, c9BP sent 11 msgs., 6ALO, 9DKB; Jan. 6, c9BP sent 7 and recd. 6 msgs., 9DKB; Jan. 7, c9BP sent 13 msgs., 7MN; Jan. 8, c9BP sent 4 and recd. 14 msgs., 6CBL, 6XAD and 9DKB both worked WNP and sent press and one message; Jan. 9, c9BP recd. 9 msgs., 7MN, 5ML, 6CBL, 9CNS, 9CCK; Jan. 10, 9EFH, 6CBL, 9DKB; Jan. 11, c9BP sent 8 and recd. 2 msgs., 9DKB sent 3 msgs., 7MN, 9EFH; Jan. 12, 7CO recd. 1 msg., 6CBL, 9DKB, 6XAD sent 300 wds. press; Jan. 13, 6CBL; Jan. 14, c4HH sent 11 and recd. 1 msg., 7OM worked WNP, 9DKB; Jan. 15, 7CO recd. 2 msgs., 1CMP, 9DKB; Jan. 16, c4HH; Jan. 17, 9DKB sent 2 and recd. 11 msgs., 6CBL; Jan. 19, 7RD, c4FV, 9BSM, 9DGC; Jan. 20, 9DKB sent 1 and recd. 4 msgs., 6CDV; Jan. 21, 1AJF, 6CJQ; Jan. 24, 9EFO.

—*K.B.W.*

Some Good Lead-In Insulators

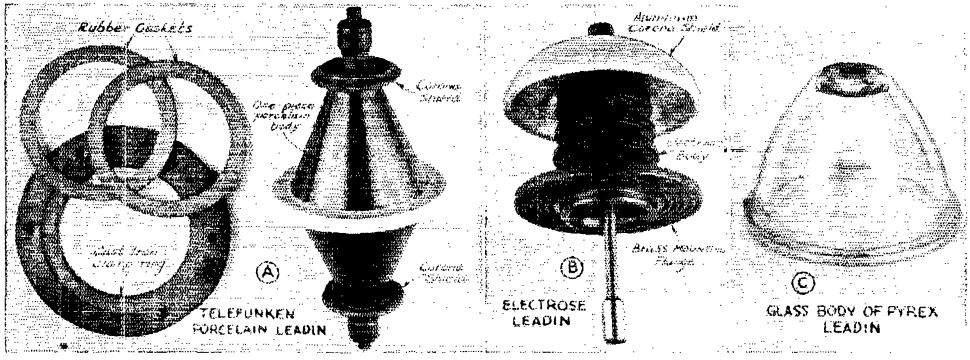
By S. Kruse, Technical Editor

WHEN we used spark sets a lead-in bushing had to be large—if it wasn't the thing would flash over every time the key was touched. When tubes came in, the antenna voltages dropped and everyone seems to have decided that any old lead-in would answer. This is not correct.

What a C.W. Bushing Must Do

In tube work it is perfectly possible for a poor lead-in bushing to decrease the range of a station 25% altho it does not show any sign of sparks or brush discharges. This was not so with the spark and it is interesting to think over the reasons.

With the spark the bushing needed to resist flashover; that was about all. The peak voltages were terrible (often 100,000) but lasted such a short time that they caused no losses to speak of unless actual fireworks took place—and even they were seldom serious. With the tube set the voltages are much less (seldom over 5,000 volts) but they "hang on" as long as the key is down and as a result the losses *inside of the insulator* may run quite high. As a result we must use a bushing of material that acts well at radio frequencies (see the article "Some tests of Amateur Antenna Insulators" on page 24, May *QST**) and also the bushing must be so built that the leakage paths are "long and skinny". Finally it is necessary, for best results, to arrange even these "long and skinny" leakage paths in such a fashion that the tendency is for the electric strains to pass thru air instead.



THREE LEAD-INS SUITABLE FOR AMATEUR USE.
A— Type JD7 Telefunken Lead-In. Cast iron clamping ring and rubber gaskets shown alongside.
B—Electrose Lead-In. Type 8357-B.
C—Pyrex Glass Bowl, to be used in Lead-Ins.

*Can be obtained from the *QST* Circulation Dept. at the regular price.

What Spark and C.W. Bushings Must Do

All lead-ins must be made to suit the fire insurance requirements which require a 5-inch distance between the incoming wire and the nearest point of the house or wall. As we understand this ruling, if a straight tube is used this means that the tube must have a length equal to the thickness of the wall or partition it goes thru *plus* ten inches more. When a disc or bowl bushing is used there would have to be a 5 inch distance along the surface of the disc or bowl to the nearest spot on the clamping ring or cleats.

Some Home Made Lead-Ins

The lead-ins in Figure 1 are both very bad, especially if the wall is of brick or stone. The leakage paths thru the bushing are very short and wide and the capacity to the wall is far too high. *No matter how good the material is* the high capacity makes such a bushing worthless.

The bushing of Fig. 2a has had its capacity much reduced by moving it from the wall to a thin board set in the window. This board should be waterproofed and a glazed tube ought to be used. A considerable further improvement is made in Fig. 2b by using a tube so large that the rod touches at the ends only, leaving an air space around most of its length. The ends are sealed by pouring in melted sulphur. A ring of metal or paper wadding is used at each end to keep the sulphur from running in too far. (P.S. Get the family to go to the movies and wear a gas mask when you are melting the sulphur.) The bushing of Fig. 2c is still better, especially because Pyrex glass is used. See the comments on the Pyrex bushing a bit later.

Manufactured Lead-Ins

The beautifully finished porcelain lead-in of Fig. 3A is made for the Telefunken

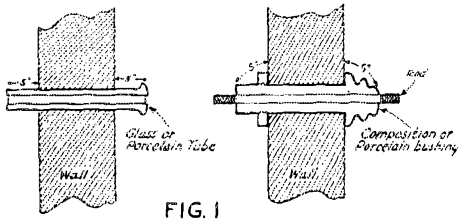


FIG. 1

THE POOREST WAY OF LEADING IN

Note the 5" dimension required by insurance rules

Co. of Germany and must be seen to be appreciated. The metal parts are nicely made and nickled, while the porcelain body is of excellent wet-process stock with a fine gray glaze. The insulator is given a very conservative rating of 39,000 volts flashover; its length is 12 inches. The electrical flux lines mainly travel outside of the insulator between the cast iron clamping ring and the round-edged corona-shield discs at each end. This insulator is known as the "JD7" and may, together with a number of other sizes, be obtained from H.O. Boehme at 241 Lafayette St., New York City.

Fig. 3B shows a singularly well designed insulator made by the well-known Electrose Mfg. Co. of Brooklyn, N. Y. The insulator shown is one of a family that ranges from the No. 8359-A, having a 5,000 volt rating,

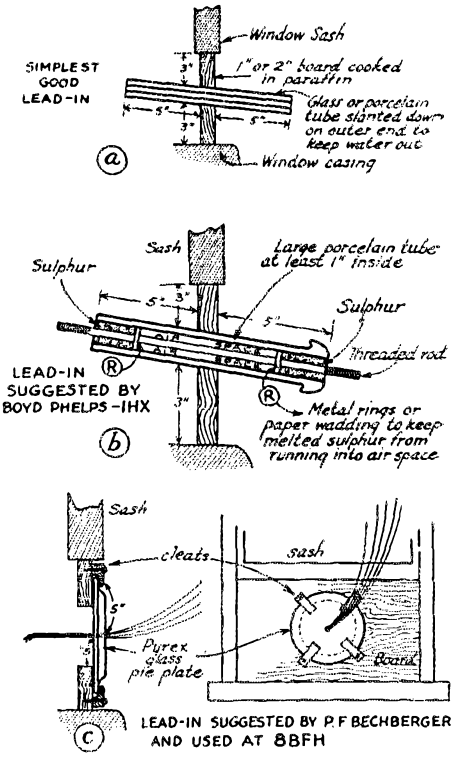


FIG. 2

GOOD HOME-MADE LEAD-INS

Notice the 5" dimensions to comply with insurance rules

to the No. 8350-A which has a 66,000 volt rating and is designed for 20 k.w. arcs on shipboard. This insulator is intended for use as a roof insulator and the cast aluminum umbrella-shaped corona shield is also a rain-shed, but excellent results will be obtained with the same lead-in in a horizontal position. It is almost impossible to hurt the insulator; it will always let go in the circular airgap at the base before flashover can damage it. No. 8357B, rated at 10,000 volts, will be about right for the average "100-watt" amateur station.

Fig. 3C shows a Pyrex glass bowl which will be used in a lead-in now being de-

veloped by the Corning Glass Co., of Corning, N. Y. Pyrex is a particularly good glass for such work as water does not gather on it in a continuous film as it does on ordinary glass—the surface is such as to make the water draw apart and form drops.

The Second Saskatchewan Convention

Reported by c4AL

This report of the Second Saskatchewan Convention reached us just too late to make our January issue and was inadvertently omitted from our February number. It is so splendid and inspiring a report, that we are sure it is much better late than never; we are only sorry that it is late.—Editor.

THE morning of November 12th saw Regina hams meeting trains and receiving amateurs from all parts of the province. The incoming amateurs were also greeted by pouring rain which rather knocked the visiting hams with autos on the head. The morning session of the convention was spent in visiting amateur sets in the city and general discussions. Towards noon many amateurs arrived from other outlying points in spite of the bad weather. The real ham spirit could not be downed; some came as far as they could by car and finished their journey by train.

The afternoon session was attended by about forty amateurs, including one Y.L. in the person of Miss Bowen-Smith of 4AJ. The meeting opened with a short speech from G. F. Muirhead, President of the Regina Radio Club, who called on 4HH for a talk. 4HH's first subject was that of the C.R.R.L. He outlined to us the plan of the A.R.R.L. for Canadian publicity and explained that they had offered us a substantial section in *QST* solely for Canadian affairs. This would be ample for our work. The organ for the C.R.R.L. is "The Radio Bug." Mr. Brickett explained that with the amateurs of Canada in their present financial condition, it would be utterly impossible to finance an organ of their own.

"The A.R.R.L. educated us into relay work and we cannot and will not leave them. The C.R.R.L. has not asked to affiliate with them. The so-called C.R.R.L. has no policies, no constitution, and we do not know what they are or what they are doing. The amateur has nearly always started any radio magazine that has been published but after the publishers have made as much as they desire out of them the amateur has generally been left in the lurch."

The next speaker was Mr. Maynard, who spoke very highly of Mr. A. H. K. Russell, our A.R.R.L. Canadian General Manager, with whom he has had a great deal of correspondence He says Mr. Russell is a lawyer, an ex-service man, and carries a good deal of weight in Canadian matters, and we can rest assured that the Canadian amateur will get a square deal.

In regard to the forming of a C.R.R.L. Mr. Maynard thinks that the Winnipeg hams are sincere in regard to such a thing. But at the same time he is of the opinion that the originators started the thing with the idea of making money. He is very much in favor of sticking with the A.R.R.L. who are always willing and ready to help. In his remarks he stated that he had never in all his

life met in Canada or U.S.A. a better bunch of chaps than the members of the A.R.R.L., who were always willing to help and a real pleasure to meet. At this time Mr. Maynard gave an invitation to every B.C.L. present to come and join us. In respect to transmitting out of hours, etc., Mr. Maynard stated that for months he had listened in and had not heard any amateur in Canada or elsewhere transmitting on an illegal wave or interfering with broadcast concerts. He also expressed the willingness of all hams present to help Listener's-In in any way they could or to clear up any misunderstandings that may arise.

The next speaker was Mr. G. Muirhead who advised us that he had been

away from Regina several months and was not very well posted on the doings of the so-called "C.R.R.L.", but, as he was a member of the A.R.R.L., he was perfectly satisfied to let matters remain as they are.

When the paper named "The Radio Bug" was first formed Mr. Maxwell financed the thing and Mr. Paterson was the editor of it. However, Mr. Paterson has recently resigned for reasons best known to himself. If we all subscribed to "The Radio Bug" and Mr. Maxwell felt inclined to back out at any time we would have nothing to fall back on. As it is, there is only the good will of Mr. Maxwell. It stands to reason that one man alone cannot finance and operate any kind of a league.

At the conclusion of this a resolution was introduced by J. Brickett, Div. Manager of the A.R.R.L. to the effect that we, The Saskatchewan Division of the A.R.R.L., consider that the time is too young to break away from the A.R.R.L. and to form a C.R.R.L. This resolution was carried by the Convention.

The next item brought up was by 4HH who asked that we make out written report of the size, time of operating and all details of our sets and send it to him so that he could compile a report for *QST* and also get a route for relay work.

It was then moved by Mr. McDougall that the meeting be adjourned for a period of one half hour for a visit to CKCK and our old friend Bert Hooper, which was greatly enjoyed by all. Geo. Shaddick, 4BR, was good enough to explain to us the entire working of CKCK and the circuit used, which was indeed of great interest. After this visit the convention again returned to the Success College where they continued the various discussions.

The first item was in regard to co-operation with the railways. A motion was proposed by Mr. Wilkinson as follows: "That we, the radio amateurs of Saskatchewan, will do all in our power to assist the various telegraph companies in keeping communication open between points when called upon to do so: through accident or weather conditions, but that we will not under any consideration attempt to fill any breach caused by a disagreement between them and their employees except in case of distress." This motion was seconded by Mr. W. Orr and was carried.

Mr. Maynard then suggested that we give the balance of the time before the banquet to the B.C.L.'s so that they could make any remarks or present any discussions before the convention. Mr. Orr, the main spokesman for the B.C.L.'s then took the floor and was heard to remark that after the honest-to-goodness manner in which the amateur went after things and the fair and just dealing they gave the listener-in, they wished no longer to be termed as B.C.L.'s but as amateurs and they too wanted to get transmitters going as soon as they could and get into the real end of the game. (Cries of "hear, hear!")

Radio 4HH then gave a technical discussion on wave traps and this was greatly enjoyed by everyone.

At 6:30 the gang adjourned to the Trading Co. banquet hall where they seated themselves to a large feast. Great credit is due to the Regina gang for the noble way in which the banquet was handled. The appreciation of the boys was shown by the host of empty plates. 4AJ caused a great commotion when he entered disguised as a Y.L. and commenced flirting with Dad Maynard. Professor Nuetrodyne also gave us a very interesting lecture on various radio subjects.

The toasts were as follows: To Radio—proposed by Mr. Wilkinson, replied to by Mr. Geo. Shaddick. Proposed by Mr. Cooper, a toast to International Radio; replied to by Mr. Michealis (English 5MX). It was a great pleasure indeed to have 5MX with us and get an insight on the English methods of transmission and reception. "The A.R.R.L." was proposed by Mr. Frank Meadows, who outlined just what the A.R.R.L. is and does in the Amateur Radio sphere. This was replied to by J. Brickett. Mr. Clarke proposed the Radio Clubs of Sask. which was replied to by Bill Hart, 4DG, who outlined the doings of the Prince Albert Radio Club; Dave Stewart, who told us of the Moosejaw Radio Club, and H. N. Stovin who outlined their plan of creating radio interest in Unity, Sask.; Mr. K. Muirhead also gave us an outline of the Regina Radio Club. A toast to CKCK was fittingly replied to by Mr. Geo. Shaddick who spoke in the absence of Bert Hooper, the operator. To the Y.L.'s—a toast proposed by Mr. Wilkins, was replied to by Miss For A Jay who outlined to us the advantages and disadvantages of having a Y.L. for an assistant op. Most of us had not sufficient experience in that line to make any comment. However, 4AJ claims that a seventeen-turn inductance can be wound in at least one night with the help of a Y.L.

With singing of "The King" the gang retired to the Canada West Electric Co. where they spent the rest of the evening and most of the morning. Before leaving, a hearty vote of thanks was proposed by 4HH to the Regina Radio Club for the magnificent way in which they had conducted the Second Amateur Radio Convention, which was heartily replied to by all, as everyone agreed that it was one of the finest times they had ever had.

Transatlantic Tests Report

THIRTY-SEVEN different European amateur stations were received with codes verified in the Fourth A.R.R.L. Transatlantic Tests of 1923-1924. Five other Europeans, not entered in the tests, were received without codes, making a total of 42. That is excellent, and proof conclusive of the wonderful progress the Europeans have made since the tests a year ago, when but two stations were received with certainty.

An even hundred American amateurs, many of them in Canada, reported European sigs. Many, to our knowledge, did not report; but few of the stations that have *worked* Europe seemed to think it worth while to report the calls heard during the Tests. The total probably would have run two hundred or so.

R. B. Bourne, 1ANA, Chatham, Mass., wins the $1,100 Grebe transmitter offered by Messrs. A. H. Grebe & Co. as a grand prize to the amateur copying the greatest number of station-miles during the entire Tests (stations counted but once per night). He won by a very narrow margin over Sheldon S. Heap, 1BDT, Atlantic, Mass., with 1BCF a hot third.

The Ott Radio Co., Lacrosse, Wisc., kindly donated one of their WC5 short-wave radio-frequency-equipped tuners as a prize, but it was entered "too late to classify" in the list previously published. The judges consequently awarded it to 1BDT as an additional "consolation" prize.

PRIZE WINNERS IN THE TRANSATLANTIC TESTS

Grand Prize: Greatest Total Station Miles—R. B. Bourne, 1ANA, Chatham, Mass.

Group A: Greatest Mileage for Any Single Reception

1st:	Norman S. Hurley, 5AC, Mobile, Alabama	4750 miles
2d:	William Moore, 9DES, Caney, Kansas	4710 miles
3d:	L. W. & T. E. Bryant, 4BL, Lakeland, Florida	4540 miles
4th:	Quentin Swigart, 9COL, Galesburg, Ills	4310 miles
5th:	Fred Marco, 9CD, Chicago	4200 miles

Group B: Greatest French Mileage for Any Single Night

1st:	Sheldon S. Heap, 1BDT, Atlantic, Mass.
2d:	Wm. Coates Borrett, c1DD, Dartmouth, N. S.
3d:	Lafayette College Radio Club, 3YO, Easton, Pa.
4th:	Ed Scattergood, 3II, Cynwyd, Penna.
5th:	M. H. Hammerly, 2BIS, Bronxville, N. Y.

Group C: Greatest British Mileage for Any Single Night

1st:	J. L. Fenderson, c1AF, Jacquet River, N. B., Can.
2d:	Bronx Radio Club, Bronx, N. Y.
3d:	Robt. H. Sproul, 1GG, So. Hamilton, Mass.
4th:	Richard S. Briggs, 1BVL, Dorchester, Mass.
5th:	J. Van Riper, 2AJF, Passaic, N. J.

Group D: Greatest Total French Mileage

1st:	Levi G. Cushing, 1BCF, So. Duxbury, Mass.
2d:	A. W. Greig, c1BQ, Halifax, Nova Scotia.
3d:	R. W. Woodward, Hartford, Conn.
4th:	Bernard J. Kroger, 3APV, Washington, D. C.
5th:	Geo. H. Pinney, 1CKP, So. Manchester, Conn.

Group E: Greatest Total British Mileage

1st:	A. A. Learned, Providence, R. I.
2d:	A. R. Tabbut, Bar Harbor, Maine.
3d:	Boardman H. Chace, 1BDU, Winthrop, Mass.
4th:	Chester W. Sprague, 1AUC, Bar Harbor, Maine.
5th:	Harold G. Riley, 1AUR, Livermore Falls, Maine.

In making the awards of prizes the judges counted only those receptions in which a code word was copied and submitted for verification. This confines the official reception record to the Europeans formally entered in the tests and eliminates the splendid transmission of nPCII, who altho sending a code, was not entered and apparently made up his own code groups, with no way for verification. Another unusual feature was introduced into the judging by the rule that contestants

were eligible to win but one prize. When the winners were first listed with consideration only to their accomplishment and neglecting the one-prize rule, all the places outside of Group A were taken by 1ANA, 1BDT, 1BCF, c1AF, A. A. Learned, and c1DD. Then as the rule was brought into play, contestants were allowed to remain in the highest place for which they qualified but their names were removed from the other places, making it necessary to advance the remaining winners in the group under consideration and bringing in new names for the vacant places. Thus the final list of winners shown in the table with this article has scant resemblance to the way in which the performances originally placed, which was as follows (Group A omitted because it had no names in common with the other groups):

Group B: 1st, 1ANA; 2d, 1BDT; 3d, 1BCF; 4th, c1AF; 5th, A. A. Learned.

Group C: 1st, 1BDT; 2d, c1AF; 3d, A. A. Learned; 4th, 1ANA; 5th, 1BCF.

Group D: 1st, 1ANA; 2d, 1BDT; 3d, 1BCF; 4th, c1AF; 5th, c1DD.

Group E: 1st, 1BDT; 2d, 1ANA; 3d, 1BCF; 4th, A. A. Learned; 5th, c1AF.

The prizes, some 4,000 worth of the best American radio apparatus, were listed in detail in January *QST*, and information on the places in the contest appeared in the December number.

The Stations Heard

The following European stations were received with codies verified.

British: 2FN, 2FQ, 2FU, 2IN, 2KF, 2KW, 2NM, 2OD, 2ON, 2SH, 2SZ, 5AT, 5BV, 5KO, 5LC, 5NN, 5PU, 6NI, 6XX, 6YA; total 20.

French: 8AB, 8AE, 8ARA, 8AZ, 8BE, 8BF, 8BM, 8CD, 8CF, 8CS, 8CT, 8CZ, 8JL, 8LY; total 14.

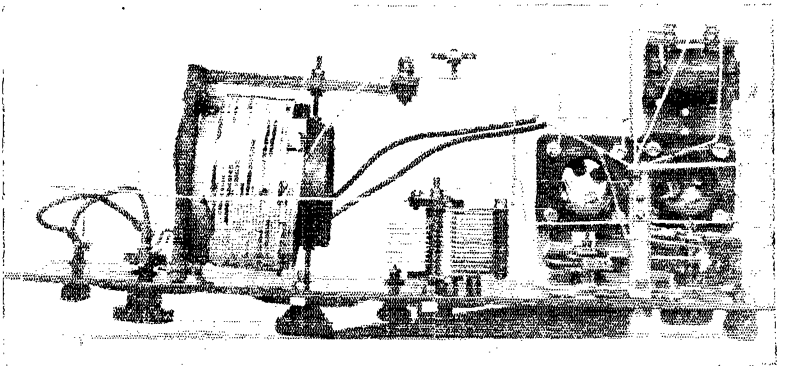
Dutch: PA9, PAODV, PAOUS, (the O is a zero); total 3.

Not entered in tests, and consequently without available verification:

British: 2KL, 2LO; total 2.

Dutch: PCII, PAR14, NAB2; total 3.

The interference from American stations was steady and deadly thruout the tests, over 1200 interfering stations having been logged and reported to the Traffic Manager.



THE SIMPLE SET THAT WON A BIG PRIZE FOR u1BDT, ATLANTIC, MASS.—Built in accordance with the ideas given in December QST in "Short Wave Tuner Design". Rotatable untuned primary of 5 turns No. 14 D.C.C. wire 3" diameter. Secondary 22 turns No. 14 D.C.C. on thin paper tube 4½" diam., tuned by good variable condenser originally of .0005 mfd. but with plates enough removed to tune 90 to 260 meters, plates cut progressively to give good control of low end of scale. Rotatable tickler 12 turns No. 28 D.C.C. on 3" paper tube. Pre-war "Audiotron" detector; one step audio, using high-ratio transformer and UV-201-A tube. This tuner worked on a Beverage wire 650 ft. long pointing northeast over a salt marsh, close to edge of sea. The northeast end was grounded thru a 320-ohm non-inductive resistance to a wire buried in a creek bed. Simple enough, isn't it?

The Star Performers

1ANA logged 12 different British stations during the Tests, 9 French and 1 Dutch. Counting receptions of a given station but once per night, he has to his credit 56 official British receptions, 62 French, and 10 Dutch, with a total "station-mileage" of 390,460. 1BDT logged 15 British, 10 French, and 1 Dutch station; crediting him with 79 British receptions, 40 French, and 11 Dutch, with a total mileage of 388,025. The greatest mileage on British stations for any one night went to 1BDT, who logged 7 different stations with codes on the nights of Jan. 6th and 10th. 1ANA took the single-night honors on the French, logging 7 different Frenchmen on Jan. 1st.

We Win the Clock

Perhaps our readers recall that the Edi-

tor had a bet with Mr. W. W. Burnham that at least twelve Europeans would be heard during the Tests. Mr. Burnham has radioed us via g5NN and u2AGB:

CONGRATULATIONS AM SENDING CLOCK AT ONCE I WANTED THE GREEN SUSPENDERS BADLY BUT BRITISH HAMS HOPE TO GIVE YOUR GANG SOCKS SOON.

Further Reports

The analysis of the Test reports is a formidable job; work is progressing on it but no further details are available at this writing. If any particularly interesting features become evident as the analysis proceeds, further reports will be made in *QST*. —*K.B.W.*

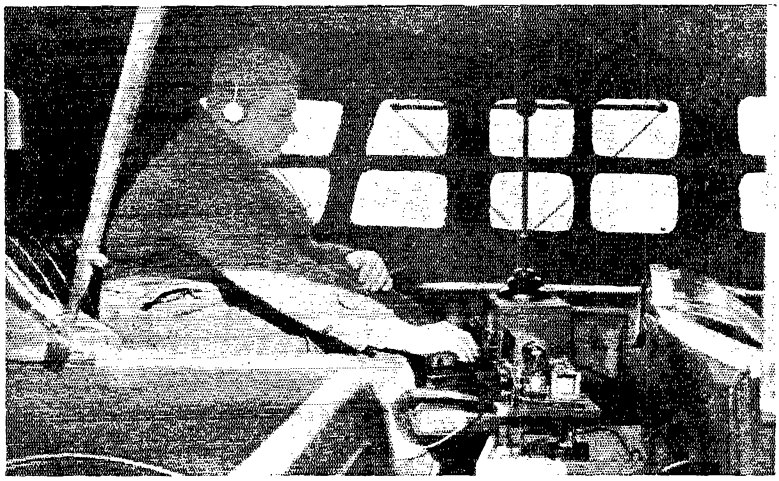
Cornering That Buzzing Interference

By Perry O. Briggs, 1BGF*

Radio amateurs often can be helpful in locating radio interference caused by power lines. This should be done in co-operation with the power company, not only because the work goes faster that way, but also because they will best know how to cure any line troubles that may be found.—Editor.

FELLOW hams. A new chapter in radio reception has been opened: the hunting down and eliminating of interference caused by, or at least blamed on street lighting equipment. The proverbial job of "finding a needle in a haystack" is a cinch compared to tracing and eliminating the microscopic causes of radio frequency oscillations emanating from street-light wiring.

Let me now relate what has happened in Hartford the past few weeks. Since last March the Hartford Electric Light Company and local amateurs owning transmitting sets have been goaded to exasperation by "hot" letters received from broadcast listeners in the southern part of the city giving them the "razz" and blaming them for starting and maintaining a teriffic "buzz" just the minute it became dark and when they wished to receive broadcast programs. In desperation the electric light company appealed to the radio club for assistance. A request for data on this bothersome "buzz" was published in the local papers by Mr. J. F. Furey, now President of the Radio Club of Hartford and Chairman of the Club's Interference Committee. The request was not met with any great enthusiasm; neither amateurs nor others responded at all well. However, several amateurs, especially Messrs. Furey, Schnell and Warner, tried by means of loops and radio frequency amplifiers to get a bearing on the "buzz" demon, but without avail for it was equally loud at all points. The task was abandoned for several days until the writer devised a systematic method of procedure.

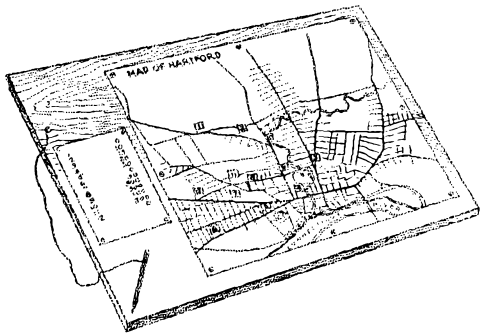


The Set That Did The Work

A map of the city of Hartford was tacked on a board and twenty-five pins with numbered paper flags glued to them were stuck in the map at various points

*Interference Committee, Radio Club of Hartford.

in the southern section of the city. On this board also was tacked a cardboard table listing the flags in numerical order. A receiving set was then installed in the writer's car. The set is as simple as can be imagined, being the famous Hassel tuner (described in December, 1923, *QST*)



with a two-foot loop of eight turns in series with the secondary. Ordinary home-made two-step amplifier amplifies the "buzz." For the detector a UV-201-A is used with excellent results. The set is mounted on rubber sponges to lessen the vibration. While riding along at thirty-five miles an hour the writer has distinctly heard second, third, and eighth district stations.

Coming back to locating the "buzz." Stops were made at the various locations of the map pins and by using an audibility meter the respective audibilities were noted beside the respective numbers on the card board chart. After taking the readings and getting back to more comfortable quarters in the station of 1BGF, a curve was plotted, which was found to have a decided peak in the Washington Street district. At last it seemed that we had a clue. We lost no time in hiking back to Washington St. Running slowly down the street it was noticed that as we came into the electrostatic field of each street light the noise of the "buzz" increased steadily. It reached its peak when we came to the intersection of five streets: Washington, School, New Britain Ave., Webster and Barnard Streets.

Feeling confident that we were close on the track of the "buzz" we hastened to the home of a confirmed broadcast listener, Mr. C. T. Maloney, inviting him to be in at the "killing." With two sets of head-fones we both listened as we drove down Washington Street and both agreed that the "buzz" was at its peak at the intersection of the streets named. By mere accident the driver of the car turned into School Street—WHAM!! the "buzz" increased a hundred-fold, and as we advanced down the street it kept increasing until we reached the second light pole where the noise in the phones was unbearable and at its peak. Being somewhat skeptical that we had located the interference we cruised down the other streets in the vicinity but found that the peak of intensity was in School Street. Mr. Maloney got out of the car and shook the light pole. The "buzz" faltered, stuttered, stopped, then came back with renewed energy. This was indeed interesting since the electric light bulb wiggled quite precariously in its socket and threatened to fall out. Rushing to the nearest telephone pay station, Mr. Maloney got into communication with a friend of his in the employ of the electric light company, who came down immediately to the location of the trouble, and after an investigation enthusiastically agreed with us that we had located the buzz in School Street.

A lineman was called and the offending bulb was plucked from its socket, but the noise continued. We were all dumbfounded but finally thinking that the street lamp bracket might have something to do with the buzz, it was reported for change. The following night we went the rounds again, being joined by several officials of the electric light company, and as before the buzz was still in operation and led us back to School street. There being only three lights on School Street the circuit was bridged by a loop of wire—but still the noise. There was only one thing to do now and it was done—the School street circuit was cut off entirely. *The noise stopped.*

The following day the Hartford Electric Light Company went to the expense and trouble of tearing out the School Street lighting circuit and installed new wire, insulators, goosenecks, and bulbs, and in the evening when the lights were turned on the troublesome "buzz" was missing and has not been heard since. As to its cause we are all in the dark. The apparatus which was removed from School Street has been given a thorough laboratory test by the light company but no cause for the "buzz" was located. Altho it is generally agreed that it was caused by a spark discharge, the point of discharge has not been found.

We are on the track of another disturbance and we hope to locate the cause before calling on the electric light people to go to the expense of tearing down a lot of apparatus when perhaps the trouble is caused by some minor defect which could be readily remedied.

In most cases the electric lighting companies in other cities as well as in Hartford will heartily co-operate with interference locators and gladly eliminate all trouble of this nature brought to their notice.

Important Notice to All Members and Readers

Information Service Suspended During Reorganization

The A.R.R.L. Information Service will be suspended for one month, starting March 5th.

This is being done to allow the organization of the Experimenters' Section to proceed more rapidly.

After April 5th service will be resumed under definite rules which will be announced in the April issue of QST.

Questions mailed between March 5th and April 5th will not be answered.

S. Kruse, Technical Editor, QST
H. F. Mason, Department Editor, QST

Annual New England A.R.R.L. Traffic Convention, Hotel Kimball, Springfield, Mass., March 28-29, 1924

TWO days of real ham fun and fellowship! You can't afford to miss the stunts, entertainment, prize contests, technical and traffic meetings.

There will be Department of Commerce examinations for those who are ready to take out licenses.

There will be an initiation into the famous Royal Order of Wouff-Hong—a chance for all New England hams to get into this wonderful fellowship order.

The "OW" and "YL" are especially invited—special entertainment for them—bring 'em along!

Tickets are $4.50 each and reservation should be made not later than March 23rd. Make reservation with A. S. McLean, 288 Main St., Springfield. Further information can be had from the same address.

SECOND DISTRICT CONVENTION AND SHOW

March 3d to 7th, New York

The Fourth Annual Second District Radio Show and Convention, under the auspices of the Executive Radio Council, will be held in the Grand Ballroom of the Hotel Pennsylvania, March 3 to 7, 1924, inclusive. There will be fifty exhibits of apparatus, a big ham banquet on Wednesday, March 5th, and a "R.O. Wouff-Hong" initiation on the night of the 6th, with contests, lectures, stunts and hamfests thruout the program. Further information can be obtained from the Council, 120 Liberty St., New York. Make your reservation at once.

All amateur radio mourns the death on January tenth of Samuel S. Frizzell, A.R.R.L. member and 1SF-1UD. He had just signed off for the night at 1CRW-1ZA and was on his way home when he was struck by an automobile, sustaining injuries which proved fatal the following afternoon. Sincere regret at his passing is expressed by all who knew him and his signals will be sadly missed by all amateurs in and around Boston.

WWV Schedules

Every day there are fewer amateurs who do not know their sending wavelengths with exactness. The reason is the continuation of the "Standard Frequency Transmissions" from station WWV, at the Bureau of Standards at Washington, D.C.

The service costs nothing, and it continues to grow more popular especially and particularly with the members of A.R.R.L.

The next schedules are given below; they can be heard and used at most points east of the Mississippi River and at many beyond.

The signals are of use in testing receiving sets, checking wave meters and adjusting transmitters. The accuracy is better than 3/10 of 1%. This is much better than the accuracy of any wave meter the average amateur will ever own.

Information on using the signals was given in the February 1923 issue of the Radio Service Bulletin, also in the following places in *QST*—July, 1923, page 28, "U.S. Will Send Standard Waves for A.R.R.L.;" May, 1923, page 47, "Laboratory Oscillators." More detailed information

(Concluded on page 53)

DID YOU SERVE IN RADIO DURING THE WAR?

An Urgent Request to Amateurs to Supply A.R.R.L. Headquarters with Vital Information Needed for Statistics—Please Read This Carefully and Fill Out the Questionnaire at Once.

HOW many amateurs gave their services to their country in radio work during the late war? We have a pretty fair idea but we can't prove it. Who were they? What jobs did they hold, where, how long, what branch of the service?

Now get this: This information in proper form, can be invaluable to A.R.R.L., as it is proof of our value to our country and evidence of the benefit of amateur training. We need this information right now, for use on behalf of American Amateur Radio, and we will need it more in the days to come. Once before we ran a little request for this information in *QST*, shortly after the war, but the response was small, and many men whom we personally knew to have served in radio were too modest to report it. We really need the stuff, men, and this is a plea for your cooperation—a request that you fill out this form regardless of whether you reported before and regardless of whether you are personally known to some of the folks at Headquarters. We want everybody, so see that your friends and your club members act too. Our many thanks!

IF YOU SERVED IN RADIO DURING THE WAR, PLEASE GIVE US THE FOLLOWING INFORMATION

Name in full.....

Present address in full.....

Were you an amateur before the war?.....Station call?.....

If you held an operator's license before the war, what grade?.....

Did you serve in the Army, Navy, or Marine Corps?.....

In what branch of that service?.....

Where did you enlist?.....When?.....

List the successive ratings or ranks held by you.....

.....

How long did you serve?.....How much of this time, if any, was overseas?.....Were you wounded?.....

Cited?.....Decorated?.....

Please state the chief capacity in which you served, such as operator, instructor, mechanic, executive, etc.....

If you attended a government radio school during the war as a student, give place and dates.....

In the following space please state briefly the various assignments held by you in actual radio work, giving duty, outfit, location, approximate dates, and rank at time, *underlining the most important duty.*

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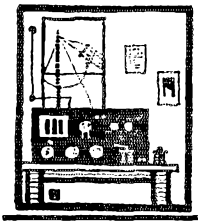
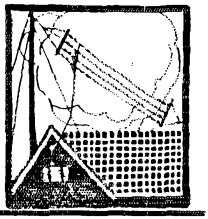
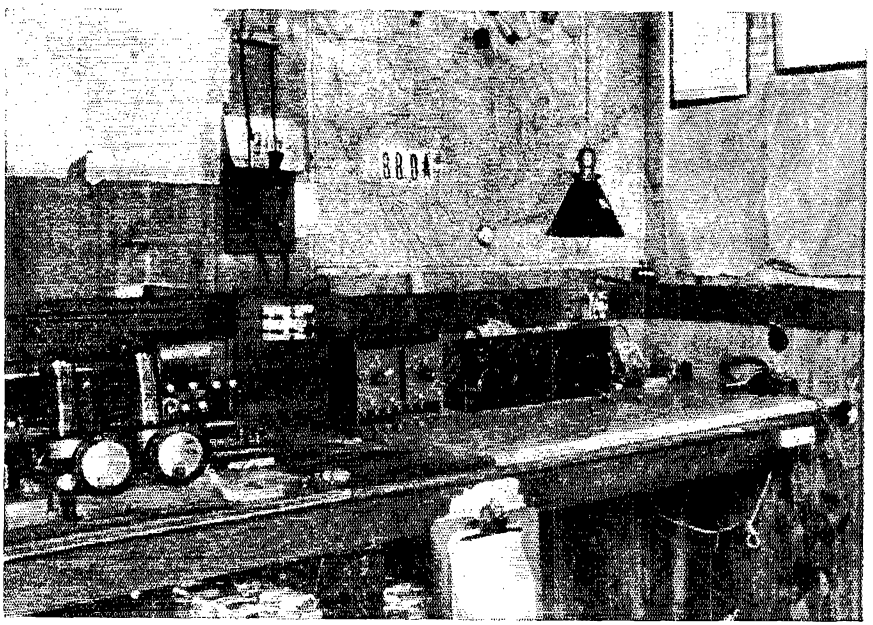
If you are willing to help us in this matter, please append a list of all the amateurs you can recall who served in radio in the late war, provided you can supply their present addresses or calls. We'll write to them.



Amateur Radio Stations



8BDA Parkersburg, W. Va.



A small unobtrusive wooden shack on Quincy Hill, overlooking the Ohio river at Parkersburg, West Virginia, houses 8BDA. Nearby is a ninety-foot pipe mast with the antenna, two six-wire cages 100 feet long, dropping down to the shack at about 45 degrees. Beneath the antenna is the counterpoise of twelve wires, used exclusively because the ground is too sandy to obtain a good ground connection.

Part of 8BDA is a remnant of the spark days, for the spark set is still in the station, ready for immediate use. It is rarely used now and is kept mainly for emergencies when communication must be established with the least possible delay. This spark set was described in the article on page 35 of the December, 1922, *QST*. A United Wireless 1K.W. coffin, a condenser with half-inch plate glass and copper sheets immersed in oil, a synchronous spark gap with a Hyrad disc, and a "split" type oscillation transformer are the essentials. The antenna current is 8 amperes.

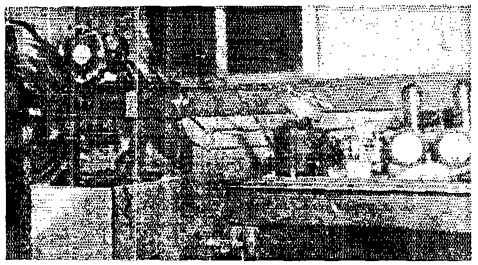
There are several who operate the station, but the license is issued in the name of Edw. Garrison, 515 10½ Street, Parkersburg, West Va., and communications addressed to him will reach the station without delay.

On the table near the spark set is the C.W. transmitter, using two 50-watt tubes, connected in the reversed feedback circuit with plate current supplied through a 60-jar rectifier and filtered. The antenna current is normally about 6.6 amperes on 200 meters.

A Reinartz tuner, slightly modified, and a one stage audio amplifier, constitute the receiving equipment. A wire 125 feet

long at right angles to the big antenna is used for receiving and the connections are such as to allow break-in operation.

As for records, the spark transmitter has been reported 50 feet from the phones at 7IY near Seattle, Washington, on a Beverage antenna, detector and two stage audio amplifier; besides being heard in all



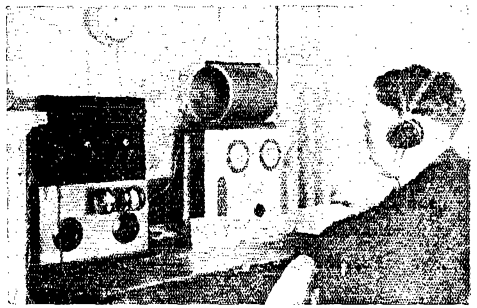
The old and new at 8BDA

districts, 1,000 miles south of San Diego in the Pacific, 2,100 miles at sea in the Atlantic and in Porto Rico, Panama, and Cuba. 8BDA's C.W. signals have been heard by amateurs in 46 states, all Canadian provinces, Hawaii, Panama, Porto Rico, Cuba, Alaska, and several times by ship operators aboard ships in the Pacific and Atlantic Oceans. Stations in every district have been worked. 8BDA is always QRV for your traffic.

6LV, San Mateo, Cal.

"QSR anywhere, anyplace, anytime" is the motto of 6LV. Here is a 6th district station which is heard consistently throughout the U. S. almost every time the key is pressed. Wm. Baker is the owner, builder and operator, and the station is located at his home at 235 7th Ave., San Mateo, Calif. The signals of 6LV have been heard in practically all states and Canadian provinces and also in Alaska, Mexico, Hawaii, and New Zealand. The average monthly traffic participation is about 150 messages.

The receiver is a three-coil honeycomb set with a detector and two-stage audio amplifier above it. Amateur signals from every district are copied quite regularly on the detector tube only, however. The transmitter uses two 50-watters in the Hartley circuit. An Acme 600-watt transformer furnishes 1000 volts which is chem-



ically rectified, then filtered and applied to the plates.

The antenna is not all one could wish for as it is rather small and completely surrounded by oak trees. It is a four-wire flat top 45 feet long and 65 and 55 feet high at the ends. The lead-in is taken from the lower end. The counterpoise, directly beneath it, is a 7-wire fan 70 feet long, 10 feet high, and fanned out to 24 feet at the far end. The antenna current is between four and five amperes.

8ZD-8VE, Pittsburgh, Pa.

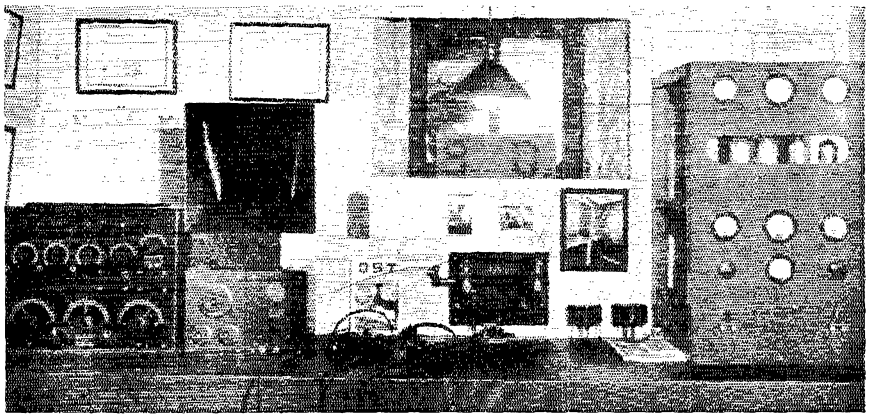
Radio station 8ZD-8VE is owned and operated jointly by P. E. Wiggin, old 8XH, and F. B. Westervelt of 8VE, and is located at the home of the latter at 5306 Westminister Place, Pittsburgh, Penn. The station is in a basement room about fifteen feet square. The walls are painted white, heat is provided by a furnace in an adjoining room and everything is arranged for the convenience of operators and visitors who come to pound brass in the early hours of the morning.

On the right of the table is the main transmitter which employs five 50-watters arranged for C.W. phone or chopper. When phone is used the Heising system of modulation is employed, two 50-watters acting as oscillators, three as modulators and a 5-watter as speech amplifier. The Hartley circuit is used. Plate current is furnished by a Westinghouse 1,000 volt motor-generator set under the table. The filaments are supplied with A.C. On the front of the panel are meters for indicating values of, D.C. plate voltage, antenna current, oscillator grid current, modulator plate current, filament voltage, oscillator plate current, and modulation. The filament rheostats are located on each side of the modulation meter and the switch below is for changing filament voltmeter from the oscillator tube circuit to the modulator

tube as each has separate rheostat control. The other two switches break the 110-volt 60-cycle A.C. lines to the filaments and motor-generator set. Power to the station is supplied direct to the operating room by a three wire 110-220 volt line capable of standing a 200 ampere load, so there is "power to burn."

A traffic record was also established in the handling of 2855 relay messages between February 15th and March 15th of last year. On the call, 8ZD, only D.C.C.W. is employed, while phone, chopper, I.C.W. or A.C.C.W. may be used on 8VE.

"If it *can* be QSR'd it *will* be" is the motto of this station.



To the left of the transmitter is the send-receive switch which starts and stops the motor generator set, closes the filament circuits and transfers the antenna and counterpoise from receiver to transmitter.

The receiving apparatus consists of a Westinghouse RC set that has been altered to cover the wave length band between 85 and 275 meters. To the left of the RC set is an old C.R.L. Paragon with detector and two-stage amplifier. Baldwin and Western Electric phones are used when headphones are desired while a Callophone (loud speaker) may be used at times on strong signals.

On the other side of the room is equipment arranged in regular ham style for rapid changes in circuit. A 500-watt experimental tube is used at times in this set-up. A good wavemeter and other experimental apparatus are also in the station and come in handy.

The antenna consists of two 6-wire cages 6 inches in diameter and spaced about 10 feet apart. It is 70 feet high and 65 feet long and is used in conjunction with a 10-wire fan counterpoise. The antenna and counterpoise lead-ins are brought through holes in the window panes directly above the change-over switch.

The transmitter first described, using one 50-watt tube with pure D.C. plate supply, was used at 8ZD last winter and worked every state with the exception of two, and was heard in every district, Canada, Panama, Porto Rico, and in England.

Book Review

By S. Kruse, Technical Editor

"Henley's 222 Radio Circuit Diagrams", by John E. Anderson, M. A.; Arthur C. C. Mills; Elmer H. Lewis, Radio Instructor, East Side Y. M. C. A., New York City. The Norman W. Henley Publishing Co., New York. $1.00.

The "circuit hound", whether receiver or sender, will revel in this book. The 222 circuit diagrams are cleanly drawn, nicely labeled, and *up to date*. More than that, the book is logically arranged, it begins at the beginning and explains the first steps briefly but clearly, then goes ahead to the next thing. To this is added a "list of symbols", a code chart, some general information on tubes and coils, and three excellent little chapters that explain the "Art of Reading Diagrams", the care of batteries, and the conversion of wavelengths to frequencies. At other points in the book there are treated: tuning, the requirements of the fire underwriters, and the construction of loops and antennas. Taken all together it is an excellent little book and one well worth having.

"The Outline of Radio", by John V. L. Hogan, Consulting Radio Engineer, Fellow and Past President I.R.E., Member A.I.E.E. Little, Brown & Co., Boston. $2.00 net.

It is a real pleasure to review this book, because one can say pleasant things about it. No better introduction can be given than by quoting from the preface of the book itself: "If you are weary of radio publications, take heart. Beneath the froth of writing that has been stirred up to meet (but hardly to satisfy) the wants of radio users, there exists a substantial literature of the art and science.....A large part of the material recently published has already been forgotten, for it was neither accurate nor readable. However, the fact remains that radio is accomplishing great

(Concluded on page 47)

Pan-American Tests

May 19th to 31st, inclusive, are the tentative dates for transmitting and receiving tests with amateurs of Central and South America. These dates are subject to change, however, and when arrangements are completed the exact dates with further information will be announced through *QST* and the weekly A.R.R.L. broadcasts. The tests probably will be divided into two parts each night so that amateurs of both North America and South America will have an opportunity to transmit and to receive.

These tests are about the biggest thing in the way of tests that the A.R.R.L. has yet tackled. We are arranging tests with amateurs who almost without exception do not speak our language and who, being situated in the tropics and southern hemisphere, encounter radio conditions quite different from what we are used to. The question of the best time of year to hold Pna American tests is a difficult one to answer, for when it is wintertime in North America it is summertime in South America and vice versa. In other words good radio conditions do not exist in the two continents at the same time. We all hope the May tests will be successful—and they will be if we all start preparing for them now and have our transmitters and receivers as perfect as we know how to make them by the time the tests are to begin.

By far the greatest interest is being shown by the Argentine amateurs. In fact it was they who first proposed the tests. At least twenty or thirty with powers averaging around 150 or 200 watts (manufacturer's tube ratings) will take part. They wish to transmit on wave lengths between 200 and 400 meters, but we know from experience that the shorter wave lengths are much better, so are recommending that they transmit on wave lengths between approximately 100 and 200 meters. In the meantime they are also perfecting their short wave receiving equipment.

All amateurs in Brazil, Chile and other South American countries are likewise invited and expected to take part in the tests. We are also endeavoring to get in touch with interested amateurs in the Central American Republics. Do any of our Mexican amateurs know of any amateurs to the south of them? Porto Rican and Cuban amateurs can hardly wait till the tests start so they can show their ability to act as a relay point between South America and the U. S.

The headquarters of the Traffic Department received dozens of cards from amateurs who saw the notice on page 44 of the January *QST* asking for the names of amateurs familiar with Spanish or Portuguese. For some curious reason most of the replies came from California. C'mon, Texas, the gates are still open!

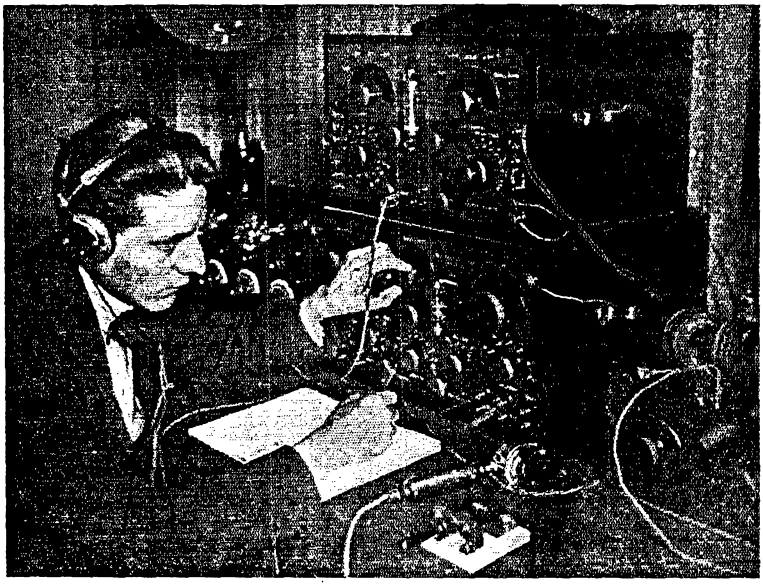
Another thing: how are you coming on your study of Spanish? Mexico City (XDA) sends Spanish press on 4000 meter spark somewhere between 9 P.M. and midnight C. S. T. You cannot fail to hear him almost anywhere in the U. S. on one tube and his even sending is excellent for code practice.

Hollander Hears 'Em All

Imagine yourself in a country where it is practically impossible to obtain a piece of C.W. equipment and where the government prohibits amateur communication. This is the situation in Holland. Even so, enthusiasm among amateurs there is at a high pitch and there would probably be dozens of stations on the air if it were possible to obtain transmitting parts. As it is, it just seems as though there are no things such as transformers, high voltage generators, copper strip and high voltage condensers. Amateurs, therefore, must turn all of their attention towards receiving. Some excellent results are obtained.

A particularly well equipped and neat receiving station is that of Mr. J. C. Nonnekens, shown in the accompanying photograph, who with his three receiving sets is able to hear almost anything on wave lengths up to 23,000 meters. In the background on the left is a set employing two r.f. amplifiers with tuned primaries and a regenerative detector. Phillips double-grid tubes, requiring six volts on the plate, are used. In the center of

the picture is a "Marine" receiver built by the Netherlands Radio Industrie, a most selective receiver with a wave length range of from 400 to 23,000 meters. The lower cabinet contains the tuning apparatus and the upper cabinet the tube control apparatus and plate variometers for oscillation. All inductances are either bank wound, or wound in slots. Results are very good; NSS, WII and WQC come in on one valve regularly. The little set on the right is the one on which the most



A Dutch Amateur, J. C. Nonnekens, At His Set

stations are copied. It is a short wave set using Corona coils, also manufactured and patented by the Netherlands Radio Industrie. Schenectady (WGY) comes in on one tube every night when conditions are not too bad. One r.f. amplifier is used at times, otherwise the standard three-coil circuit is used. Using detector only a number of amateurs have been heard, among them being 1AW, 1BCG, 1BCT, 2SZ, 2TJ, 3BT, 8TT, 8ATB, 9APE and Canadian 1AR and 3XN. The last-named is one of the strongest. Many of these can be heard clearly through the loud speaker when two a.f. amplifiers are used.

Short Waves the Key to T-P Work

N.Z.-Hawaiian Tests Partly Succeed

By F. D. Bell, N.Z.4AA

The second Transpacific Tests have been successfully concluded. I understand that over 200 American amateurs were heard in Australia alone and, by the time the New Zealand logs have been sent in, that number should be doubled. We have trouble in getting our logs in, however, for we have no national organization like the A.R.R.L. to work up enthusiasm over the tests and collate the results. Therefore, what has been done so far has been accomplished entirely by individuals. I was talking to one of our leading amateurs the other day, and he mentioned casually that he had recently heard about 40 Yanks in a single evening! But he said he never bothered keeping a log and had probably misplaced the paper they were copied on. However, he promised to send his lists to *QST* in the future.

Apparently no Australasian transmitting stations were heard either in Hawaii or on the mainland during the tests. This is not hard to understand for I am quite sure that your receiving conditions are not near as good as ours. Provided that our stations kept well below the congested band centering around 200 meters and put out currents of three amperes or more I believe we will have an excellent chance of being heard there, but on 200 meters I do not believe we could break through the interference if we were putting 30 amperes into our antennas. In New Zealand our working waves are from 140 to 170 meters and we would much prefer to send below 200 meters, but we will look to *QST* to tell us the best wave to use.

In the recent tests with Hawaiian amateurs, both 6TQ and 6CEU were heard here. However, we transmitted on 195

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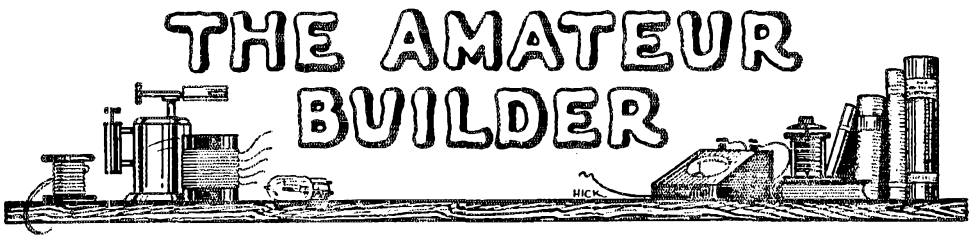


HINTS ON BUILDING RECEIVING SETS

By H. F. Mason, Department Editor.

THERE is nothing hard about building radio receiving equipment. Anyone who can drive a nail straight can, with the aid of a few tools, the proper parts, and a knowledge of how to proceed, build a piece of receiving apparatus that will be all he desires. The purpose of this article is to give some practical hints on receiver construction and to outline a good method to follow in planning and building. These remarks will not apply to any particular type of receiving set, but are general. The knowledge of how to do a thing is a great part of doing that piece of work well, and the better the amateur builder knows how to go about his work, the better will be the result of his efforts.

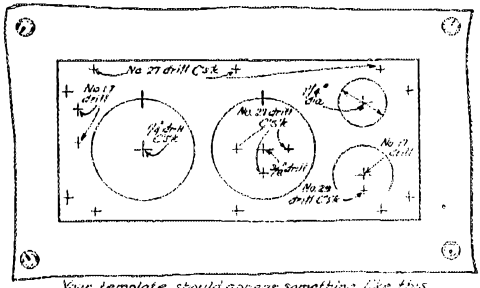
It is not necessary to have access to a well equipped machine shop. Much has been done within recent years in the standardization of radio parts and in the marketing of small macine parts, units, panels, etc.; the result of which is to aid the kitchen table mechanic in doing a first class job. It is true that a small machine lathe is a very handy addition to the amateur's workshop but the amateur would usually rather spend his money on a few more tubes or other radio apparatus and, when he has some lathe work to do, take it elsewhere to be done. So then, in this and subsequent constructional articles the assumption is that only the corner of the basement or the kitchen table is available as a workshop and that the number of tools is limited to necessities only.

The progressive amateur builder will fortify himself with the latest catalogs of several good radio manufacturers, dealers and mail-order houses and be thoroughly familiar with the parts listed in each of them He will also be a frequent visitor at the leading radio stores in his town; and will by constant observation add to his knowledge of the constructional details of radio sets and how they are put together.

Planning the Set

The first thing to do, when a piece of apparatus is to be built, is to make a complete list of the necessary parts, preparatory to obtaining them. It is worthwhile to make this list complete, including every condenser, screw and bracket, for it is very exasperating to have a receiver nearly completed and be anxious to try it out, only to find that some part is missing.

With pencil and paper, draw up some rough sketches of how the finished set is to look. Is the set to be low or high, long or short, etc.? What parts will be mounted inside of the cabinet, if the set is to be in a cabinet? Are the binding posts to be on the front of the panel or at the rear, and how many tubes will



Your template should appear something like this

FIG 1

there be? How many knobs and dials will there be on the front of the panel? All of these questions will be answered in the preliminary sketches. Many of these things will depend on the circuit that is to be employed, so a complete, neatly drawn schematic wiring diagram of the proposed set should also be on hand.

The next step is to begin purchasing the parts for your new set. If you do not feel that you can tell good apparatus from poor apparatus—and every good radio store has both—get a competent friend to go with you and advise you what to buy. Remember, too, that each piece that goes into your set should be both mechanically and electrically as near perfect as possible This does not mean most expensive, as for instance a porcelain tube socket, which is without doubt the

best electrically, is one of the cheapest. However, it is beyond the scope of the present article to discuss the advantages and disadvantages of various makes of apparatus.

Buy the panel last. You will then have the opportunity to lay out the various pieces of apparatus on a table in the relative position they are to occupy in the finished set and tell just how large the panel should be for the best arrangement. Within the past year manufacturers of panel materials have agreed on a set of standardized sizes of panels which are carried in stock by good radio stores. For his own convenience, then, it is well for the builder to plan his set so it will fit a panel of one of the following standard sizes:

6" x 7"	7" x 18"
7" x 9"	7" x 21"
7" x 12"	7" x 24"
7" x 14"	

In addition to the above sizes there are others that are more or less standard, besides which you can usually obtain panels of any special size on order or can get a large enough piece of the panel material and cut it to the desired size yourself with a hacksaw.

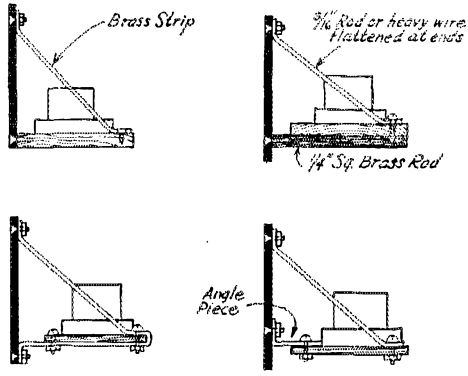
In laying out the parts in the approximate position they are to occupy in the finished set, the main things to work for are simplicity of wiring, good arrangement behind the panel, good arrangement on the front of the panel.

The wiring diagram should be constantly before you when arranging the parts as they are to be in the completed set, and the apparatus should be disposed so that all connecting wires will be as short as possible. This can be accomplished in a vacuum tube receiver by putting the antenna connections and tuning apparatus at one end of the set, with the detector tube next, and then the audio amplifier. This can be contrasted with an improper arrangement where the tuning apparatus is put in the center of a cabinet with the detector tube at one end and the audio amplifier at the other. The apparatus should not be crowded in order to obtain short connecting leads, however. Keep all inductances at least one inch away from the cabinet and panel in all directions and at least two inches from metal objects such as variable condensers, panel shields, audio transformers and such. Likewise, audio transformers should be separated at least a couple of inches and have their cores at right angles to prevent interaction. When choosing the vario-couplers and other inductances for your set, give preference to those wound on cardboard tubes with the minimum number of metal parts near the wires.

At this stage a cabinet can be obtained for the set. Here is another advantage of choosing a standard size of panel; you can obtain a cabinet that is built to fit your panel. These cabinets can be had from several firms either in knocked down and unfinished form, or completely assembled and finished.

Laying Out the Panel

When you have all of the parts at hand, together with the schematic wiring diagram and your rough sketches you are ready to make a template for drilling the holes in the panel. This template is a sheet of heavy paper, the size of the panel, with the location of every hole marked on it. See Fig. 1. The template can then be placed over the panel and punch



Method Of Securing the Bottom Panel
FIG. 2

marks made through the paper where the holes are to be, after which the template is removed and the holes drilled.

There are reasons why this procedure is best. It is impossible to mark the holes accurately on the front of a panel without putting pencil lines or scratch marks on the panel. Neither of these can be removed from the polished panel very satisfactorily without leaving marks. It is easier to erase pencil lines on a sheet of paper than to remove center-punch marks on the panel if a mistake is made.

The first step upon obtaining a sheet of paper a little larger than the panel will be to draw on it a rectangle the exact size of the front of the panel. Then determine where the shafts of the main pieces of apparatus are to come through the panel. You will have the apparatus at hand, besides your preliminary layout, so this should present no new difficulty. Circles of the same size as the dials should be drawn with a compass in the correct location and they will give an idea how the finished set will appear. Take care to space the apparatus the proper distance inside of the cabinet and arrange it to ac-

commodate the wiring to best advantage. If the parts are too much spread out the set will be large and cumbersome, with much waste space both behind and on the front of the panel. If too close together the parts will interact upon one another, impairing the goodness of the set, not to speak of the trouble you will have when you start wiring the set. Remember, also, to leave room around the tube sockets and above them for inserting the tube.

After the exact position of every important item in the set has been determined, accurately mark the holes for fastening all of these component parts to the panel. Check the small paper templates that some of the makers of the parts supply against the apparatus itself before applying them to your template and marking the holes through with a pin. Extreme care should be taken to mark these holes accurately.

If there are to be binding posts on the panel, locate them far enough from the edge so the set will go in the cabinet. They should not be placed less than one inch apart nor at the extreme bottom of a panel unless you are sure no difficulty will be had in attaching or detaching the wires Also locate the binding post as near as possible to the part behind the panel to which they connect, rather than run a wire the whole length of the set to accomodate a misplaced binding post Then mark all the rest of the holes, not forgetting the ones around the edge that are to hold the set in its cabinet. The template is completed by marking the size of each hole in its proper place.

In order to make a good mechanical job of the set, all parts should be fastened to the panel to form a rigid unit. Variable condensers, rheostats, etc., can be secured directly to the panel but tube sockets and amplifying transformers are usually fastened to a separate wooden board or panel of other material which is in turn fastened to the main panel by brass angle pieces or braces made of brass strip. Various methods of fastening this sub-panel to the main panel are shown in Fig. 2.

If the sub-panel is of wood there is hardly any use of making a template for the holes in it, as they can be marked on it directly If it is of bakelite or other panel material, however, a template for this sub-panel should be made after the same fashion as the main one. Holes for securing the sockets, amplifying transformers, and binding posts will be marked on this template.

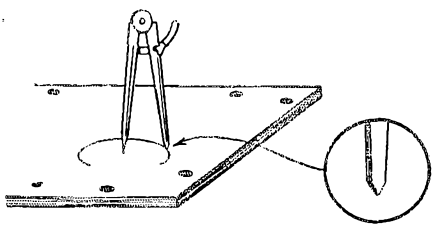
Drilling the Panels

Secure the paper template to the front of the panel with small clamps, or even with a bit of paste, and locate the position of the holes by punching through to the panel with a center punch and light hammer. Then remove the template and go over all of the holes again, making the punch marks deep enough so the drill will surely take hold.

The next operation is to start drilling the holes, using a small geared hand-drill Clamp the panel to a flat surface with an old piece of board underneath Drill the smallest holes first for if you make a mistake you can go back and enlarge the hole to the right size later. Most of the holes will be of such a size as to just pass a machine screw having a 4-36, 6-32 or an 8-32 thread. The drills to use for these holes are No's 31, 27, and 18 respectively. Where the shafts of the various parts come through the panel, make the holes large enough so the shafts will not bind.

To make holes up to 1¼ inch in diameter, such as are sometimes used for peep holes in the panel, use a ¼ inch drill first; then ream to the correct size with a pipe reamer such as electricians use to smooth out the ends of a piece of conduit, held in an ordinary bit brace. Or you can use a coping saw to cut away most of the material and finally smooth the hole with the large reamer.

If you intend engraving a scale for the filament rheostats, as is often done, do not drill the hole for the rheostat shaft until later. This circle may be engraved by scratching a groove deeply into the panel with an old pair of sturdy dividers sharpened as shown in Fig. 3. This is easily



Engraving the Rheostat scales
FIG 3

done. Then cut in an arrow-head at the right end as shown in Fig. 1. It is also well to engrave a straight groove above each dial to use as a marker. After the engraving is done it should be filled in with some white material. "Monofoil," a greasy, chalky preparation, is made especially for this purpose, though it is not always obtainable. White lead, white ink, or even white toothpaste will accomplish the purpose. If the panel is to be grained, do not fill the engraving until later.

After the drilling and engraving is finished, those holes that are to take flat-headed screws should be countersunk with an ordinary wood countersink held in a bit brace. Take care to do this properly as nothing impairs the looks of a set more

than a poor job of countersinking the holes. Those that come under the dials should be deeply countersunk so there will be no danger of the screw heads interfering.

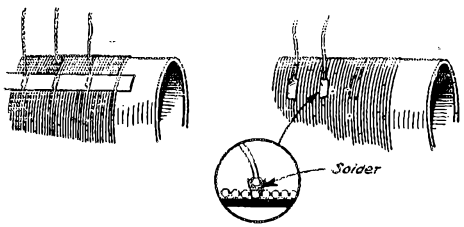
At this stage you may wish to grain the panel. Graining consists simply of sandpapering the "shine" off. Place the panel front up on a smooth surface and if possible clamp it down. Then, with fine sandpaper, or fine steel wool if you can get it, start work. Run the sandpaper exactly parallel with the long edges of the panel *always*, for a cross scratch is hard to remove. When all trace of polish has been removed, clean the panel with a soft cloth, then rub it down well with a little machine oil.

Mounting Apparatus

Start mounting the parts on the panel when all of the above work is done. Use either all nickel plated screws or all brass screws and either flat-headed or round-headed screws throughout. If a machine screw is too long and projects in the rear, cut off the extra portion. Mount the parts so as to simplify the wiring.

Winding the Coils

A few pointers on bringing out taps will not be amiss, for you may have some of this work to do. Figure 4 shows some



Two good ways of Tapping Coils

FIG 4

good methods. In one case a strip of fish paper is laid under the turns that are tapped as the coil is wound. In the other, a piece of thin copper about $\frac{1}{8}$ inch square, bent U-shape, form a small trough for the solder and connecting wire. Neither of these methods requires cutting the wire on the coil.

Be sure that all of the kinks are taken out of the wire as it is being wound and that the wire is wound just as tightly as you can wind it without breaking the wire. When soldering the taps be sure not to get soldering flux on the coil as it is likely to cause leakage between turns and impair its effectiveness. If you must coat the coils with an insulating varnish to keep them in shape, do not use shellac, but rather colodion, or some similar composition, applied very thin.

Wiring the Set

No matter how careful you have been so far you can completely spoil the looks and operation of your new set by a poor job of wiring. Do not become discouraged, however, for though experience is necessary for a first class job, the beginner by being careful can do the work satisfactorily. All connections should be soldered and the reader should review the article in last month's *QST* before beginning the wiring.

There are two general methods of wiring receivers in use today. The first is to use bare or enamelled wire (the bare wire may be ordinary No. 14 copper or square or round tinned copper wire) running the wires straight and making all corners sharp and square, bus-bar fashion. The other method is to use No. 14 soft copper wire, running the wire in varnished cambric tubing ("spaghetti") but still running the wires straight with right-angled bends as nearly as possible. Of the two methods the beginner will have more success with the latter. One advantage of running the wires in cambric tubing is that there is less danger from accidental shorting of the wires which may cost you several burned out tubes. It takes a good deal of experience to make a real workmanlike job of wiring a set with bare wire if the set be at all complicated.

Begin by wiring the filament circuits, checking off each lead on your wiring diagram as it is put in place. Where a wire runs between several terminals use a continuous piece rather than several smaller pieces. This does away with having to solder several wires to one terminal, which is always rather difficult to do well. Run all leads as short as convenient, consistent with good looks. Always cut the wire to the right length and bend it in the correct manner before soldering it to the first post. If the lead has several bends and is difficult to bend right, experiment with a piece of wire solder as a pattern to get the correct shape of lead; then bend the final wire to the correct shape with the aid of the pattern. A very important point to remember is to keep wires coming from opposite terminals of coils and condensers as far apart as possible. This does not apply to wires coming from the same terminal or to wires in the filament circuits, however.

Testing

After finishing the set and connecting it for test, do not expect it to work perfectly at first. It is not possible to go into detail here on shooting trouble in receivers, but the first thing to do if it does not work is to check the wiring with the diagram and be absolutely sure that it is

correct before you go further. Also be sure that the batteries are correctly connected. Then search for poor or loose connections, especially in the springs in the tube sockets, coil taps, connections to moving parts, etc. If you followed the directions and specifications for the set to the letter you will have found the trouble by this time.

BOOK REVIEW

(Concluded from page 40)

things.....Imagine that you are spending a week-end at my home; that we have drawn our chairs before the fire; and that you have asked 'Just what is this radio anyway? How did it happen? What makes it work, and that, after a long pull at my pipe, I've said, 'Well....it's like this.....' If you wish answers to those questions, read on. I am going to give you a somewhat informal (but I hope, none the less helpful) introduction to radio."

"Reflex and Radio Frequency"; by M. B. Sleeper; M. B. Sleeper, Inc., New York City. 50¢.

This book is for the man who wishes to build his own receiving set. Detailed worked drawings, photos of the finished sets, wiring diagrams and text, are all given in the well-know clean-cut Sleeper fashion. The drawings carry the signature of Mr. Grimes, deviser of the inverse-duplex circuit. The following sets are described: Grimes 2-tube reflex, one-tube reflex, one-step radio amplifier, 2 stage straight radio and detector, 2-step audio, 4-tube Grimes reflex giving 2 stages radio, detector and 3 steps audio.

INTERNATIONAL AMATEUR RADIO

(Concluded from page 42)

meters and I believe that is why we did not get across as Hawaiian stations undoubtedly had heavy QRM from America. On our next tests we shall be at least ten meters lower, with correspondingly more chances of getting into successful two-way communication with Hawaii. (Why not go down to 100 meters or less, OM, where sigs will be QSA?—Dept. Ed.) On our side Mr. O'Meara, 2AC, used one 50-watter with 4.3 amperes in the antenna and I used two English tubes putting 3 amperes into the antenna. Several others using 5-watt tubes also took part.

During November 6KA was still by far the loudest of your stations. The following are marked "very loud" in my log, although none come near 6KA: 5HT, 6CGW, 6BVG, 6BBC, 6CDG, 6AJD, 6GR, 6PL, 6TS, 6ARB, 6AOS, 6LV (who signs 6LIM), 6BKX, 6BUO, 6BEM, 8RV, 9MC, 9ZT and Canadian 5CN. Some eighth district stations were heard transmitting code words in the transatlantic tests also. 6PL, 8CEI, 9BPM, and 9CCV were heard calling WNP, but so far N.D. here from Mix himself. I am offering a prize of a brand new UV-202 to the first New Zealander who hears him. The filament is busted, of course, but that's mere detail.

(A letter from Mr. W. L. Shiel of Dunedin, N. Z., reports WNP heard at his stations. See this month's WNP story.—Dept. Ed.)

There is a transmitter in the Philippine Islands which is going to be heard in the U. S. soon. Fred Esler, ex-6ANM, is over there now with a self-rectifying set using two 50-watt tubes. He says it comes in fine all over Manila but he does not know how he gets out yet. Listen for him, fellows. His call is 1ZA and he's dyin' to connect up with some of the U. S. hams. A letter will get to him addressed to Fred Esler, 600 M. H. del Pilar, Manila, P. I.

Franco-British Tests

Some transmission tests between British and French amateurs were held during the latter part of November and the first of December. French amateurs began transmitting on November 26th and continued until December 9th on alternate nights while the British transmitted on the intervening dates. First reports show that out of approximately 104 French amateurs who participated 46 of them succeeded in reaching England. We have no report yet to shown how successful the British transmitters were in reaching France. The great majority of those taking part in the tests were using powers of less than ten watts or so and this is probably why more stations did not succeed, as the distances are all under 800 miles.

Italian amateurs are reaching out. M. Guilo Salom, 1MT, of Venice, Italy, exchanged signals with British 2HF on the night of December 9th. The distance between 1MT and 2HF is over 800 miles. This is the first time that an Italian amateur has successfully transmitted over so great a distance. Who will be the first American amateur to hear 1MT?

WHAT'LL WE DO WITH IT?

The Amateur Builder

The American amateur is criticised for buying too much of his equipment ready-made. Necessity is the mother of invention—and since the necessity for an amateur building his own is nearly past, because complete sets can be purchased on the radio market, the inventive and ingenious spirit of a modern amateur is fast disappearing also, it is declared.

Is this criticism just?

We have started a Department in *QST* known as "The Amateur Builder"; going on the assumption that the majority of the amateurs get more fun out of building a piece of apparatus to their own notions than to buy it ready-made. We are sure that there are many amateurs who avail themselves of standard parts and build their own sets, but we would like to hear from them and get their ideas on what they would most like to see in this new department. A post card to A.R.R.L. Headquarters will do the trick.

6AW is an A.C.C.W. station at Palo Alto, Calif., and never uses voice. All of the cards and letters he has reporting his voice transmissions should have been sent to Cuban 6KW, the broadcasting station of Mr. Frank Jones at Tuinucu, Cuba, who is regularly heard throughout most of the U. S. This is just another reason why broadcasting stations should sign "six K king A able," etc.

If you want to make that detector tube get right down on its hands and knees and go looking for 'em, use a Federal 1850-ohm potentiometer in series with a C battery where your grid leak would ordinarily go.

Here is another way for the "five watt wonders" to compete for the championship. Figure the total cost of your transmitting equipment only and divide the greatest distance you have actually worked by this figure, thus giving your rating in "miles per dollar." 1BEF starts it off by scoring 77 miles per dollar! Who will raise him one?

Asking for Trouble

Just to start something this page is going to make the claim that 1ER at this moment has the record for number of stations worked transcontinental in 100 minutes. Let's see your records with logs to prove 'em. Huh? Not a bit of it—we'll tell you what 1ER did afterwards—and prove it too.

Dead Spots in the A.R.R.L.

The deadest spot in this League seems to be the writing hand. Trying to pry information loose from this gang is a shade like pulling teeth and also a bit like a surgical operation.

Here the Tech. Ed. has been francticalIy appealing to all of you for many months to COME THRU WITH SOME DOPE ON DEAD SPOTS and less than 1/10 of 1% have answered.

What in thunder have all the rest of you been doing since 1907?

Double-Barreled Convention

On April 1 there will be held a most unusual radio convention at the Hotel Muelbach at Kansas City, Missouri.

This convention is held by the short-wave men and by those that have never called CQ. Attendance is strictly confined to those that have never sent with any wavelength above 200 and those that have never called CQ. An oath will be required at the entrance to the two telephone booths which will be used as meeting halls.

Does anyone who can get them officially have access to constructional details of the SE-1420 receiver? There are hundreds of persons who would like to have the details of a really good receiver that covers a wide band of wave lengths, as does this one, and that is selective and sensitive, besides being built as a unit.

Have you seen the nifty little "radio call pins" that look like a miniature fifty-watt tube and have the call letters of the wearer on it? One of these is just the thing to wear alongside of your A. R.R.L. pin. R. C. Ballard, 9FZ, has the information on where to obtain them.

All stations interested in the Intercollegiate Radio League, an organization for

(Continued on page 49)

(Continued from page 48)
the relaying of messages between schools and colleges, are invited to get in touch with R. W. Carlisle, President of the City College Radio Club, 140th and St. Nicholas Terrace, New York City, N. Y.

L. S. Hillegas-Baird, up Milwaukee way, is optimistic. He has his A.R.R.L. membership paid up to 1937!

J. K. Bolles, A.R.R.L. publicity manager, is getting to be quite an amateur. He is now looking for someone who will tell him how he can smuggle radio junk into the house without letting the wife know what is going on.

Show Your Appreciation of the Bureau of Standards

Just to show how the standard waves from WWV are being used we would like to have a postcard from every A.R.R.L. man who has used the service at *any* time since it was started. If you don't have a station card use one of Uncle Sam's—but let's show the Bustan that we appreciate a good service. SEND THE POSTALS TO THE TECHNICAL EDITOR OF *QST*, NOT DIRECT TO THE BUREAU.

The Champion Carbon company has lately placed on the market a 22½ volt block B battery in which the terminals are placed at one end, thus allowing the batteries to sit side by side with the shortest possible connections between them. A connecting strip is provided to reach to the next block.

The American Hard Rubber Company owns exclusively the rights to the word "Mahoganite" as applied to radio panels and parts. The unauthorized use of this word by others constitutes an infringement.

The new Klosner rheostats are much above the average in rheostats and are worth your attention.

New officers of the Second District Executive Council recently elected for the 1923-1924 season are:

President—W. J. Howell, 2II
Vice-President—Geo. T. Droste, 2IN
Cor. Secretary—D. H. Doscher, 2BSC
Rec. Secretary—Moe Joffe, 2BYO
Treasurer—Robt. T. Morris, 2BQS

Did you notice that we had to print the index to the February issue in smaller type than usual to get everything on the one page? This is the first time in the history of *QST* that this has happened. We are growing, aren't we?

A tube transmitter putting ten kilowatts of energy into the antenna has been installed at Ft. Douglas. This makes it the largest army station, instead of WVR at Atlanta, Ga., the five-kilowatt station mentioned on page 21 of the December, 1923, issue of *QST*.

The article on page 45 of the February issue was written by Frank Curtin, 7SZ of Spokane. We are sorry that Mr. Curtin's name was misspelled as Curtis.

Here's another way to compensate for the filament voltage dropping when you push the key. Using separate plate and filament transformers, try setting them with the cores end to end. If the direction of winding is correct the stray fields will interleave in such a direction as to raise the filament voltage, or at least prevent it from dropping, when the primary circuit of the plate transformer is closed, or when the load is put on the plate transformer. Of course this stunt will only work with transformers having a good deal of leakage and stray field.

A local undertaker who is a B.C.L. has offered to hold funeral services and bury 3QW free of charge. 3QW is thinking of changing over from spark to C.W. and thus save him the trouble.

Have you a copy of the Radio Communication Laws of the U.S. in your station? Do you know the proper method of calling a station; and do you know what to do upon hearing a distress call? Better send 15¢ (not in stamps) to the Supt. of Documents, Gov't Printing Office, Washington, D. C., and get a copy, OM. It may make the ifference between your having a license and not having one some day.

The note on page 29 of the February issue, to the effect that copies of the January issue were available, was an error. Our stock of the January issue is exhausted.

An Inexpensive Filter Choke

2MU has a choke coil in his "brute force" filter that has everything beat for simplicity. He obtained an old ¼ kilowatt spark transformer; put four dilapidated L-1500 honeycomb coils on one leg with insulating washers between them and then put the core back together again, leaving a small air gap, about ¼ inch. Nothing simpler, is there?

It looks as though the recently conducted transatlantic broadcast tests show our B.C.L. friends to be as good at DX reception as we are. English broadcasting stations were heard in 32 states and 4 Canadian provinces, British Columbia and New Mexico being the farthest away. Three hundred and six different listeners heard stations from across the ocean.

Radio Communications by the Amateurs

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

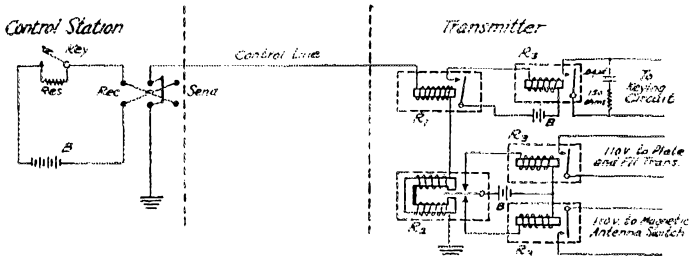
Hot Stuff on Remote Control

Augusta, Maine.

Editor, *QST*:

A remote control system should (a) be reasonably simple and practically foolproof, (b) use the fewest number of wires between the control station and the transmitter, (c) preferably use only standard inexpensive apparatus (ND on difficult-to-construct trick equipment), (d) preferably give the sending operator some information as to how the transmitter is operating, (e) be able to turn on and off the filament and plate current, allow keying of output, and possibly the grounding of the transmitting antenna when not in use.

The suggested circuit incorporated in the accompanying diagram does all of these things.



To adjust the relays: (a) Disconnect the resistance around the key and, paying no attention to R-2, increase the battery voltage at the control end until R-1 operates with a fairly stiff tension on the armature retractile spring. (b) Cut in the resistance around the key and increase it until R-1 just fails to operate. (c) With the key open, then adjust the polarized relay R-2 until it responds freely in both directions to the pole-changing switch, S.

The operation will now be as follows: Switch S is the send-receive switch. When in the sending position the magnetic antenna switch will be released and will spring to sending position. Primary circuit of both the plate and filament transformers will also be closed. When S is thrown to receiving side, magnetic antenna switch will be energized and return to receiving position and current to transmitter will be cut off at the same time. Because relay R-1 operates on a strong current only and strong current can only pass when the key is down, R-1 will not be influenced by the position of the send-receive switch.

If the 110-volt line to the transmitter is brought through the control station an ammeter and voltmeter can be installed here and they will serve as indicators as to how the transmitter is performing. A second relay, not shown in the diagram, may be connected in series with the actual keying relay to short circuit a filament compensating resistance in the primary circuit of the filament transformer if desired.

Considering the moderate price of the apparatus used in this system, the total cost is small compared to the convenience obtained in controlling the set at a distance.

—F. C. Patterson.

News From a New Zealander

90 Nursery Road, Linwood,
Christchurch, New Zealand.

Editor, *QST*:

You Yanks will be the death of me. I've been going to write this for a long time now, but was ashamed of my silly little list of "calls heard" but my pen sure gets away with me tonight. You chaps are banging in tonite, and jamming each other beautifully. It's quite a job to get a complete call. Here's tonite's list. Half an hour's logging. 5EK de 6BOU, 8AZG de 5—,— de 6BJJ, CA de 9BLY, 1AW de 9AWV, 8— de 6ZBK or 2DK,

and 6AWT, 6GGW. Not sure of this last one. I heard many more thru local fone QRM etc., and fairly bad QRN. I went into the static room to dodge the OW and kids for a while, started up and called CQ but could not raise a single New Zealander. Guess 4AA and a few more are celebrating or something. So I listened a minute and hearing you chaps, I twisted the dials and got to it, but in the end I got sick of QRM and started this letter. My list to date besides those already mentioned includes 6CHR, 6CKP, 6AWT, 6AOS, 6KA, 6AJF, 5GO, 9ZT, 9MT, 9CIP, 6ALK, 9CMK, 9MC. In addition to these few I have had a couple of 4th district stations, but have mislaid the paper I copied them on. I haven't very many calls to my credit, but all these have been logged during the last two months or so on a single valve, a pair of "Amrad basketball variometers", and "Baldies." The valve is a good one, an old marconi VT2. It's been in use about five years now, and has gone quite soft, and is a fine detector. My aerial is a twin cage, forty-five high and 90 feet long. Transmitter is a five watter, in a Hartley circuit. Best DX to date is about 600 miles on fone using loop absorption modulation. Tonight I heard a 9th district ICW fellow going strong, his note being very QRK with the receiver not oscillating. A local fone playing "Yes, We Have No Bananas" QRM-ed his call, so dunno who he was. Peculiar thing, all stations faded together tonight, not right out, but from QSA to QRZ and back again. I noticed this several times and admit I don't know the cause. My loudest "ham" so far is 6KA. He was readable on my one tube with fones a foot from my ears. I copied all his nr 7 to Love, 3BQ, Melbourne, except one word. That was during the last T-P tests. 6KA on this night (I forget the date,) was copied solid by dozens of amateurs, here. Must have been a freak night for him and yet I did not get more than one other "Yank" that night.

Well, I won't make you waste any more time reading this stuff, so will QRT wishing *QST* (the best in the world) more and more success, and my congrats to those American hams who drop their sigs into this country.

—Len. F. Ball, z3AF.

Let's Reduce QRM

Ann Arbor, Mich.

Editor, *QST*:

The achievements of amateur radio, such as the bridging of the Atlantic and Pacific on the low power we use, reflect most favorably upon us; but when we realize that the very stations that bridge six thousand miles of the Pacific find it hard to bridge the country, the efficiency of our means of communication does not seem so great.

The greatest obstacle to DX work seems to be the jammed condition of the air around 200 meters, and the failure of most of our receivers to tune much below that. A few minutes listening will convince anyone that much of the 200 meter QRM is unnecessary. One will hear about one third of the stations CQ-ing, many answering CQ's, and the all too small remainder in actual communication with each other. And then his conviction is cinched when he answers a long CQ and listens for his call, only to hear the same station stage another long CQ call.

One cause of the excessive QRM seems to be that for the great majority of the amateurs the ratio of sending to listening is too great. Many CQ's are five minutes long, and the period of listening following them, about one minute. It may be suggested that we overcome this by making the period of listening correspondingly greater.

The fellow who calls a long CQ probably thinks that he is more likely to get an answer to the long call, but in reasoning thus he fails to take into account the fact that someone hearing the first part of his CQ will get disgusted after a minute or so and pass on. The op who, realizing that fact, still draws out his CQ, is as much of a QSL-card fiend as the one I heard this afternoon (call upon request) who, after a long CQ, said, "anyone hearing these sigs pse QSL card." If he is but a QSL card fiend, he might bear in mind the fact that any decent op is not likely to QSL a station with which he is disgusted, even if he does ordinarily QSL stations merely received. So the long, drawn-out call not only jams the air for others, but is not the most desirable for the stations wishing to establish communication or DX.

Some have proposed that we abolish the use of CQ on the grounds that it was not originally intended to get the hard usage it now receives. I think that, regardless of what it was intended for, it has a definite place in amateur radio as the chief means of establishing communication, so I would merely argue (with the wouff-hong, if necessary) that we make all calling short and to the point, for thus we may reduce QRM for others and increase the probability of our accomplishing our immediate purpose. And one must remember that reducing QRM for others encourages them to do likewise, so a person using only short calls is indirectly benefited on that score also.

Another way in which QRM may be reduced is in using more of the wave lengths allotted to us. It has been proven time and time again that transmission on the shorter waves is better than on 200 meters.

Most of us admit that the short waves are the coming thing—but why wait for somone else to do something about it? Each of us should get busy and fix his own receiver for the short waves. Let's pull a few turns from our tuners and shorten up the leads. If you are using variometers connect the rotor and stator in parallel, and after that get some good series condensers for your transmitter.

It's shortening our calling and using shorter waves that will send these QRM babies to oblivion. QSY dwn hr C U tr.

—David R. Inglis, 8AGF.

Acknowledged Correction

Avalon, Catalina I., California.

Editor, *QST*:

In the January *QST* I have noted the letter from F. D. Urie, Asst. Director, Elgin Observatory. He is quite correct. In the rush of matters at the time I "mixed" my professorial ingredients. It was to Prof. Leuschner, in charge of the University of California's Eclipse Staff at Catalina Islnad during the eclipse, that time signals were given, on the mountains, by a special wire put up for that purpose by the Pacific Tel. & Tel. Co. I regret that I have accused Mr. Urie unjustly.

—Lawrence Mott, 6XAD-6ZW.

Co-operation

Statesville, N. C.

Editor, *QST*:

About a week ago the B.C.L.'s started kicking about my spark. They kept on kicking so I though I had better investigate. I did and found that they were hearing a leak in the power line. I went around and listened on several sets and found where it was loudest and then notified the head lineman of the power company. He came out and found it just two blocks from the place where the B.C.L. lived who heard it loudest. It was fixed and the listeners are again happy.

—H. P. Woodward, 4DQ, O.R.S.

Bug Sending

Houston, Texas.

Editor, *QST*:

To date I have heard every district and must say as a general conclusion that three-fourths of the transmitting amateurs using vibroplexes are *pretty punk*. I am a railroad telegrapher working for the Southern Pacific and have been listening and copying good, poor and indifferent sending for the past ten years and as a rule I can consistently say that I have never heard such poor sending as the boys "put out" via radio. One of the great faults is that they take the weights or balls off the bug so that it sounds like the well known "goat on the tin roof," it is so fast. Furthermore, a very slowly adjusted bug, with the weights near the end, will move more business in one hour than one with the weights taken off will in an hour and a half. I know because I have seen it done. In addition a slowly adjusted bug will make better characters and will "carry" better than a fast one, the reason being that a fast bug will not enable the sender to make real healthy dashes and still keep in harmony with the very fast dots. At a distance the sending will be very jerky and the receiving operator will have to do a lot of guess work; and that defeats the purpose of either radio or telegraph; whereas a slow but steady sender will be a dozen times easier on the receiving operator and he will be able to make good solid copy for hours at a stretch if necessary.

Furthermore, some of the alleged bug senders make a "6" for the letters "th" by ramming the first dash right into the dots. Then again a "v" will be sent as a "4"; "st" a "y", etc I could relate the horrible combinations I hear without number.

There is nothing prettier than to hear a real bug sender, but a poor bug sender is worse than the poorest hand sender. The latter is preferred because the hand sender is not a speed demon and you can dope out practically all of it whereas with a poor bug sender and a bug geared up "ninety to nothing" it is a continual guess. But all in all, for radio a hand sender is to be given the chair as generally he will send clearer cut stuff than the man with the bug who does not know how to properly use one.

I feel better now, and hope this criticism will "go home" with some of the boys and that they will slow their "jerked lightnings" down and try their level best to "make something" out of their sending. 73.

—R. K. FitzGibbon, 5ACX (AB).

WWV SCHEDULES

(Concluded from page 36)

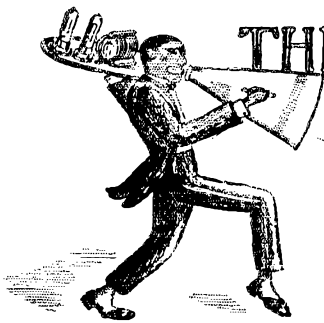
can be found in the Bureau of Standards Circular No. 92 which may be obtained on application from the Bureau of Standards, Washington, D. C.

All transmission is by "straight" unmodulated continuous-wave telegraphy. A complete frequency transmission consists of a general call (i.e., "QST de WWV"), a standard frequency dash, and announcements. The call continues for two minutes, including the statement of the *frequency*, (not wave length) being used. The standard-frequency dash is broken occasionally by the signature "WWV" and continues for about 4 minutes. The "announcement" is on the same wave length as the test that has just been sent and gives the *exact* frequency of the signal, measured while that signal was being sent. The next frequency is then announced and a 4 minute interval follows while adjustments are made.

Schedule of Frequencies Kilocycles

(Approximate wave lengths in meters in parentheses)

Eastern Std. Time	March 5	March 20
11:00 to 11:05 P.M.	500 (600)	1300 (231)
11:12 to 11:20 P.M.	600 (500)	1400 (214)
11:24 to 11:32 P.M.	700 (428)	1500 (200)
11:36 to 11:44 P.M.	833 (360)	1600 (187)
11:48 to 11:56 P.M.	900 (333)	1700 (176)
12:00 to 12:08 A.M.	1000 (300)	1800 (167)
12:12 to 12:20 A.M.	1200 (250)	1900 (158)
12:24 to 12:32 A.M.	1400 (214)	2000 (150)



THIRD DISTRICT GANG!!

FIRST CALL FOR THE FIFTH CONVENTION

ALL SET, fellows, for another of those big get-together A.R.R.L. Conventions the Third pulls off every year, with eats and talks and trips and enough sock-chewing to keep a hosiery factory humping.

Look at the good things in store for the lucky ham or hamlet that saves up the pennies and comes to Philadelphia; it's going to be the biggest radio hamfest ever staged in the Third District and that's saying a lot!

DATES AND THINGS

(Put them on your calendar in red)

Time: April 24, 25 and 26. (Easter Week—no school).

Place: Hotel Adelphia, 13th & Chestnut Sts., Philadelphia.

Banquet: Friday April 25. Lots of eats and few speeches.

Wouff-Hong Initiation! The final destination of every League member.

ADDITIONAL ATTRACTIONS

A full fledged ham transmitter will be at the hotel. 3DRC (3rd District Radio Convention) will be in operation day and night for the gang to sit in on. (We'll say it will!)

Trips to interesting ham stations, broadcast stations and to Central High School, birthplace of radio and site of Benjamin Franklin's kite experiments.

Technical meetings, contests, exhibits, speeches from WOO, and lots of time to meet other hams and get QSO. BYOW (Bring Your Old Woman).

PLEASE

Make your reservations **early.** It assures you a place and is a big help to the Arrangements Committee. Banquet ticket $5.00 includes everything but Wouff-Hong Initiation. Just drop a line to:

TOM APPLEBY, Business Manager

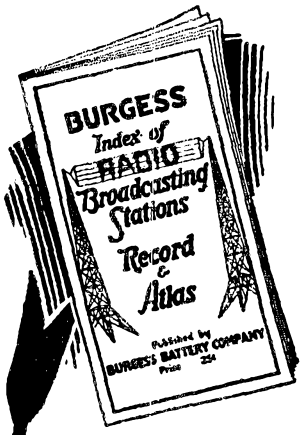
708 Harrison Bldg., Phila.

and say;

"I'LL BE THERE WITH BELLS, OM!"

A Handy Booklet

for every Radio Fan



THE STATIONS you hear—who are they? Where are they? Who operates them? What are their wave lengths?

This new Burgess Index of Broadcasting Stations, Record and Atlas answers those questions. It contains in part, a revised list of every broadcasting station in America. There are maps of the United States, Canada and the World, together with accurate charts showing time divisions of the world.

10¢ Brings it

Keep a record of every station tuned in

Several pages of this booklet are devoted to to space for a record of the stations you tune in, the date, call number, location, time, distance and dial positions. There's a lot of satisfaction in looking over a long list of stations brought in and showing your friends what a great little set you have.

The size is handy—The price is handy

This booklet fits the pocket—takes up little table space and the information you want is easy to find. It only costs a dime. This forty-eight page Index and Atlas was compiled to sell for 25c but in keeping with our policy of furthering the interests of radio enthusiasts, we are glad to distribute these booklets at cost. We believe you will be glad you secured your copy.

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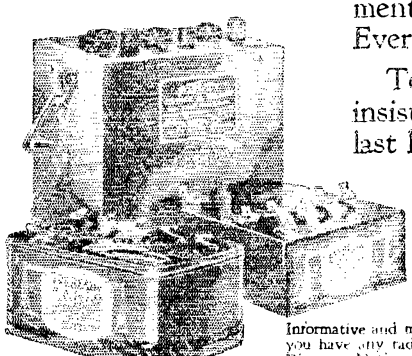

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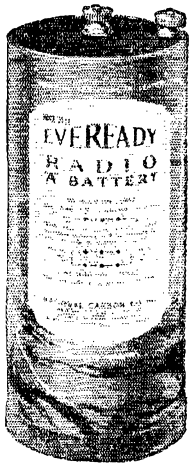


The radio dry cell triumphant

For economical, satisfactory radio, light the filaments of your dry cell tubes with the Eveready Dry Cell Radio "A" Battery. Will unfailingly outlast any other at ⅛ ampere current. Full instructions for getting this Economical Eighth, on labels and in our booklets. This battery will exceed your expectations in economy and performance.

Equal to all demands

Power flows from your "B" Battery, power that gives life to your head-phones or loud speaker. Some tubes draw more "B" Battery current than others, but whatever the tube or tubes you use, Eveready "B" Batteries will give you maximum results. Eveready "B" Batteries are made in six sizes, for all possible uses. Always use the biggest possible battery, for it contains more energy in proportion to cost, and lasts longer. Where table space is limited, use the compact vertical 22½-volt "B" Battery No. 764. Its power is packed in small space.

This battery is a wonder worker

Eveready's biggest contribution to economical and more satisfying radio is the Eveready "C" Battery, a triple-use, universal battery. It will make the loud speaker respond with a new fullness and naturalness of tone, and save much money by making the "B" Battery last still longer. Connect it with the grids of audio frequency amplifiers and notice the big difference. Can also be used as an "A" Battery for 199-type tubes in portable sets, and as a "B" Battery booster. Eveready Radio Battery No. 771—use it!

The AFRICAN "Drum talk" of TODAY

BOOM! BOOM! BOOM! BOOM!

Thus the drum talk of the natives of Africa broadcasts to a radius of fifty or sixty miles the departure of white men leaving one village for another. To the weird Boom! Boom! of the huge drum, the travelers with their porters commence the perilous journey, knowing that their arrival is expected at the next village.

What a far cry this crude method of sending messages is from our modern, useful, pleasure-giving radio. And how very backward it seems when we consider the rapid strides made in the radio industry in just a few years time as exemplified by the Crosley story.

Three years ago Crosley Radio Receivers were unknown. Today, The Crosley Radio Corporation is the largest manufacturer of radio receivers in the world. In every part of the United States, happy users are enjoying the beautiful concerts, useful lectures and valuable news that Crosley instruments unfailingly bring in from the distant points desired.

Real Merit at moderate prices has brought about this Crosley popularity. Crosley engineers have continually kept abreast and perhaps a little ahead of the rapid advancement that radio has made.

We firmly believe that Crosley Radio Receivers are the best that have ever been offered to the public.

Insist upon Crosley Radio Apparatus.
For Sale by Good Dealers Everywhere.

The Crosley Radio Corporation

Powel Crosley, Jr., President

Formerly

The Precision Equipment Co. and Crosley Manufacturing Co.

318 Alfred Street, Cincinnati, Ohio

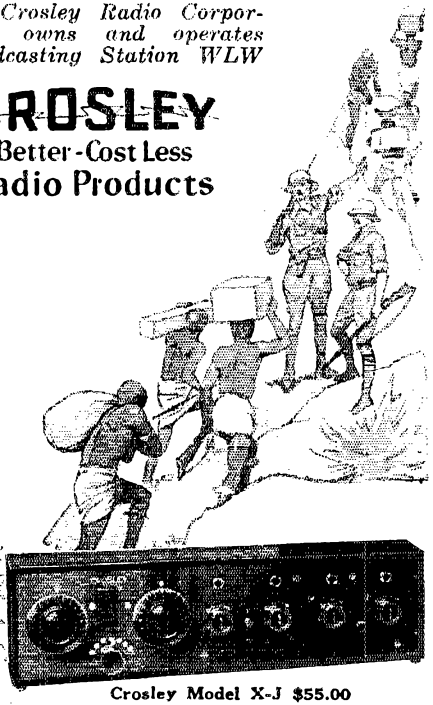
Following is a List of the Most Popular Crosley Receiving Sets With Their Prices

Crosley Type V (formerly Ace) one tube regenerative.....$16.00
Crosley Type 3-B (formerly Ace) three tube regenerative...$42.00
Crosley Type 3-C (formerly Ace) consolette model $110.00
Crosley Model VI, two tube incorporating radio frequency..$24.00
Crosley Model X-J, four tube, incorporating radio frequency..$55.00
Crosley Model X-L, four tube Consolette $120.00

The Crosley regenerative receivers formerly called Ace, listed above are licensed under the Armstrong U. S. Patent No. 1,113,149.

The Crosley Radio Corporation owns and operates Broadcasting Station WLW

CROSLEY
Better-Cost Less
Radio Products



Crosley Model X-J $55.00

A 4 tube radio frequency set combining one stage of Tuned Radio Frequency Amplification, a Detector, and two stages of Audio Frequency Amplification. A jack to plug in on three tubes for head phones, the four tubes being otherwise connected to the loud speaker, new Crosley multistat, universal rheostats for all makes of tubes for dry cells or storage batteries, new condenser with molded plates, filament switch and other refinements add to its performance and beauty.

We believe that for bringing in distant stations it cannot be equalled.

Cost of necessary accessories from $40.00 up.

MAIL THIS COUPON TODAY

The Crosley Radio Corporation,
318 Alfred Street, Cincinnati, Ohio
Gentlemen:—Please mail me free of charge your complete catalog of Crosley instruments and parts.

Name .....

Address .....

.....

Here is the Man---Here is the Receiver

The amazing story of continued communication with the MacMillan Expedition, on the Steamer Bowdoin—frozen in somewhere near the North Pole—and with other distant points is here told by Mr. Len Weeks, Radio 9DKB, Minot, N. D.

December 30, 1923.

"I submit the following account of the use of the Ace Type 3B and the Ace Type V radio receivers for DX work, especially with WNP.

"Using the Ace Type 3B or Type V have heard the schooner "Bowdoin" radio WNP a total of seventeen times during November and December. On thirteen of these occasions communication was established. Thirty-four messages totaling several thousand words were received from the Bowdoin, including a 1500 word press dispatch, taken in 3 hours and 30 minutes. Twenty-two messages were sent to MacMillan and members of the crew. The greatest length of time between communication was nine days, of which four were spent away from the station. Signals were unusually readable and often uncomfortably loud on two steps.

"During the month of December Canadian 9BP, Jack Barnsley, has been on a vacation. During this time my station has been the main, but not the only, link between the North Greenland expedition and the United States. Most of the credit for this is due to the fine control of regeneration and ease of adjustment on the Ace sets. Having a wave length range that completely covers the amateur band, it was easy to quickly shift wave length in order to avoid interference.

"In addition to the above reception, 7AHB in Alaska and 6CEU in Hawaii have been copied several times. Of course stations on both the east and west coast are heard every night. It is nothing unusual to copy stations from every district in a night's work. I have discarded a higher priced three circuit set for I honestly believe that the ACE sets give greater receiving range both in miles and kilocycles."

January 5, 1924.

"Last night my second operator, Homer Stenerson, a man comparatively inexperienced in amateur work, successfully established communication with WNP, giving him a message and getting an acknowledgment. Many people seem to think that the results are due to expert manipulation. This is not the case, for on several occasions I have had other amateurs listening for WNP while I took a much needed sleep. Nearly always they were able to pick him up and hold him till I got on the job."

The above communications are merely samples of the continued proofs, voluntarily sent us of the superiority of Crosley Instruments.

We believe that for bringing in distant stations they cannot be equaled. And the prices are Remarkably Low.

The ACE TYPE V—$16.00 **The ACE TYPE 3-B—$42.00**

Write for Complete Catalog

THE CROSLEY RADIO CORPORATION

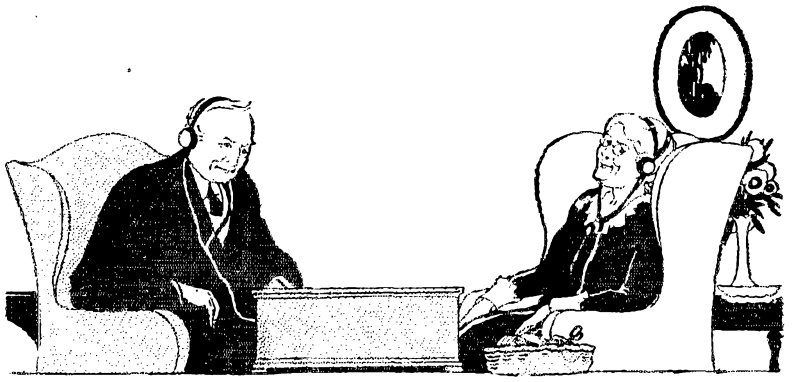
Powel Crosley, Jr., President

Formerly

The Precision Equipment Company and Crosley Manufacturing Company

318 ALFRED STREET **CINCINNATI, OHIO**

The Ace Receivers mentioned above are now known as Crosley Receivers



A new world of entertainment

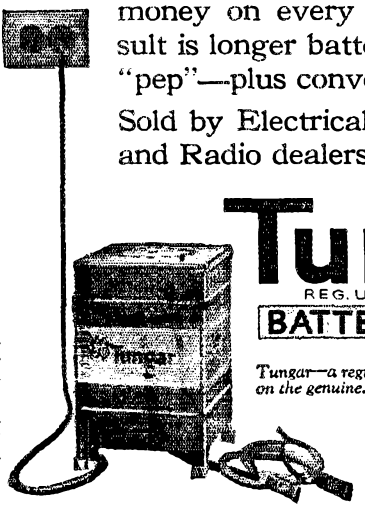
—when the radio battery is fully charged ready to receive choice programs. So it's up to you to keep the battery full-powered with the Tungar. It recharges the storage battery overnight from the house current.

The Tungar is equally good for your radio or auto battery—saves money on every charge. The result is longer battery life and more "pep"—plus convenience.

Sold by Electrical, Auto-accessory and Radio dealers.

Tungar is one of the many scientific achievements contributed by the G-E Research Laboratories toward the wonderful development of electricity in America.

Tungar Battery Charger operates on Alternating Current. Prices, east of the Rockies (60 cycle Outfits)—2 ampere complete, $18.00; 5 ampere complete, $28.00. Special attachment for charging 12 or 24 cell "B" Storage Battery $3.00. Special attachment for charging 2 or 4 volt "A" Storage Battery $1.25. Both attachments fit either Tungar.



Tungar
REG. U.S. PAT. OFF.
BATTERY CHARGER

Tungar—a registered trade mark—is found only on the genuine. Look for it on the name plate.

Merchandise Department
General Electric Company
Bridgeport, Connecticut

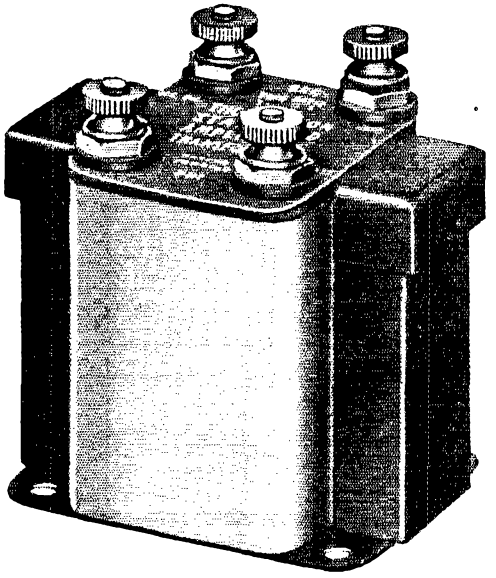
GENERAL ELECTRIC

48E-8

NOT CLAIMS — JUST FACTS!

THORDARSON Super Transformers

AUDIO FREQUENCY



3½ to 1 RATIO.....$4.00
6 to 1 RATIO..... 4.50

Every manufacturer claims that his product is the "best" in the world. But the quality of scientific apparatus is not a matter of claims and opinions, but of facts.

CUTTING & WASHINGTON
KENNEDY
ZENITH

are names that rank supreme in the receiving set world. The superiority of their apparatus does not depend on opinion, but is the result of careful construction and scientific selection of parts. All three use the Thordarson Super Audio Frequency Amplifying Transformer, for, after exhaustive tests, it was found to be the most in keeping with the high quality of their sets.

AMATEURS READ THIS

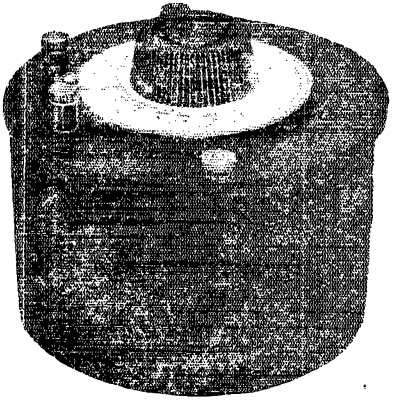
McMillan, preparing for his North Pole expedition, sought the most efficient and durable radio equipment obtainable. His engineers specified Thordarson transmission equipment because Thordarson can be relied upon for serviceable distant transmission.

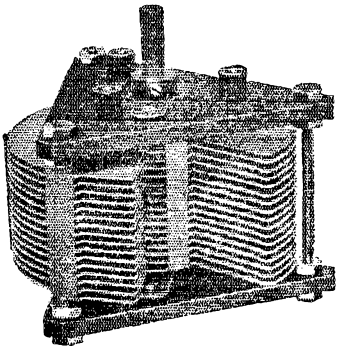
When selecting your apparatus bear in mind the choice of these experts.

THORDARSON
ELECTRIC MFG. CO.

CHICAGO — ILLINOIS

Successful Transatlantics





Amateur Radio Station 1ANA
Chathamport, Mass.
Jan. 16th, 1924

General Radio Company,
Cambridge, Mass.

Gentlemen,

I wish to present a testimonial for your type 247 Condenser, which deserves recognition as being one of the best.

During the recent transatlantic test just completed, twenty-seven European amateur stations were copied at 1ANA. The tuner used was a simple regenerative outfit using one .0005 G. R. Co., type 247 Condenser.

The signals from F8AB, Nice, France were copied every night on a wavelength of 110 meters. Only an efficient condenser would permit of this.

Yours very truly,

R. B. Bourne.

General Radio Condensers are the result of over a decade of engineering research and design.

Send for description in free Radio Bulletin 916-Q

GENERAL RADIO COMPANY

GENERAL RADIO CO.

Manufacturers of

ELECTRICAL AND LABORATORY APPARATUS

Massachusetts Avenue and Windsor Sts.

CAMBRIDGE, MASS.

To Our Readers Who Are Not A.R.R.L. Members

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

.....1924

American Radio Relay League,
Hartford, Conn.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2 in payment for one year's dues. This entitles me to receive *QST* for the same period. Please begin my subscription with the.....issue. Mail my Certificate of Membership and send *QST* to the following name and address.

.....

.....

.....

Station call, if any.....

Grade operator's license, if any.....

Radio Clubs of which a member.....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write to him too about the League?.....

.....Thanks.

The CLEAR Loud Speaker!

HOW near the music sounds when it comes through the clear Herald! Just as if you were dining in a famous restaurant, and its orchestra were playing beside you.

That's the effect the Herald always gives. *Absolute clearness.* Because it is free from all blast and blurr. Whether the number be music, lecture or news, the clear Herald is faithful to the performer.

THE Herald, like other good musical instruments, improves with age because of its laminated core, mica diaphragm and permanent magnet. It stands up under power without rattling. The adjustable diaphragm makes it possible to get the most out of a weak set. Height 30 inches. 6-foot cord. Price $30. Slightly more on Pacific Coast and in Canada. Write for folder and enclose your dealer's name.

HERALD ELECTRIC CO., Inc., 113 Fourth Avenue, New York

A VERY POPULAR STYLE OF RADIO TABLE.

DESIGNED ESPECIALLY FOR RECEIVING.

PLENTY OF LEG ROOM.

BATTERY CABINET IS ON RIGHT INSTEAD OF LEFT AS SHOWN IN CUT.

SPECIFICATIONS.

Hardwood, rubbed mahogany or golden oak finish.

Height 31 inches, top 20 x 34 inches.

Drawer with lock, size 4 x 10 x 13 inches.

Battery cabinet, size 17 x 14 x 16 inches.

PRICE

No. 30-R Radio Table $18.00
Freight prepaid to east of Miss. river.
To Rocky Mt. states freight prepaid, $20.00

This Table is a very handsome piece of furniture weighing, crated 85 lbs. We make these in our own factory in large quantities and sell direct to you at a small factory profit.

RADIO CABINETS.

Our cabinets are high-grade in every respect and are not to be classed with the cheaply made stained cabinets with which the market is flooded.
Hardwood, hinged tops, tops spleined to prevent warping, rubbed dark red mahogany finish.

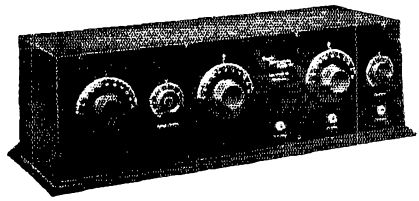
SIZES AND PRICES

7 x 14 x 10 deep	$3.00
7 x 18 x 10	3.25
7 x 21 x 10	3.50
7 x 24 x 10	3.75
7 x 26 x 10	4.50

Postage prepaid to east of Miss. river.
To Rocky Mt. states add 25 cents each.

CASH MUST ACCOMPANY ALL ORDERS.
Send for free Catalog

THE SOUTHERN TOY CO., Inc.
HICKORY, NORTH CAROLINA



MU-RAD RECEIVERS

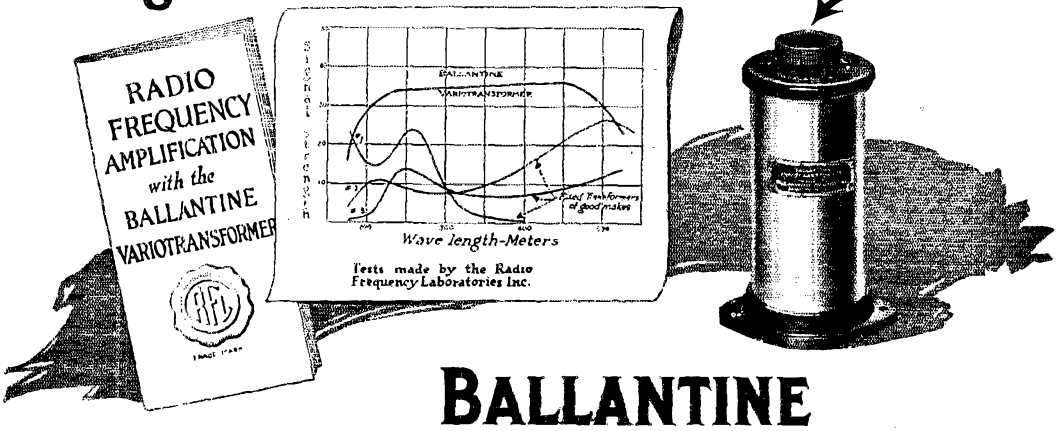
STILL FURTHER beyond the accepted bounds of radio reception, this long-range MU-RAD Receiver, MA-15, has extended the domain of radio entertainment. To the easy operation and high selectivity of the MU-RAD design, is added a still greater mastery of illimitable spaces together with pure, clear loud speaker volume. All this with only a handy 2 foot loop! The standard MU-RAD circuit of proven performance—two stages of audio and three stages of radio frequency amplification with detector. Adam Brown, hand-rubbed finish mahogany cabinet with voltmeter for quick reading of "A" and "B" battery conditions.

Guaranteed range with 2 foot loop—1000 miles

Write for Literature

MU-RAD LABORATORIES, INC.
804 FIFTH AVE. ASBURY PARK, NEW JERSEY

How turning this knob gets more stations



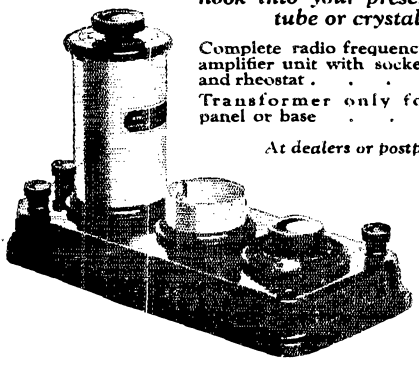
BALLANTINE VARIOTRANSFORMER

HERE'S evidence that the tuning dial of a Ballantine Variable R. F. Transformer gives superior results. The light line curves (plotted from careful experiment) show you that fixed transformers do not give satisfactory amplification for many of the important stations. Why? Because the *fixed* windings are out of tune.

With Ballantine instruments you can accurately tune everything from 200 to 600 meters—by merely turning the knob. This adjusts the windings to the wave length of the station wanted.

Get Stations You've Never Had

Perfect shielding and pig-tail connections assure clear tones. Then, by keeping amplification uniformly high throughout the broadcast range, you get all there is within reach of your set.



Here's an assembly ready to hook into your present set—tube or crystal.

Complete radio frequency amplifier unit with socket and rheostat $15.00

Transformer only for panel or base $9.00

At dealers or postpaid

Send for This Booklet

"Radio Frequency Amplification with the Ballantine Variotransformer," 25 pages of practical interest. Mailed to Radio experimenters upon request.

BOONTON RUBBER MFG. CO.
Pioneers in Bakelite Moulding

124 Fanny Road, Boonton, N. J.

A.R.R.L Members -- What about your friends?

You must have a friend or two who ought to be members of our A.R.R.L., but aren't. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

.....1923

American Radio Relay League,
Hartford, Conn.

I wish to propose

Mr..... of.....

Mr..... of.....
Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

.....

.....

Murdock Radio Phones

are built, not assembled

MURDOCK Radio Phones are unsurpassed for acoustical efficiency. For 20 years they have been the choice of research radio engineers and discriminating amateurs—because of their sensitiveness, clarity and volume reproduction. They are made in a single unit, of superior moulded insulation. Each part is fitted by one process into its proper place. They are moulded together—thus assuring firmness, strength, durability and maximum service. And the parts can't get out of adjustment.

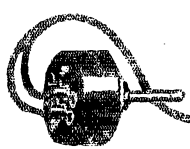
You can pay more but you can't get better value

Quantity manufacture has standardized the price at what a high grade 'phone should sell for. Over 1,000,000 users have accepted the Murdock standard of quality and price as the best measure of radio phone value. Get a Murdock today and test it out. They are fully guaranteed.

Murdock Multiple Plug Jacks for one to four 'phones.

WM. J. MURDOCK COMPANY
343 Washington Ave., Chelsea, Mass.
Sales Office: Chicago and San Francisco

Standard Since 1904



PATTERN No. 96

RADIO TEST SET

¶ This radio test set has been designed to meet the demands coming to us from serious experimenters, manufacturers and dealers in radio equipment and supplies, for a complete radio testing outfit.

¶ While the various ranges of readings permit making practically every test necessary in connection with radio receiving sets, it has been particularly designed for the taking of characteristic curves on vacuum tubes, the only extra equipment required being the batteries.

¶ The several instruments, any of which may be used independently, include a 0-1.2 filament ammeter, a 0-6 filament voltmeter, a 0-120 plate voltmeter, a 0-10 plate milliammeter, and a 10-0-10 grid voltmeter.

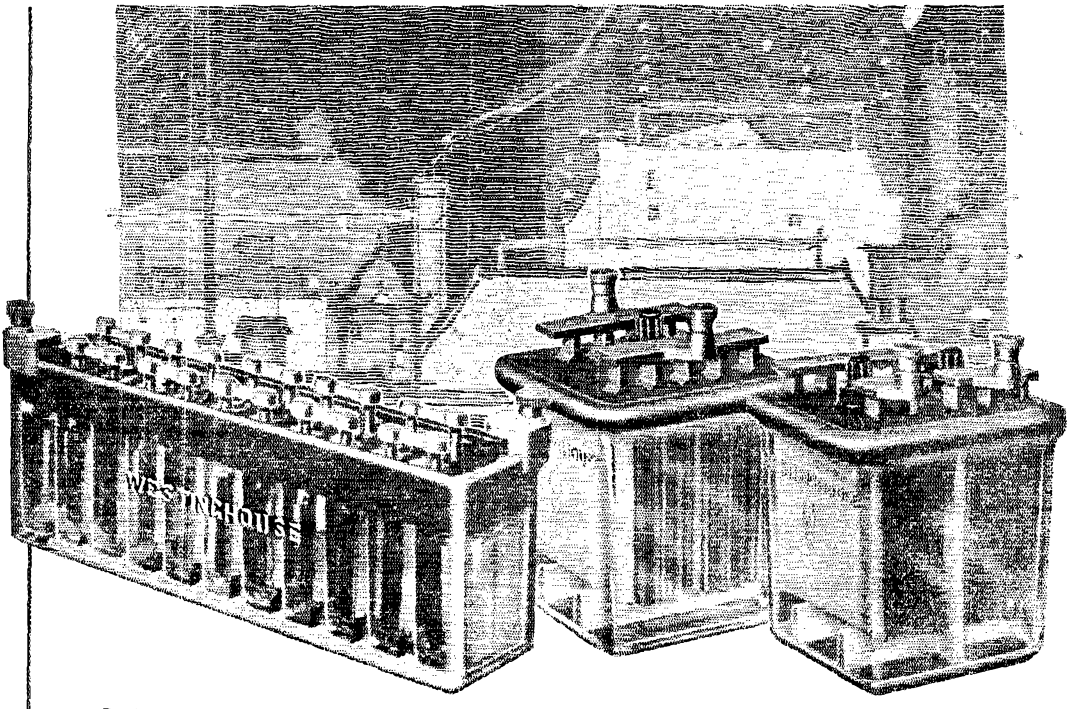
Complete With Instructions

Price, $75.00

Send for Circular

ORDER FROM DEALER

JEWELL ELECTRICAL INSTRUMENT CO.
1650 WALNUT ST.
CHICAGO



NOTHING about a radio set is so absolutely essential to satisfactory receiving as *good batteries*. Sustained voltage, slow, even discharge, ample capacity, utmost quiet, long life—these are important. Don't be satisfied with anything less than Westinghouse Radio Storage Batteries. They are built to meet the most exacting requirements of radio broadcast transmission and reception. And they last! Thoroughly insulated against current leakage. Easily recharged. A size and type for every radio need.

MAIL COUPON for interesting facts about batteries.

Westinghouse CRYSTAL CASE Radio Batteries have one-piece clear glass cases, with glass cell partitions and high glass plate rests (deep sediment spaces). "A" Batteries in 2, 4 and 6 volt sizes. 6-volt size made in rubber-case types too. "B" Batteries in 22-volt units—regular and quadruple capacities. "C" Batteries in 6-volt units.

WESTINGHOUSE UNION BATTERY COMPANY, Swissvale, Pa.

WESTINGHOUSE

RADIO

"A," "B" and "C" BATTERIES

Westinghouse Union Battery Co.
Swissvale, Pa.

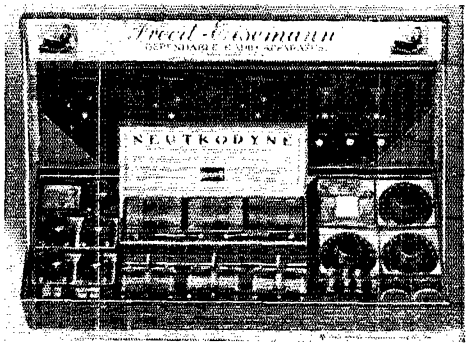
Send me Westinghouse Radio Battery Folder A-3-D.

.....

.....

.....

A *Freed-Eisemann* KNOCK DOWN NEUTRODYNE RECEIVER



Unassembled Model KD-50
Freed-Eisemann Neutrodyne Receiver.

NOW the opportunity is presented to obtain a complete set of parts, recommended by the manufacturer, to work with each other in building your Neutrodyne set. An illustrated 32-page book on how to build the Neutrodyne with full-sized diagrams and templates included.

Complete
With full instructions

$80

Dealers Write for Name of Nearest Distributor.

NEUTRODYNE has taken the country by storm. It is **the** remarkable distance getting, powerful, non-oscillating and non-whistling receiver.

A 32-page book answers every question. The panel is accurately drilled. A baseboard is furnished; in fact, everything down to the very last screw and nut, including all necessary parts excepting the cabinet.

Besides the book there is furnished schematic blueprints and template for drilling the baseboard, also full-size pictorial perspective, wiring diagram, so that it will hardly be possible for the amateur with ordinary care and skill to make an error.

Remember that here are licensed parts —not a collection of apparatus trusting to luck that they will assemble properly. Each part is **designed** and fitted to work with each other part in this particular set. The instructions are so complete and the parts so accurately matched that you will be grateful for the manner in which we have eliminated guess work in the amateur construction of this receiver.

For sale by dealers of the better class throughout the country, for amateurs and experimental building. Builders are cautioned against attempting to build a Neutrodyne Set with parts which are not recommended and designed by the manufacturer to work with each other.

Front View KD-50
Neutrodyne Being Assembled

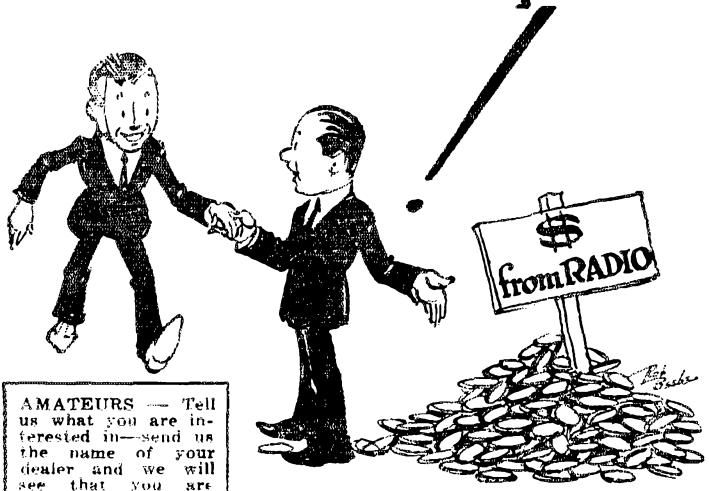
NEUTRODYNE

32-page illustrated book of instructions on "How to Build the Neutrodyne" with full size pictorial wiring diagram and full size panel and baseboard templates, $1. At your Radio Dealers.

Freed-Eisemann Radio Corporation

SPERRY BUILDING, MANHATTAN BRIDGE PLAZA, BROOKLYN, N. Y.

Let HOMMEL'S experience guide you



AMATEURS — Tell us what you are interested in—send us the name of your dealer and we will see that you are supplied promptly.

This organization was one of the pioneer wholesale distributors of radio equipment. They have seen hundreds of retailers come and go.—they know from experience "what and when and how" dealers can best sell radio supplies and enjoy a satisfactory margin of profit.

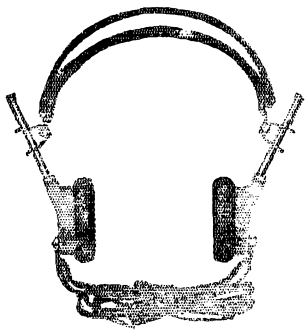
HOMMEL distributes only recognized nationally advertised apparatus that is guaranteed by the manufacturer, — their dealer discounts are very liberal, — their stocks are always ample to take care of any requirement, — they wholesale exclusively and do not compete with dealers by retailing.

HOMMEL'S Dealer Service Department is maintained for your benefit,—their experience and advice will prove helpful to you in many ways, and this service is cheerfully given any time without charge.

Get in touch with us to-day, write for the new HOMMEL encyclopedia, 216T—profit by HOMMEL'S experience—it is paying hundreds of other dealers,—why not you?

LUDWIG HOMMEL & CO

530-534 FERNANDO ST. — PITTSBURGH, PENN'A



A Reduced Price
A New Bulletin
BUT

The same old reliable Roller-Smith Universal Headset. Type A. 3,000 ohms, list price **$6.00.**

It brings in the stuff, local or DX as loud and clear as the chimes.

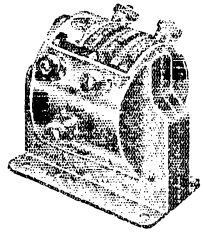
If your dealer doesn't have them write us. Send for new Bulletin No. AG-20.

ROLLER-SMITH COMPANY
16 Park Place, New York
Offices in principal cities in U.S. and Canada

"PUSH —PULL" POWER AMPLIFICATION

—added to your audio frequency amplifier by means of All-American Power Amplifying Transformers, develops—in any good loud speaker—the maximum volume with a roundness richness, depth and purity of tone positively amazing!

All-American "Push-Pull" Transformers lead their field—just as All-American Audio and Radio Frequency Transformers do. The most widely used, most popular transformers in the world. Standard on the better sets. Recommended by all the better dealers.



Special Offer!
Send 4¢ for Power Amplification diagram-circular and book of 22 hook-ups

Rauland Mfg. Co.
Pioneers in the Industry
2650 Coyne St.
CHICAGO

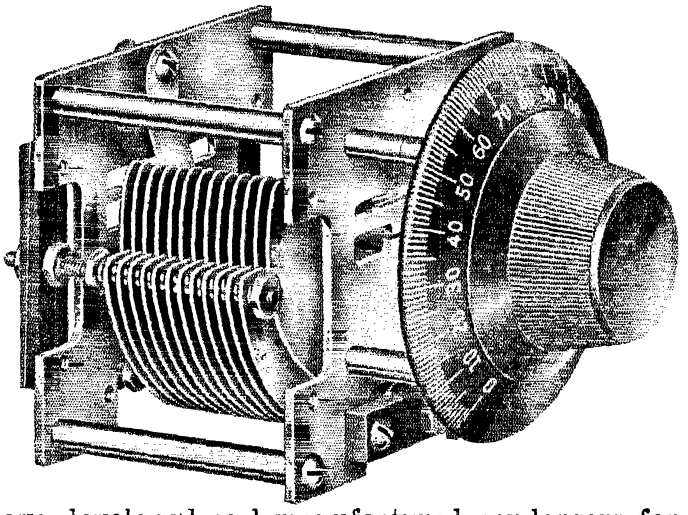
Audio Frequency (3:1, 5:1, 10:1)

Power Amplifying Transformers (input and output) for "push-pull" circuits. Each $6. The best-no need to pay more.

ALL-AMERICAN
AMPLIFYING TRANSFORMERS
Largest Selling Transformers in the World

THE NATIONAL
PERFECT VERNIER CONDENSER
TYPE DX
TESTS PROVE THIS DESIGN MOST EFFICIENT

Minimum Loss



Maximum Signal Strength

We have developed and manufactured condensers for several of the best known receiving sets. The requirements have been exacting but have been met with well designed units of high quality. Over 45,000 of our condensers are in daily use.

In presenting our latest condenser to the readers of this magazine we realize that we are approaching a class of purchasers who are most discriminating. We feel, however, that the unit justifies careful consideration. It has been thoroughly tested in competition with several of the best makes of condensers and the results obtained show that it is equal to the best and far superior to the average. It has an exceptionally low loss and a high ratio of maximum to minimum capacity.

The Vernier Dial is a great aid in micrometric adjustment. It gives a positive reduction in movement with no backlash or lost motion and in combination with the condenser produces a unit whose "touch" is decidedly smooth in operation and attractive to the user.

Mechanically and electrically the type DX condenser is as perfect as scientific design and laboratory skill can commercially produce. It is guaranteed for one year.

PRICES

Type DX 10	Perfect Vernier Condenser (.001 MF)	$7.00
Type DX 5	Perfect Vernier Condenser (.0005 MF)	6.00
Type DX 3.5	Perfect Vernier Condenser (.00035 MF)	5.75
Type DX 2.5	Perfect Vernier Condenser (.00025 MF)	5.50

THE NATIONAL COMPANY, Inc.
ENGINEERS & MANUFACTURERS
CAMBRIDGE, 39, MASS.
ESTABLISHED IN 1914

If you contemplate purchasing a condenser and your dealer has no Type DX condenser we make for a limited time, the following offer:—

The National Co., Inc., Cambridge, 39, Mass.

.....1924

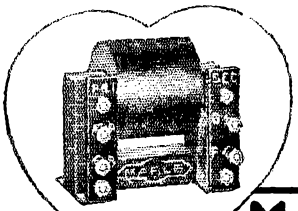
Gentlemen:—

Find enclosed check M.O. for.....

for.....Type DX Perfect Vernier Condenser size..... I am to use it for five days and if not satisfied, I am to return it to you carefully packed by Parcels Post insured, and upon receipt of same you are to refund purchase price.

Very truly yours,

.....



MARLE

Radio & Audio Frequency

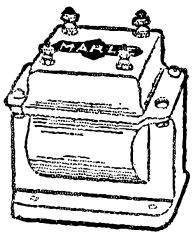
TRANSFORMERS

"The Heart of a Good Receiver"

PERFECT AMPLIFICATION is the boon you secure when you buy a *Marle Transformer.* Radio impulses are magnified to the uttermost limit without a sign of distortion. True over the widest range of frequencies. Special folders showing the hookups for standard circuits, sent upon request.

Write for hookups and Illustrated Folder TODAY!

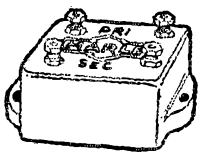
Your Dealer Sells Marle Transformers, or Write to us for the names of the nearest Marle dealers.



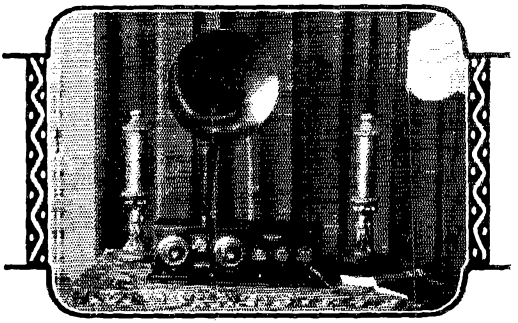
Audio F
Type A7
Ratio of
3¾ to 1

MARLE Engineering Company

Orange New Jersey



Radio F
Types
R1 and R2



RADIODYNE

"The Voice of the Nation"

NO LOOPS — NO ANTENNA

The RADIODYNE is ready for operation by simply grounding to a water pipe or radiator, and throwing a few feet of wire on the floor. Uses any standard tubes—dry cell or storage battery. Extremely selective. Simple to operate—***only two controls.***

Stations within a radius of 2000 miles can be picked up on the loud speaker; any wavelength from 200 to 700 meters. You can select the best programs on the Radiodyne.

Price $150.00

For use in apartments, boats, automobiles, railroad trans, etc., the RADIODYNE is enjoyable where other receiving sets would not be practical.

When interference, strays, static, etc., make other types of reception utterly useless the RADIODYNE picks up broadcast programs clear and distinctly.

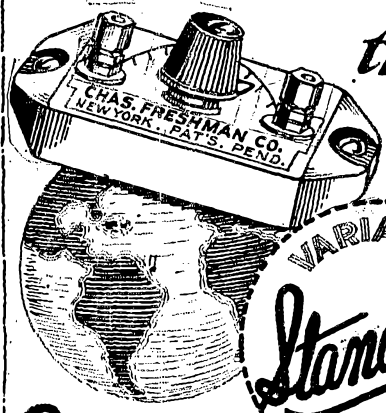
TO THE A.R.R.L.

We appreciate your efforts in boosting W.C. sets and are always pleased to furnish full information about them to members who have not yet had the opportunity to operate a Radiodyne. We want every member to know the merits of this efficient outfit.

Just drop us a line and we will see that your enquiry gets prompt attention

Western Coil and Electrical Co.
305 Fifth St., Racine, Wis.

The Stamp of Approval the World Over



FRESHMAN Variable Grid Leak

"The Standard Unit for Every Tube Set"

EVERY tube and every circuit require a different grid leak resistance. The method employed in the Freshman Variable Grid Leak permits you to adjust your circuit to any resistance you wish, from 0 to 10 megohms in an unbroken range of 180 degrees. The Freshman Variable Grid Leak and Condenser combined, takes the place of a grid condenser, leak mounting and grid leak—and, in addition, permits an adjustment to the correct amount of resistance.

The Freshman Variable Grid Leak is the most compact, the most perfect, the most efficient, the most readily adapted to all grid circuits,—and the only one which is entirely sealed and always remains unaffected by any climatic conditions. It is the

ORIGINAL

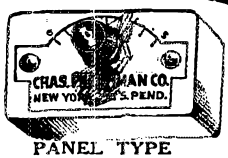
VARIABLE GRID LEAK

Ask your dealer or write for our free diagrams of Neutrodyne, Tri-Flex, Kaufman and other good circuits.

Either Base or Panel Type Complete with .00025 or .0005 MF. Freshman Condenser $1

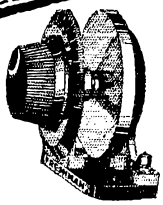
Either type without Condenser..75c

At your dealers, otherwise send purchase price and you will be supplied with out further charge.

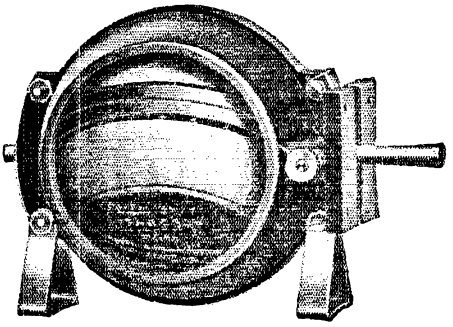


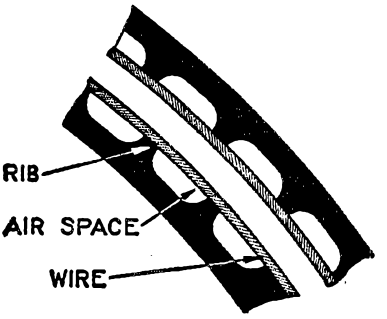
PANEL TYPE
VARIABLE GRID LEAK

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE
NEW YORK CITY



"FRESHMAN SELECTIVE" MERCURY VARIABLE CONDENSER
$5.00

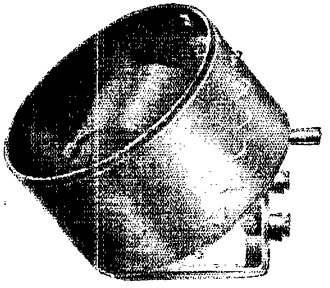




The Paragon Variometer No. 60

reduces dielectric losses to the minimum. It is the first variometer to combine coils surrounded by air with the mechanical strength necessary in such an instrument. It has no equal in the radio field.

Both stator and rotor forms are of polished black, moulded Condensite, each having 24 narrow raised ribs upon which windings are supported, thus practically surrounding them with air. This design, the result of eight years' experience, meets the rigid electrical requirements of Paragon Receivers and fulfills the high mechanical standards of Paragon parts. Price $5.00.



Paragon Variocoupler No. 65

The ultimate in Variocouplers. Coils of double-silk covered wire wound on moulded, black Condensite tubes with highly polished finish. Only multiple turn taps are brought out in the primary. Single turn taps and switch for same are unnecessary. Is simple to operate and insures better reception. Price $3.50.

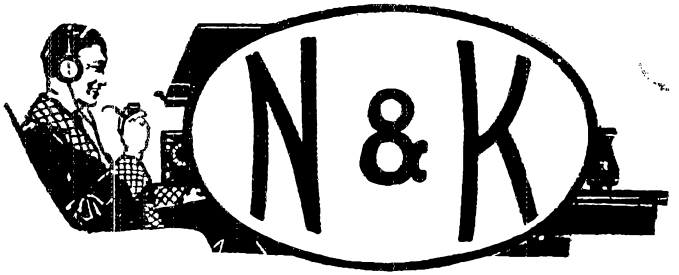
Write for Illustrated Catalog of Paragon Radio Parts

ADAMS-MORGAN CO., 4 Alvin Avenue, Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS



Imported PHONES

give you a *new* radio set!

A PAIR of N & K Phones on your old radio set work a complete transformation. They make it sound new and different. Never before have high or low tones, loud or soft tones, come in so *clear*, so mellow, so natural, so free from distortion.

Get The World With N&K

N & K was designed by one of the world's foremost makers of telephone and other scientific apparatus. It was designed especially for *telephone* reception, whereas most radio phones in use today were originally designed to receive *telegraphic spark signals*. The diaphragm is larger and more sensitive, and is placed at a carefully measured distance from the poles. Even the sound chamber is different.

Last year this head set was submitted to hundreds of American amateur radio stations. 90% of these declared it the best head set they ever used.

Famous for comfort

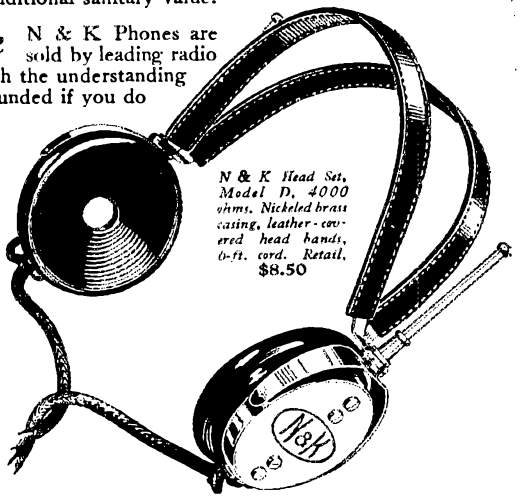
Every user of N & K Phones comments immediately on their comfort and the way they exclude outside sounds. This is due to two things—the extra size of the phones, covering the ear completely, and the leather-covered head bands—which have an additional sanitary value.

You shall be the sole judge

N & K Phones are sold by leading radio dealers everywhere. They are sold with the understanding that your money will be cheerfully refunded if you do not find that N & K Phones reproduce more naturally, give clearer, mellower tone, and fit more comfortably than any other head set.

Dealers, read this!

We authorize you to refund the money on any N & K Phones returned after the above test. We will exchange or replace any that come back to you. Pending the announcement of jobber distributors, we will fill orders direct so that dealers may be prepared for the increasing demand for N & K Phones. N & K comes packed ten to the carton, each carton containing a supply of display matter and literature. Wire or write your order today to department **Q3**



N & K Head Set, Model D, 4000 ohms. Nickeled brass casing, leather-covered head bands, 6-ft. cord. Retail, **$8.50**

TH. GOLDSCHMIDT CORPORATION, Distributors, 15 WILLIAM STREET, NEW YORK CITY

Electrasote Radio Panels Are 25 to 50% Lower Priced

Yet Electrasote is a quality material, in every respect equal to or better than other high-grade radio-panelling. It is the latest addition to the famous "sote" products which have made internationally famous

THE PANTASOTE COMPANY., Inc.

The laboratory tests of experts and the practical installations of users have proved that Electrasote has an exceedingly low phase difference and a high surface and volume resistivity. Its complete absence of abrasives means, besides, that it easy to work with, cuts clean, and won't dull tools.

Beautifully finished with a high piano polish on one side and a fine satin-grain on the other, Electrasote meets every requirement. Every panel is individually packed in a separate envelope.

Electrasote is now on sale at good radio dealers almost everywhere. Certain desirable territory, however, is still open and offers a most attractive proposition to jobbers and dealers. Write to us for complete information.

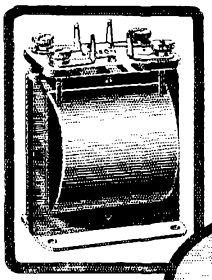
ELECTRASOTE
REG. U.S PAT OFF
TRADE MARK

M. M. FLERON & SON, INC.

Exclusive Sales Agents for Electrasote Radio Panels

113 North Broad Street - - Trenton, New Jersey

IMPROVED IN DESIGN



Reduced in Price

Samson
HW-A2
AUDIO FREQUENCY
Transformer

Leaping sales permitted a reduction in price from $7 to $5, the same as ordinary transformers.

In six short months the SAMSON won first place among **audio frequency** transformers. Samson **Helical Wound** Coils gave to Samson Transformers the highest possible efficiency by reducing the distributed capacity to an absolute minimum, practically eliminating distortion and increasing the amplification 40%.

Now comes a NEW DESIGN, the SAMSON HW-A2 Transformer. Exactly the same in efficiency as the HW-A1 which proved Samson Transformer superiority, the new model occupies 30% **less** space, has special soldering clips, standard terminal markings, drawn metal case and slotted terminal screws for quicker, more convenient connections.

Samson HW-A2 Audio Frequency Transformers will help your set receive at its best. Get them at dealers; or if yours doesn't carry them, direct from us on receipt of price. Write for Bulletin B28 proving Samson's superiority.

Helical Winding—Samson's Secret

Only Samson Transformers have or can have coils with the wire wound in **disc shaped** layers. These give to Samson Transformers greater efficiency. One stage of amplification with a Samson Helical Wound Transformer often proves far more satisfactory than two stages of some and better than three stages of other transformers.

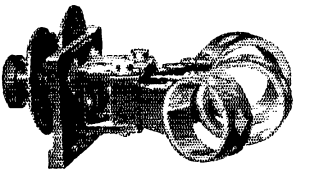
SAMSON ELECTRIC CO.
Factory, Canton, Mass.

SALES OEFICES

Boston, New York, Philadelphia, Buffalo, Pittsburgh, Chicago, Cleveland, Detroit, Indianapolis, St. Louis, Atlanta, Minneapolis, San Francisco, Los Angeles, Seattle, Portland, Montreal and Toronto.

BRANSTON RADIO

Branston Univernier Three-Coil Back-of-Panel Geared Mounting



This is the latest Branston Honeycomb Coil Mounting (R-63). A complete unit. Mounts rigidly on back of panel. Nothing on front of panel but two large closely-graduated dials. Unit has its own terminal block. Spur and bevel gears move coils accurately and give remarkable selectivity. With dial graduations you can "log" stations with precision. Made of genuine Bakelite throughout. Strong and substantial. If your dealer has not yet secured his supply, send check or money order for as many as you need, @ $8.50 each, or order parcel post C.O.D. Mention your dealer's name, please.

Branston Honeycomb Coil Mountings are made in two and three coil types, both for front and back panel mounting, geared and plain. There is one to meet every requirement. Branston Honeycomb Coils are made in sixteen sizes—Use the two or three coil combinations that give you the wave lengths you desire.

SUPER HETERODYNE Special Announcement

Write for complete information and prices on the following apparatus, which we have especially designed for Super Heterodyne circuits.

No. R-90 Oscillator Coupler. Complete with mounting brackets, bank wound inductances and adjustable coupling coil with locking device.

No. R-91 Intermediate Radio Frequency Transformer. Very sharply tuned and shielded.

No. R-92 Special Transfer Coupler for last Stage of Intermediate Frequency. Very sharply tuned and shielded.

No. R-93 Specially Designed Coupler. For using antenna.

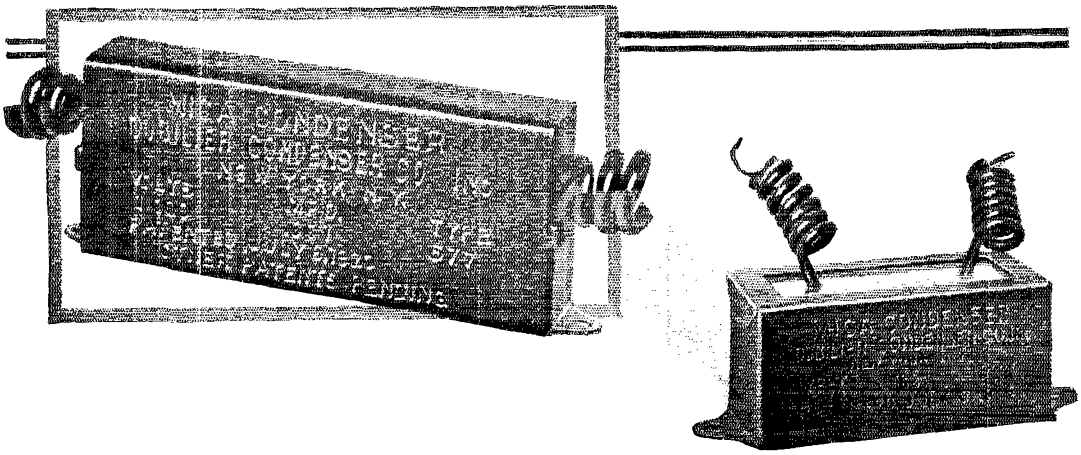
Send 2 cent Stamp for New Honeycomb Coil Hookups.

Look for this trademark card in your dealer's window or salesroom.

Compiled by experts and includes five good Honeycomb Coil "Hookups" and complete catalog of famous Branston Radio Apparatus. Write today. Give us name of your radio dealer. If he cannot supply you, write

Chas. A. Branston, Inc.
823 Main St.
BUFFALO, N.Y.

Manufacturers of Branston Violet Ray High Frequency Generators. In Canada — Chas. A. Branston Ltd., Toronto, Ont.



Dubilier Condensers
Standard for Radio Transmitters

Dubilier Condensers, type 577 and 580, are the recognized standard precision equipment for low power tube transmitters, because of their extremely low loss and accurate capacity.

Dubilier Condenser
Type 577

Capacity	Voltage
.00025	1000
.0005	1000
.001	1000
.002	1000
.005	1000
.0075	1000
.01	1000

Dubilier Condenser
Type 580

Capacity		Voltage
.001		5000
.002		5000
.005		2500
.01		2500
.02		2500
.0003 .0004 .0005	These 3 capacities combined in 1 condenser	5000

Complete information will be supplied on request

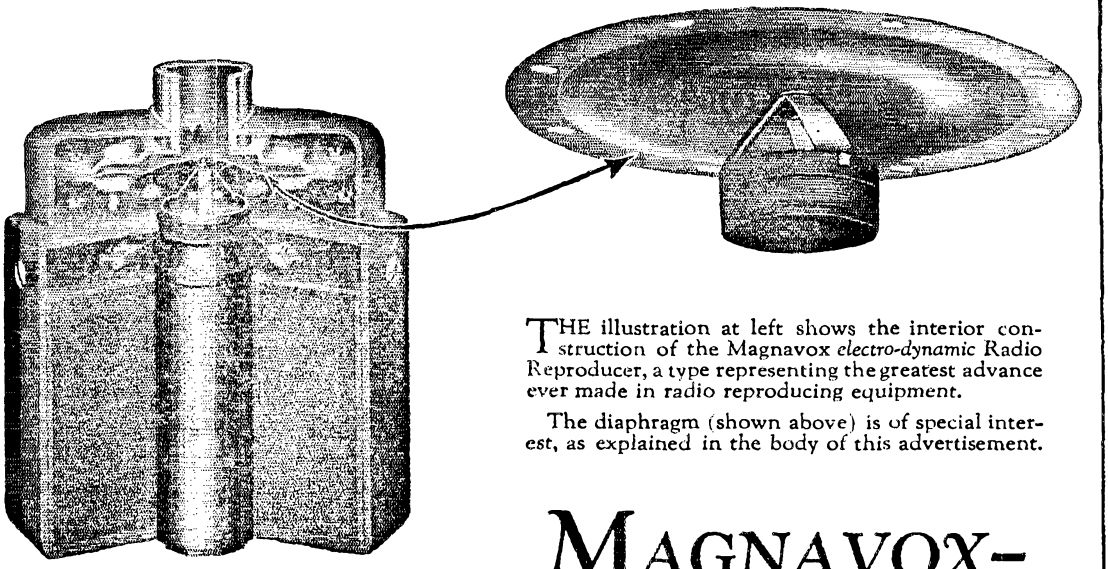
DUBILIER CONDENSER AND RADIO CORP.
48-50 WEST FOURTH STREET, NEW YORK

Dubilier Ducon
The Standard
Socket Plug

Dubilier
Duratran
Radio-
Frequency
Transformer

DUBILIER DEVICES

Dubilier
Micadon
The Standard
Fixed
Condenser



THE illustration at left shows the interior construction of the Magnavox *electro-dynamic* Radio Reproducer, a type representing the greatest advance ever made in radio reproducing equipment.

The diaphragm (shown above) is of special interest, as explained in the body of this advertisement.

MAGNAVOX-

The true Radio Reproducer

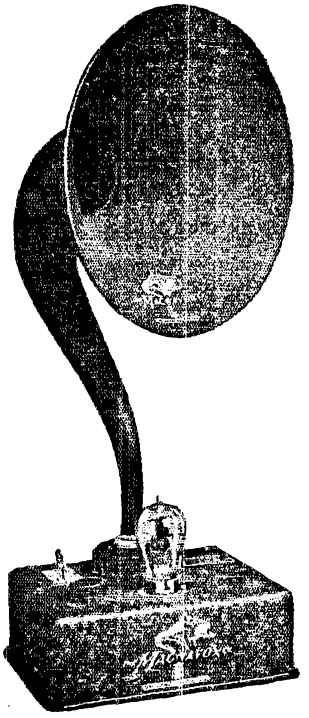
THE basis of the operation of a Magnavox Reproducer is its diaphragm, the importance of which can be seen from the fact that it is required to render an almost human service in recreating every tone and quality of instrumental music as well as speech.

This diaphragm (as illustrated above) has been designed and constructed in accordance with entirely new principles. Its shape, size and special character make it capable of responding to the widest range of tones.

But even this highly efficient diaphragm might be handicapped by operating restrictions—every diaphragm must have a vibrating force applied to it, and the inherent ability of any diaphragm will be injured if it is affected by mechanical operation or other foreign influences.

The use of the electro-dynamic principle of operation (found only in Magnavox Reproducers) removes all objectionable influences. This principle, utilizing the famous "movable coil" permits the Magnavox diaphragm to respond in perfect unison to the original tone.

There is a Magnavox for every receiving set: Type R for storage battery sets, and M1 for dry battery sets.



A1-R—$59.00

This instrument (Magnavox Combination Set) consists of Magnavox electro-dynamic Reproducer combined with a Magnavox Power Amplifier in one unit.

THE MAGNAVOX COMPANY

Oakland, California

New York Office: 370 SEVENTH AVENUE

PERKINS ELECTRIC LIMITED, Canadian Distributors
Toronto, Montreal, Winnipeg

3R

PERFORMANCE

Price

$7.00

2200 OHMS

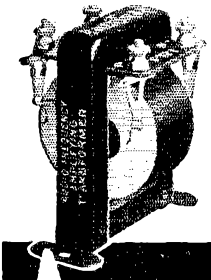
THE performance of a radio receiving set, like any other mechanical piece is only as good as its weakest part. The Federal Telephone and Telegraph Company manufactures 130 different radio parts, which carry the Federal guarantee of perfection, due to more than 25 years' research by experts in the radio field.
To insure 100% performance specify Federal when purchasing a complete radio or parts.

All reliable dealers carry
Federal Standard Radio Products

Federal Telephone and Telegraph Company

Factory: Buffalo, N. Y.

Boston New York Philadelphia Chicago San Francisco Pittsburgh
Bridgeburg, Canada London, England



STANDARD
of
EXCELLENCE
for audio amplification
With all tubes
In all stages

AMERTRAN

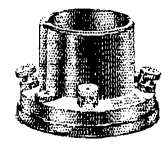
TRADE MARK REG. U.S. PAT. OFF.

Improve your set with an AmerTran

Its flat-top, distortionless amplification curve assures faithful reproduction of speech and of music over the full musical scale.
In one stage audibility is increased 30 to 40 times in the flat part of the curve, depending on the tube constant—the amplification is approximately 5 times the tube constant. Send for Circular 1005.
Type AF-6: turn ratio 5:1. Price $7. Ask your Electrical Dealer; or, sent carriage charges collect.

American Transformer Co.
Designers and builders of radio transformers for over 22 years.
176 Emmet Street, Newark, N. J.

DeLuxe Contact



Na-ald DeLuxe No. 400

NA-ALD

De Luxe Socket

The laminated phosphor bronze contacts of the Na-ald De Luxe Socket press firmly on both the ends and sides of tube prongs, keeping the surface clean and insuring clear reception.
Moulded of genuine Bakelite this socket expresses the very highest quality in appearance and workmanship.

ALDEN MANUFACTURING CO.
Largest makers of Radio Sockets and Dials in the world.
Springfield, Mass.
Dept. M 52 Willow St.

NESCO

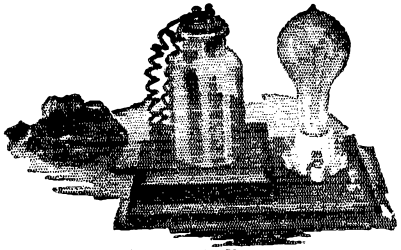
Complete line Radio Corporation Products, and popular parts for amateurs.

Mail orders given special attention.

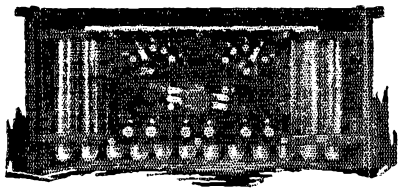
Complete consultation at your service for the asking.

In emergency telegraph or call 3ZW, W. A. Parks.

National Electrical Supply Co.
1330 New York Avenue, Washington, D.C.



Mounted Charger



100 Volt Panel Type

"I've found KIC-O "B" batteries the most satisfactory."

A prominent New York engineer said the above. KIC-O batteries make good with professionals and novices. Alkaline type; won't sulphate or buckle. Life unlimited. Not harmed by short-circuiting, over-charging, idleness. Panel switches give single cell variations. Recharge from any 110-volt A.C. line with small home rectifier. Charge lasts 3 to 6 months in detector plate circuit.

GUARANTEE

Your money back on any KIC-O Battery if not satisfied within 30 days. Write for full information on "A" and "B" Batteries.

Unmounted Rectifier $1.00
Mounted Rectifier 2.50

Cells	Volts	Price Plain	With Panels
16	32	$5.50	
24	32	7.25	$11.75
36	48	9.50	14.00
50	68	12.50	17.00
75	100	17.50	22.50
108	145	23.50	28.50

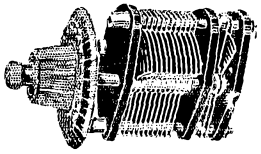
KIMLEY ELECTRIC COMPANY, Inc.
2666 Main Street, Buffalo, N. Y.

KIC-O Storage "B" Batteries—long service, low cost

—and when it comes to selecting condensers, there is no need for deliberation. Of course, the choice is

AMSCO

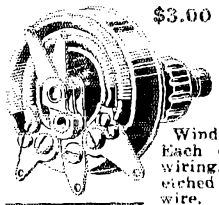
Vernier Variable Condensers



Satisfy the most exacting—accurately spaced, permanently adjusted, afford a high maximum to low minimum ratio. There is absolutely no iron used in any bearing or other part of the condenser.

Ask your dealer or write for complete literature

AMSCO PRODUCTS, Inc.
Broome and Lafayette Sts, New York City



$3.00

SOMETHING ENTIRELY NEW
PREMIER
"DUOSTAT"
Two Rheostats in One
(Trade Mark)

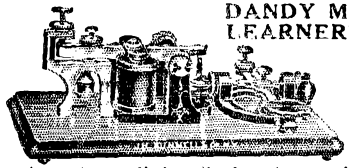
Windings independent of one another. Each operates one tube. Simplifies wiring. Base Bakelite moulded, silver etched Dial, winding "NICHROME" wire. Made for all types of tubes. No. 12, two windings, each 7 ohms; No. 13 two windings, each 25 ohms; No. 14 two windings, each 40 ohms.

Price all types—$3.00

Our Free bulletin 292 gives complete list of Premier Radio parts priced right. Ask your dealer.

Premier Electric Company
3811 Ravenswood Ave., Chicago

TELEGRAPH INSTRUMENTS
DANDY MORSE LEARNER'S OUTFIT



One dry cell is all that is required to operate this instrument. Made by the best Telegraph Instrument Makers in the World. Other types carried in stock. Send stamp for Telegraph Manual No. 43Q.

Instrument only $5.00
With dry battery 5.50

Special Price to Dealers

Send stamp for new and complete No. 29 General catalogue, just off the press.

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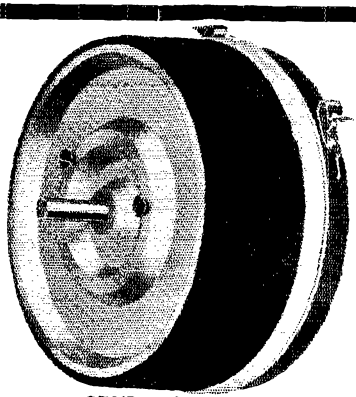
An Easy Way to Cut Out Interference Add a FERBEND WAVE TRAP to Your Set.

Have You Been Doublecrossed?

An Entertaining Program—Brr-rr-rr! ? !
Another Station Spoiled Again!

How many times have you been disappointed when listening to your favorite station or some especially good program because some other station interfered and drowned it out? Provoking isn't it? It is no longer necessary to be bothered with this continual annoyance. The FERBEND WAVE TRAP tunes out any interfering station. It makes your set highly selective and allows you to hear stations that would otherwise be lost entirely.

Radio fans all over the Country are taking to this easy inexpensive way of putting their fingers on the stations they want—the stations they enjoy. Hundreds of users report very gratifying results. We have hundreds of unsolicited testimonials. Equip your set with a FERBEND WAVE TRAP and stop being doublecrossed by some innocent but offensive station. The FERBEND WAVE TRAP is mounted on formica panel in mahogany finished cabinet 6x5x6. Beware of imitations.



SEND NO MONEY.

Just your name and address; and pay Postman $6.00 (plus postage) for the unmounted, or $8.50 (plus postage) for the mounted Wave Trap. If you prefer send cash in full with order and we will ship postage prepaid. You take no risk, so order today.

ANY NIGHT is "SILENT NIGHT" with a FERBEND.

FERBEND
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Wave Trap
PATENT APPLIED FOR

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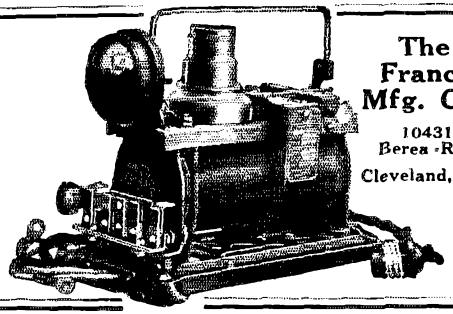
CHARGES RADIO A BATTERIES
CHARGES RADIO B BATTERIES
CHARGES AUTO BATTERIES

Triple Duty!

The type A.B. FF Battery Charger charges up to 120 volts on "B" battery as well as 2, 4 or 6 volt "A" or auto battery. No fuss or trouble—anyone can operate successfully. Simple and Fool proof. The pioneer battery charger—a success for over ten years. Type A.B.—Price $20, West of Rockies $22; Type 6 for "A" battery or auto battery charging $15, West of Rockies $16; B battery charging attachment $2.50 extra.

Write for literature with data on battery maintenance, station calls and wiring diagrams of basement installation of batteries. Send name of nearest dealer.



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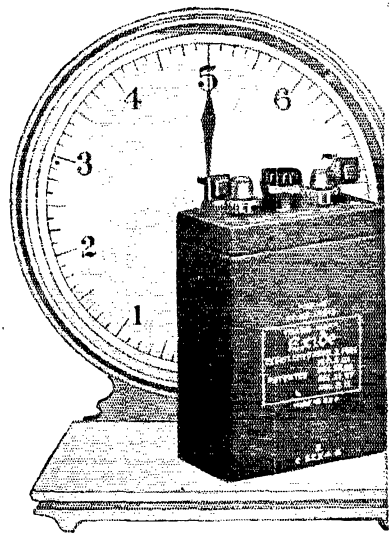
To get best results with low-voltage tubes

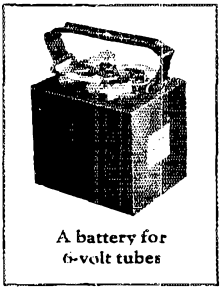


This 2-volt A Exide Storage Battery weighs only five pounds

FOR perfect clearness you must use a storage battery with uniform current. This is particularly true if you are a fan for long distance. When signals are weak the steadiness of a dependable A storage battery is indispensable to good receiving.

There are two tiny but sturdy Exide A Batteries designed specially for WD-11 and UV-199 vacuum tubes, and they give fine service with any low-voltage tubes.

You can carry one of these little batteries in the palm of your hand, yet they are powerful enough for long-distance receiving and have the true Exide ruggedness built into them.



A battery for 6-volt tubes

Three sizes of A batteries

The 2-volt battery has a single cell and weighs five pounds. It will heat the filament of a WD11 or other quarter-ampere tube for approximately 96 hours. The 4-volt battery has two cells, weighs six pounds and will light the filament of a UV-199 tube for 200 hours.

A battery with a pedigree

The Exide A Battery for 6-volt tubes is made in four sizes, of 25, 50, 100 and 150 ampere-hour capacities. These batteries have extra-heavy plates, assuring constant voltage and uniform current over a long period of discharge.

A good storage battery does not just happen. It is the result of long experience. The skill acquired and the resources developed in making batteries for every purpose since the beginning of the storage battery industry thirty-five years ago are built into the Exide Batteries made specially for your radio.

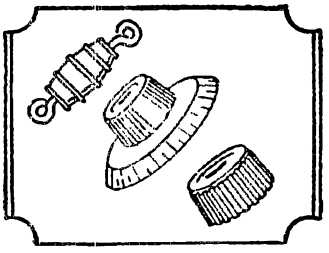
Wherever batteries *must* be reliable—such as on submarines, in the telephone system, in firing the guns of our battleships, in the central power stations of our great cities—there you will find Exides doing their unfailing duty. A majority of all government and commercial radio plants are equipped with Exide Batteries.

Exide Radio Batteries are sold by radio dealers and Exide Service Stations everywhere. Ask the dealer, or write direct to us, for booklets describing the complete line of Exide Radio Batteries.

Exide
RADIO BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, PHILADELPHIA

Manufactured in Canada by Exide Batteries of Canada, Limited, 133-157 Dufferin Street, Toronto



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Drill, saw or engrave a Radion Panel. Use what tools you will, dull or sharp, this material will not chip or show ragged edges. Its proven electrical values make RADION the supreme insulation both from a scientific and a practical standpoint.

Made in the beautiful MAHOGANITE or polished black with Dials and Knobs to match.

Look for this stamp on every genuine RADION panel. Beware of substitutes and imitations.

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The Supreme Insulation

PANELS

If your dealer does not sell Radion write us. We will see that you are supplied.

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WHY USE YOUR SET FOR A MORGUE WHEN AN EDISON B WILL LAST A LIFETIME?! 100 VOLTS THE MOST POPULAR SIZE BATTERY, IN FUMED OAK, COVERED CABINET, OVER 4" LEAKAGE PATH, LARGEST SIZED EDISON ELEMENTS WIRED WITH PURE SOLID NICKEL, PERFORATED HARD RUBBER SEPARATORS AND BANDS, GENUINE EDISON SOLUTION, WHITE SEALING OIL, TEST TUBES FELT PACKED, CRATED FOR SAFE SHIPMENT, $15.00, CELLS ALONE 15¢ EACH. AN EFFICIENT CHARGER, WILLARD RECTIFIER $2.00. TUNGAR HIVOLTAGE CHARGERS & PARTS. INSTRUCTION SHEET 50¢. ANNEALED GLASS TEST TUBES INDIVIDUALLY WRAPPED, ¾"x6" 3¢, 1" 4¢, 1⅛"x7" FLAT BOTTOMED 7¢. 99% PUREST SOFT DRAWN SOLID (NOT PLATED IRON) No. 20 NICKEL WIRE FOR CONNECTORS 1½¢ FOOT PREPAID. PERFORATED HARD RUBBER SEPARATORS ½¢ PREPAID. RUBBER BANDS ON REQUEST WITH $1 ORDER. GENUINE EDISON SOLUTION 5 lb. CAN $1.50. PURE POTASH 80¢ lb. TYPE A ELEMENTS 6¢, 7¢ DRILLED, 10c WIRED. TYPE G EDISON ELEMENTS 4¢ PAIR, 2 POSITIVES 1 NEGATIVE 5¢, 3 POSITIVES 2 NEGATIVES 8¢, HICAPACITY UNIT DRILLED AND CUT READY TO WIRE 10¢, EVERYTHING TO MAKE COMPLETE HICAPACITY CELL 19¢, WIRED AND ASSEMBLED 24¢, GREAT FOR TRANSMITTERS, POWER AMPLIFIERS, SUPERS. SENT PREPAID IN 100 CELL LOTS. 500 VOLTS ON 4 FIVERS GOOD FOR 1000 MILES VOICE. 6 A ELEMENTS IN 1⅛"x7" FLAT-BOTTOMED GLASS, DRILLED AND CUT READY TO WIRE, NICKEL, SOLUTION, SEPARATORS, 30¢, 35" WIRED & ASSEMLED 3 AMP HOUR CAPACITY. SAMPLES, A & G CELLS 25¢, SUPPERCELL 35¢. FRANK MURPHY, RADIO 8ML, 4837 ROCKWOOD ROAD, CLEVELAND, OHIO.

EVERYTHING FOR THE AMATEUR FROM COUNTERPOISE TO ANTENNA. NOTHING JUST AS GOOD AS OHIO BRASS PORCELAIN ANTENNA INSULATORS. 5" 75¢, 10" GLAZED ALL OVER $1.50, BOTH PREPAID. THE PERFECT SHORT WAVE INSULATOR. EVERY WATT LOST CUTS FROM 10 to 100 MILES OFF YOUR RANGE. REDUCE YOUR ANTENNA LOSSES TO RADIATION RESISTANCE WITH NO. 12 SOLID COPPER ENAMELED AERIAL WIRE. STAYS NEW. DOES NOT BECOME BRITTLE WITH AGE. A BRIGHT SHINY WIRE GIVES A CLEAR TRACK FOR YOUR SIGNALS BOTH COMING AND GOING. LOWEST HIFREUENCY RESISTANCE OF ANY AERIAL WIRE SOLD. 1¢ A FOOT PREPAID TO YOUR STATION. GOOD STOCK INSULATORS AND ENAMELED NO. 12 INSURES SNAPPY SHIPMENT. SILICON STEEL IN STRIPS AND PUNCHINGS 25¢ LB. BOTH SHELL & CORE TYPE. WINDING DATA SUPPLIED. RADIO CORPORATION TRANSMITTER PARTS SENT PREPAID. 8ML, 4837 ROCKWOOD, CLEVELAND, OHIO.

YOU DONT HAVE TO NURSE A BULB CHARGER, HOW ABOUT ONE? Will charge 6 to 12 volt "A" battery, variable rate up to 4 Amperes, and any "B" battery up to 100 volts. Complete compact unit, not requiring "Special Attachments." Has real transformer that wont toast. Looks good, too. Without bulb, $12. Send for leaflet. Special chargers of any type built to order. A. R. Spartana, 615 N. Washington Street, Baltimore, Md.

FOR SALE—3 Brand New Jewell Meters. 0-1000 D.C. Voltmeter $15, 0-5 Thermocouple Ammeter $9, 0-15 A.C. Voltmeter $6. All meters are exactly matched, projection type. C.O.D. or money order. Postage prepaid. Edwin L. Early, 3942 Garfield, Kansas City, Mo.

FOR SALE OR TRADE—Paragon 2-5-U 5 Watt transmitter outfit, complete with tubes A.C. plate current rectifier, key etc. New, unused. Also DeForest Multi-Wave tuner and detector. Both at bargain price. Chas. C. Hurst, Paradise, Pa.

"BOY HOWDY"—SATISFACTION WILL NEVER BE YOURS TILL YOU'VE WORKED THE OLD RECTIFIER OVER AND INSTALLED NEW CHEMICALLY PURE SHEET ALUMINUM AND SHEET LEAD FROM OUR STOCK. 90¢ PER SQUARE FOOT FOR THE ALUMINUM, AND 80¢ FOR THE LEAD. PLENTY OF FIVE WATTERS IN STOCK. TUBES GIVEN SERVICE TEST THAT INSURES THAT YOU GET NOTHING BUT FRIST CLASS ARTICLE. ORDER FROM US ANY OF THE FOLLOWING, BRASS STRIP, ANGLE, ROD OR TUBE. ¼" FORMICA ROD 50¢ FOOT. 4/36, 6/32, 8/32 BRASS MACHINE SCREWS BOTH FLAT AND ROUND HEAD ALL LENGTHS. EMPIRE CLOTH $2.00 SQUARE YARD, $1.00 FOR HALF. FORMICA TUBING SIZES 2" to 5" CUT TO ORDER. 1MFD FILTER CONDENSERS 1000 VOLT $2.00; 1750 VOLT $2.50. GIVE US YOUR NEXT ORDER, WE GUARANTEE SATISFACTION, THE ONLY HAM STORE IN THE FIFTH DISTRICT. FORT WORTH RADIO SUPPLY CO., 104 EAST 10th ST., FT. WORTH, TEXAS.

SELL: Two S Tube Rectifiers, never used, $12.00. Irwin Johnson, 831 Rittenhouse St., Washington, D.C.

FOR SALE COMPLETE OR IN PARTS
100 Watt Kenotron Rectified CW and Phone Transmitter consisting of Jewell 1-0-10 Radiation, 2-0-15 A.C. Voltmeters, 1-0-500 Milliammeter; A Radio Corporation Inductance, 750 Watt Power Transformer, Grid Leak, Magnetic Modulator 3.5-5 amp., Plate Reactor, 4 Filter Condensers, 4 Sockets, Bypass Condenser, Grid Condenser, Antenna Series Condenser, Radio Frequency Choke, Western Electric 50 Watt Tubes $28, 2 Kenotrons ₤217, $20. Above is mounted on Brass Frame 5 ft. high on Bakelite Panel engraved. Sperry Navy Receiver $30; 2 Roller Smith Commercial 0-10 Radiations $10; Westinghouse Navy Dynamotors 32 Volts D.C. 350 Volts D.C. Output $15, Spring Rack ₤3 extra including Choke Coil; Acme 300 Watt Transformer $12; Also, Grebe C.R.5 $50 Quench Gaps, Field Rheostats, Inductances from Navy Transmitters, Condensers, Keys, Remote Control Switchboards, ¼ K.W. 500 Cycle Hand Generator ¼ K.W. 110 Volt D.C. 500 Cycle Motor Generator with 1600 Volt Transformer, W.E. Modulation Transformer 20 Watt CW and Phone Set, 110 Volt D.C. 550 D.C. Motor Generator, 500 Cycle Transformers ½ K.W. Dubilier Condensers, Amrad Wavemeter, General Radio Wavemeters, ¼ K.W. D.C. Electric Drill. C. N. 114 Receiver 250-2500 Meters $25. C.N. 240-1000-10000 Meters $85.00. Large Assortment of Antenna and Strain Electrose Insulators. 2 U.V.202 $5.50 each. G. E. 5 Watt Tubes $5.50 each. New W. E. 10A Amplifier and Loud Speaker $95.00. Troy Radio Co., 1258 St. John's Place, Brooklyn, N.Y.

SELL FOR HIGHEST OFFER: New Omnigraph No. 2, with 15 dials. C. L. Somers, Dresden, Tenn.

IF YOU ARE INTERESTED IN ARTISTIC TWO COLOR RADIO PRINT WRITE THE RICHARDSON PRINTING COMPANY, 535 MAPLE AVE., HAMILTON, OHIO, FOR SAMPLES AND PRICES.

NEW STORAGE BATTERIES Six Volts 80 Amperes $6.50. Generator 500 volts cheap. 824 North Fifth, Phila., Pennsylvania.

REINARTZ TUNER $12.00, Wavemeter $10.00, Acme 200 watt C.W. transformer $15.00, and a quantity of transmitting and receiving apparatus. Send for complete list. T. Porcher, Chestnut Hill, Phila., Penna.

QSL CARDS printed by a 'HAM that knows wot AM'. 60¢ hundred and up. Many different designs and prices. Send for samples. Ray Groebe, Printer, 338 El Mora Ave., Elizabeth, N. J.

SELL OR TRADE:—Esco 750 volt, 150 watt two bearing motor-generator in A-1 condition. 110 volt direct current drive. Sell for $50 or trade for Paragon RA-10, Grebe CR-8 or good standard make receiving or transmitting apparatus. What have you? H. Gilman, 8CZC-8ADQ, 8932 Quincy Ave., Detroit, Mich.

EDGEWISE WOUND Copper Ribbon ⅛ inch wide 6 inch diameter 15¢ turn, any number turns one piece. Remler Giblin Coils mounted 25-75-100-150-200-300-400-500-600-750-1000 turns, half price. Genuine Silicon Transformer steel, cut to order, 25 cents pound, 10 lb. and over, 4 cubic inches to lb. Postage extra. Geo. Schulz, Calumet, Mich.

WANTED: A Morse Ink Recording Machine. State price and conditions. The Lee A. Bates Co., 274 Main St., Worcester, Mass.

EXTRA—Grebe CR-5 $42.00, Grebe Rork two step amplifier $30.00, Cutting and Washington portable receiver using 199 tubes complete $75.00. Marshall Gerken Suburban receiver $22.00, Brandes Table Talker $8.00, Frost phones $3.25, Sorsinc Tunit $9.00, Remler 3-coil mounting $4.00, UV-201 tubes $4.25, 5 watt tubes $6.00, Arlington Loose Coupler $7.00, Airway variometers $3.00, Kellogg moulded variometer $5.25, A.C. two-step amplifier $35.00, Radio Corporation R.F. transformer $4.25, Rasla R.F. transformers $4.25, Atwater Kent variocoupler on panel $9.00, Remler detector panel $4.00, M.G. detector panel $4.75, Remler amplifier panel $4.00, Bremer Tully Universal Tuner $4.00, Interference Eliminator $5.00, Faradon Condenser $7.00, Baldwin phones $9.00, Morrison phonograph unit $8.00, Signal Choke Coil $1.75, Signal Helix $3.00, Chelsea Loading Inductance $3.00, Signal Kick Back Preventer $3.25, Western Electric Horn $40.00, Cast Aluminum Horn $6.00, Duntley 23 Plate vernier condenser $4.25, Grewol crystal detector $1.50, DeForest Crystal $1.75, Radiola RS set complete $70.00, Fada 43 plate vernier with dials $6.50, Chelsea Condenser .0011 with dial $4.00, Chelsea condenser .0006 $2.85, DeForest condenser .0005 $3.75, Remler Power Rheostat $1.25, bakelite sockets 65¢, Frost 4-phone plug $1.50, light-socket aerials $1.50, Justrite Soldering Iron $1.75, Chelsea variable grid-leak $2.00. All new apparatus and subject to prior sale. N. E. RISTEY, 251 West 95th Street, New York City.

500 Volt, 200 Watt, ESCO Motor Generator Set $45.00. 500 Volt, 100 Watt Motor Generator set $35.00. 750 Volt, 250 Watt Motor Generator Set $55.00. All above complete with field rheostats. 500 Volt, 250 Watt, 2750 R.P.M.-Generator only—complete with field rheostat and pulley $25.00. We also have a number of 1000 Volt Generators and Motor Generator Sets. QUEEN CITY ELECTRIC COMPANY, 1734 West Grand Avenue, Chicago, Ill.

SALE SALE—EDISON STORAGE BATTERIES AND ELEMENTS. TYPE A ELEMENTS 3¢ PER PAIR. TYPE G ELEMENTS 2¢ PER PAIR. 3 POSITIVE & 2 NEGATIVE PLATES TYPE G 4½¢. ALL ELEMENTS ARE DRILLED. EDISON TYPE G-14 375 AMPERE HOUR CELL $5.75. COST $48.00 NEW. TYPE A-8 300 AMPERE HOUR CELL $6.75. TYPE A-12 450 AMPERE HOUR CELL $9.00. COST $60.00 NEW. TYPE A-6 6 VOLT 225 AMPERE HOUR BATTERY $24.50. ALL PRICES F.O.B. PHILA. J. ZIED, 530 CALLOWHILL ST., PHILA., PA.

RUBBER STAMPS—with your call letters in half-inch type, 55¢. Stamps of all kinds made to order. Sample impressions on request. Radio Print Shop, Box 582, Kokomo, Indiana.

1 1000-volt Robins & Myers D.C. Generator with pulley, 500 Watt, with rheostat, cost $142.00; 1 R. C. Inductance, cost $11.00; 1 R. C. Rheostat largest size, $12.00; 1 R. C. Grid leak, U.P.1718, $1.65; 8 50 Watt Radiotron tubes. 5 never used, other three good, cost $240.00; 1 5 Ampere hot wire meter, $8.00; 4 50 Watt tube sockets Model UT-541, cost $10.00; 2 Plate reactors UP-415, cost $11.50; 1 Magnavox transmitter, cost $24.00; Total $460.15. Will sell all equipment mentioned for $236.00. Harry S. Myers, Van, Venango Co., Pa.

AT A BARGAIN—500 cycle 250 watt transmitting set complete or parts, WE tube. HURRY. Leon Faber, 9AMK.

SELL: Western Electric Power Amplifier 10A Complete, New, Hundred Dollars. 3 Radiotrons UV 202, New Four Fifty Each. W. R. Bradley, 48 Jeffrey Avenue, Jamaica, N. Y.

GREBE DIALS TAPERED GRIP $1.25 Marconi Sockets, a bargain at $0.40 each. Used filter condensers 1Mfd. good for 700 volts $0.80 each, 10 of 'em will take that hum out of the old set. S. A. Hendrick, 85 West 181 Street, New York City.

TO INTRODUCE NEW SET will include four radiotrons, loud speaker and batteries for list on bear set Seventy Dollars. Tully Battery Company, Tully, N. Y.

SELL: One Ten watt transmitter less one tube $45.00. Apparatus is RCA, Acme, and Jewell all in fine condition. Apply to Edwin S. Guilford, Box 224, Farmingdale, New Jersey.

SELL: Paragon transmitter, motor-generator, omnigraph, two headsets, det. panel. Description free or trade for Magnavox, Baldys, Det. amplifier, or whatcha got. J. G. Schroeder, Wisner, Nebraska, 9CHS.

MAGNAVOX R3 or M1. Latest nationally advertised reproducers. List $35. Introductory $25. The factory sealed carton is your guarantee. Radio Central, Dept. Q, Abilene, Kansas.

SELL: Omnigraph complete with dials $12. Jim Smith, Weston, Mo.

SELL OR SWAP: 2 new S tubes, 100 watt transformer, want fifty watter; 1 new two stage receiver worth $100, will sell for $50. D. G. Goings, Rome, Ga.

TRADE: Good outboard Evinrude motor with flywheel magneto, for salt or fresh water, for C.W. Phone set, address C. L. Blakely, North Girard, Pa.

INSULATORS, porcelain, genuine British Commercial 18" long, stand 1500 pounds pull $1.45 each f.o.b. Canadian 2BN, J. L. Miller, 136 Vendome Ave., NDG, Montreal, Can.

FOR SALE: Ten watt fone, CW, including tubes, transformer, and three meters, Fifty Dollars. F. E. Norwine, Jr., Maplewood, Mo.

FOR SALE: Paragon R.A. 10 and D.A. 2 Detector-Amplifier. Excellent condition, $90. Glen Franz, 524 Bluff St., Beloit, Wis.

SELL: Three new Western Electric 50 watters $28.00 each. Telefunken amplifiers 2 volts, 3/10 ampere, fine radio frequency tubes, Western Electric peanut "N" tubes $5.00, socket $1.00 extra. New "J" tube $5.00. 2BYJ.

General Electric transmitting sets for fone, cw, icw Complete with dynamotor, sealed tubes, antenna wire and spares, $75. ¼ KW 500 cycle quenched gap transmitters for belt drive New $75., costing originally $1650. General Electric Dynamotors with filters for 12 volt battery output 350 volts .143 amperes $18. For belt drive $20. ¼ KW new Crocker-Wheeler 500 cycle-generators with exciters $25. used $20. ⅓ KW $22.50. Large types with motors ½ to 2 KW SPECIAL Flame Proof Keys with "Winker" light. "See yourself send" Complete with miniature step down transformer and bulb $1.50; every up to date station needs one. Western Electric 50 watters $25. Weston TC Ammeters 0-4 Bakelite constructed inductances $7.50. Stranded Silicon Bronze wire $3.00 per 400' roll. Henry Kienzle, 501 East 84 Street, New York.

CHEMICALLY PURE ALUMINUM. Square Foot: ⅛" Eighty Cents, ⅛" Dollar Sixty, $\frac{1}{32}$" Sixty Cents. Immediate Shipment. No C.O.D. H. Appleton, 427 Euclid Avenue, Toronto, Canada.

SACRIFICE: Reinartz tuner $15, Reinartz tuner detector and 2 step in Cabinet $45.00. Westinghouse Storage-A-60 Amp. $8.00. F. B. Lutz, 148 Biddle Ave., Wyandotte, Mich.

FOR SALE: Unused Atwater-Kent Radiodyne Receiving Outfit Complete. Information Free. J. C. Weston, South Brownsville, Pa.

NEW W. E. 7A power amplifier and 3 216A tubes $49.00; $60.00 R2 Magnavox base $14.00; 2 W. E. VT 1's $12.00. R. Breunig, 2252 Roscoe St., Chicago.

SELL: Reinartz with detector 2 step. Heard all dists on loop $55. 9BDZ.

C.Q.D. SOS: Coto-Coil Radio frequency transformers $2.50, cost $5.50; 210 ampere 6 volt Exide battery $17, cost $69. Write for list. William Golden, 680 West End Ave., New York.

$110.00 Edison Chrome Nickel 6 volt 150 ampere hour storage "A" battery @ $22.85, same voltage in 100 amperes at $19.50 each. Guaranteed perfect. Type "g" storage battery elements for that "B" at 1¾¢ per pair, large size type "A" @ 3¢ per pair. 3 positives, 2 negatives in type "G" @ 4¢ total. Complete knock-down units consisting of large size plates, special molded glass flat bottom cells (not ordinary test tubes) nickel wire, 200 hole hard rubber separator, chemical electrolyte and simple instruction for assembling, making charger and charging. 100 volt unit $8.95; 150 volt $12.90; 200 volt $16.50. Get my prices and literature with special 30 day

trial offer. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

VACUUM TUBES FREE!! Write for proposition. 23 plate variable condensers $4.00 quality, only 95 cents. Send 10 cents for print of best radio hookup known and price list of parts to build set. Address R. R. Stewart, 3023 Boulevard Place, Indianapolis, Indiana.

NEW FADA Neutrodynes Eighty Dollars; Freed Eisemann five tube Ninety Five Dollars. Tully Battery Co., Tully, N. Y.

SELL: 2 Amrad variometers, 1 Amrad Vario-coupler in separate hardwood cabinets. Fine for experimenters, $15. 9BDZ.

FOR SALE: 550 volt 125 watt motor generator, double bearing, double commutator 214 bars. Motor drive 110-220 volts A.C., new, with spare armature $65. Great for phone work. Pre-war DeForest audiotrons, new, $4.00 each. Western Electric peanut tubes "N" $4.75 each. Also 50 watt "G" tubes and 250 watt tubes type I, prices on request. Radiotron UV203s at $22. All tubes are new. Telefunken phones 4000 ohms $6.00 per pair. Navy SE 143 tuner (I.P.500) first $140 takes it. Half cash with order. Radio 2AGD.

FOR SALE OR EXCHANGE: 3 brand new French fifty watt tubes. Address William Schweitzer, 115 Eastern Parkway, Brooklyn, New York.

FOR SALE: 8CKN's 15 watt transmitter, complete with 3 brand new tubes, filter, transformer, etc. $80.

WANTED: Western Electric Amplifier Transformer No-III-A. 9RZ.

AMRAD Synchronous motor and high-voltage rectifier disc for same. Twenty-five Dollars. Write if interested. 9DJB, 3808 Wyoming St., Kansas City, Mo.

WANTED: 1500 or 2000 volt motor generator. Sell—Stahl Sinc Rectifier, 3000 volt transformer, Benwood Inductance, honey-comb set. 9CVO.

MASTER RADIO CODE in 15 minutes. Ten word speed 3 hours. Our students made these world records. Previous Failures who tried all known methods have thanked us for License. To hesitate kills speed. To master Code our way kills hesitation; gives speed. Code instructions that instruct only $2.00. Information free. Dodge Radio Shortkut, Dept. SC, Mamaroneck, N. Y.

100 METER coil and complete data for Reinartz Circuit. Postpaid $1.50. Superior Coil Co., Harwichport, Mass.

HAMS: Get our samples and prices on printed Call Cards, Letterheads, Radiograms and Envelopes. Hinds & Edgarton, 19 S. Wells St., Chicago, Ill.

SELL: 140 VOLT EDISON "B", REMLER DETECTOR PANEL, MURDOCK HORN. CHEAP. VIRGIL HENTHORN, PADEN CITY, WEST VA.

QST MIDWESTERN FANS! Here's a real bargain in a set particularly well suited to your part of the country. A Mu-Rad MA-13 six tube set (three radio, one detector and two audio) listing at $150 will be sold to first money for only $100 f.o.b. Hartford. Perfect condition. Address Box M. c/o American Radio Relay League, Htfd., Conn.

FOR SALE: Dandy DeForest 20 watt transmitter, complete. Also a lot of RCA transmitting equipment. WCAJ.

FIRST fifty dollars takes Autoplex with one step in cabinet with battery switch, two new genuine UV201A's, Rico tuned phones. Walbridge, 2246-14th, Troy, N.Y.

FOR SALE. "Send an acknowledgement card". Complete line of samples sent upon request. Wireless Acknowledgement Card Company. 325-6th Avenue, McKeesport, Pennsylvania.

SALE: ½ K.W. Spark Transmitter with cabinet, standard parts $30.00. Also complete 5 tube receiver unwired. W. H. Randel, 14905 Euclid Ave. E. Cleveland, Ohio.

8BRL FOR SALE.

WANTED: Radiocorp power transformer UP1016 Name cash price. 9AEL.

FOR SALE: Limited number Western Electric 211-A and RCA 203-A fifty watt tubes. A. H. Hardwick, Radio 2 PD, East Highland Avenue, Orange, N.J.

TRADE AMMETER, 8" plate glass AC or DC 0-5 scale. Want flush mounting Jewell radiation ammeter, 5 watt tubes, chokes, and condensers. Radio Shop, Belmond, Iowa.

RUBBER STAMP with large call letters 50¢; Radiogram and Relay Radiogram blanks 25c per hundred, Stock Post Card 60¢ hundred. Send us your orders. Carolina Printing & Stamp Co., Wilmington, North Carolina.

FOR SALE—Motor generator just like on cover June QST. 500V 150W 40 fish. Burt Middaugh, 7629 Morgan St., Chicago, Illinois.

FOR SALE: Grebe CR3, 3 circuit long wave tuner and RORD, 100 Watt transmitter with transformers and rectifier. Write for quotations. 9YAK, Yankton, So. Dak.

Every Radio Owner needs our TRANSCONTINENTAL ½ inch PURE COPPER RIBBON AERIAL. Doubles Range and Volume. 75 feet, $2.75. United Sales Company, Aberdeen, So. Dak.

FOR SALE—Tuska combined Tuner and detector; also swap two stage Magnavox power amplifier, for Paragon Ten watt transmitter. 9CGI.

BARGAINS—For that Storage B battery—Largest size Edison A battery Elements only 4¢ per pair. $29.50 Edison A-6, 225 amp. hour, sells for only $15.00 each. Everything in first class condition. We carry a complete line of radio supplies; write us your needs. Triumph Electric Co., Inc., Sheffield, Ala.

WANTED— 10, 15, or 20 watt C.W. and fone set. Also large DeForest duolateral coils. 9CGE.

COMPLETE 10 watt transmitter for sale, $40.00. Thomas Davis, Benson, Minn.

FOR SALE: 20 watt CW and Fone transmitter on panel, complete, less tubes $85.00. A real DX receiver using Giblin-Remler coils 120-26000 meters and including a Signal Corps VT, one, $90.00. If interested write for foto, description and records made. 9BSH, 1014 Good Hope St., Cape Girardeau, Mo.

COUPLED INDUCTANCES: For Hartley and Meissner circuits, containing 16 turns of ¼" brass strip on Bakelite supports, 2 coils $15.00; 3 coils $20.00; satisfaction guaranteed. 8NX.

BARGAINS: 2 Remler variometers @ $4.00; Pair Baldwin Fones type E with Federal plug $8.00; Boston Key $3.50; Fifteen dial Omnigraph $14.00. Satisfaction guaranteed. E. S. Clark, 333 Princeton Place, Pittsburgh, Pa., 8BQS.

FOR SALE: Esco Motor generator and field rheostat, generator 1000 volts, 500 M.A., Motor 110-220-A.C., 60 cycle, 1-phase. This set has only been tested, value $197.50; first $150 takes it. G. Atchison, 3712 Roosevelt Ave., San Antonio, Texas.

HAVE SOME NEW Western Electric fifties $30. new 203's $19. Would appreciate card anyone hearing 2QH.

RADIO BARGAINS: Aluminum dials 18¢, Homecharger $9.50; wooden variometers $2.75, porcelain sockets, $30¢; 30 Ohm rheostats 55¢; and many others. Radio Shop, Belmond, Iowa.

SELL—Magnavox 2 stage amplifier $50., two Western Electric 216A's $18., Both $65. Acme 600 watt 1000-1500 volt transformer with filament connection $30. E. B. Etchells, Yale, Mich.

FOR SALE: 1 Grebe CR 5, 1 B battery, 1 UV 200, 1 set 3000 Murdock phones, price $50.00. Have received Massachusetts, New York, Washington, Texas, Chicago, Wisconsin and many other stations. Reason for selling, have another set. Ernest Cramblet, 325-6th Avenue, McKeesport, Pennsylvania.

SALE OR TRADE: Best offer gets all or any part. 2 New Acme 200 Watt CW Transformers, 1 Slightly Used 200 Watt CW Transformer, 3 New Rectigon 6

Amp Chargers, 1 DeForest OT3 Radiofone slightly used, 1 New R.C.A. 1368-325 Watt C.W. Transformer, 1 Slightly used Electric Specialty 350 V. Radiofone Generator, some other apparatus. Bill Paulus, 213 Tomlin, Atlantic City, N. J.

BARGAIN—New Grebe RORN Radio-frequency Amplifier with amplifying tube, $25. Charles Laper, 116 Williams St., Greenville, Mich.

FOR SALE: Paragon RA-10, DA-2 $90; 10-R $25; Used only two months. V. R. Blauch, Leechburg, Penna.

FOR SALE—One half k.w. Acme and 1 k.w. Thordarson transformers, one Thordarson oil condenser, one Benwood quenched gap without motor, one Racine motor with sixteen tooth rotor, oscillation transformer, Murdock aerial switch, Acme anti-light blinker, Roller Smith 0-30 d.c. voltmeter—first money order for thirty five dollars takes all. Sell separate if desired. R. M. Nelson, 58 Penn. Ave., Binghamton, N. Y.

5 WATT CW: $25, brand new tube. 9ELT, Box 8, Whitewater, Kans.

POSITION WANTED: RADIO ENGINEER, now in middle west, desires connection with well established manufacturer in the east. Twelve years radio experience with five years in designing and development work, college education, licensed commercial operator, eligible rating as Radio Inspector civil service, and owning over $1000 worth of personal laboratory equipment. Technical work with opportunities for advancement more important than salary. Satisfactory references. Available at once. Box E—QST.

FOR SALE: 150 Watt phone set mounted on panel 24x30, Formica panel, 3 meters, 1000 Volt motor generator, 3-50 Watt tubes. M. C. Haigh, 1109 Pleasant View Drive, Des Moines, Iowa.

VIBROPLEX—almost new $15. 8BOB.

WANTED: 2 and 3 KW non-synchronized transmitters complete, 220 volts, 60 cycle primary; and five condensers .01-10,000 volts. Box A, c/o QST.

SELL: Radiocorp power transformer UP1368. Perfect condition. First Money Order $14.00. 9AEL.

WANTED: OMNIGRAPH. New #2, A-1 condition. Give full particulars. V. M. Chaberd, 362 Custer Ave., Youngstown, Ohio.

TELEFUNKEN TRANSMITTING TUBES, genuine, guaranteed 30 Watt $15.00; Filament 2 amperes, 6 volts, Plate 750 volts. Genuine new R.C.A. Model UC1820 "Faradon" .0005 variable condensers $3.50. New genuine u. v. 199 s $3.75. Arthur Beyer, 106 Morningside Drive, New York City.

FOR SALE: ESCO M.G. FIVE HUNDRED VOLT .2 AMP. TRANSFORMERS; RADIO CORP THIRTEEN SIXTY EIGHT THORDARSON SIXTY WATT FLIXITOY AND GENERAL RADIO MODULATION, FOUR RADIO CORP SOCKETS AND TWO GOOD USED FIVE WATTERS. FIRST REASONABLE OFFER ACCEPTED. RADIO SMITH, GRAYVILLE, ILL.

Complete three coil outfit with one step, mounted on panel. Sixty dollar value, thirty takes it. Also batteries, tubes, phones. Forest Otis, Langford, South Dakota.

BIG BARGAIN: 100 Edison A batteries. Same type as used on shiphoard auxiliary transmitters. Guaranteed in first class shape. Price $1100, make offer. W. H. Lewis, Jr., 226 Upland Road, Cambridge, Mass.

MAKE $120 WEEKLY IN SPARE TIME. Sell what the public wants—long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country—write today before your county is gone. OZARKA, 853 Washington Blvd., Chicago.

WHILE THEY LAST: A few 50 watt power transformers left, $7.00. For 5 watt tubes. 375 volts each side of center tap. Filament winding 10 volts with center tap. Send money order. If not satisfactory, may return within ten days and receive money back. Fair enough! C. C. Endly, 22 Sturges Ave., Mansfield, Ohio.

FOR SALE—Quantity U. S. Navy type CN 113 short wave radio receivers good condition $15 each; limited number new ones $20 each. Also limited number long wave type CN 240 receivers, good condition $50 each. Receivers may be returned if unsatisfactory. Send money with order to RADIO MATERIALS CORP., 949 Broadway, New York City.

FOR SALE: 2" Spark Coil $8.00. Like new. 9TC.

FOR SALE: 50 watt transmitter. Write 8CP.

FOR SALE—Grebe CR5, $45. Reinartz in mahoganey cabinet, a bear for distance, $20. 5 WD-11 tubes, $5.25. 2 1714 Radio Frequency transformers $3.50. 1 New Type Cardwell 43-plate Condenser $4. 1 Boston Marble Base key $3.50. All of the above are new and will be shipped postpaid. Edgar M. Knepper, 317 So. 5th St., Columbia, Mo.

BARGAIN: 9EGH's 20 watt C.W. and fone transmitter. R.C.A. power transformer and 500 V. M.G. DX 2,100 mi. Write.

8RP's Ten Watt Transmitter For Sale. For particulars write Radio 8RP.

FOR SALE: New DeForest Type D-6 Receives all wave lengths, includes 2-25 turn, 2-35, one each 50, 75, 100, 150 DeForest DL Coils, 1 Remler Giblin 35, 2-50 all mounted. First Money Order for 89.00 takes all delivered prepaid anywhere, need the money. M. M. Michaelis, 1757 Lunt Ave., Chicago, Ill.

SELL 9AVP; UP1016 R.C.A. 750 watt Power transformer like new $23.00. 2 vibroplexes @ $4.00. 1 KW Acme, spark set complete 1 KW Acme in oil 80 plate condenser 8"x10"x¼" also in oil. Heavy copper on bakelite O.T. High speed non-sink gap power rheo and switches. $25.00 Benwood Sink motor ⅛ H.P. Like new $18.00. ½ H.P. Globe heavy duty 110 volt 60 cycle motor and starting switch and 300 volt 100 watt D.C. Generator both $20.00. 1 KW Marconi (United Wireless) "coffin" transformer 110 volt 60 cycle primary 30,000 volt secondary $20.00 guaranteed accurate wave meter 130-260 meter $8.00. Ship anything C.O.D. Willard McCulla, Waukegan, Ill.

CALLS HEARD POSTAL CARS (for DX reports). Send $1.00 with your name, address and call letters for 100 (or $1.75 for 250) printed report postal cards with large red call letters. Complete form for description of your station, etc. State if member of A.R.R.L. Cards also printed to order. Letterheads—100 and 100 envelopes printed on fine bond paper, special radio size, $1.75. Samples on request. Printed by 9AVO (member A.R.R.L.) Radio Print Shop, Box 582, Kokomo, Ind.

SELL: Grebe RORN, forty dollars; CR3 and RORD Amplifier, hundred dollars; R3 Magnavox, twenty dollars. A. W. Hynds., Seward, N. Y.

SALE: ½ KW 500 cycle alternators $75; ¼ KW 500 and 900 cycle alternators $25; 25000 volt Dubilier $11; Exide 8V 160 AH storage bats $25; Advance sink rectifier $35; Paragon with detector and 3 step to match $75; Western Electric 50 watters $28; 6 N tubes $4; Colt Army .45 cal. automatic $30; UV203s $20; 150 or 300 AC voltmeters $20; 1 HP 60 cycle motors $60; 1000V generator. Edward Page, Baldwinsville, N. Y.

NEW TUNER, Detector and two step $35.00. R-2 Magnavox $30.00. One tube set $20.00. Chesaning Elec. Co., Chesaning, Mich.

SWOP!—500 volt 125 watt generator for battery charging generator. CW inductance $5.00. Marion Graham, Angola, Indiana.

BARGAIN: Will sacrifice my five brand new UV199 tubes. Absolutely perfect. $3.50 each. Need cash. R. Riedelbach, 1806 Locust Street, Milwaukee, Wis.

SELL: Radio Corporation 375 watt transformer, $12.50; Grebe CR3A, $15; Grebe CR2, $30. Write 2WZ.

9DDJ SELLING OUT. Grebe 2 stage amplifier with tubes $45.00. 50-watt transmitter, with meters, tube, keys, microphone, etc., complete $100.00. DX CW—WNP, fone—1400 miles. J. M. Cook, Langford, So. Dak.

SELL: Radio apparatus used and new. Write Albert Krug, Gardner, Ill.

FOR SALE: Two UV-217 Kenetrons, UP-1016 Power transformer, Acme double choke, six UP-1719 grid leaks, two PR-535 Rheostats, two UV-202 (new) UV-216 (new). two UC-488 condensers. Write, they're cheap. Arthur Walser, Chesaning, Mich.

LOOK: 1 R.C.A. Power Transformer model U.P. 1368 for $19.50. Has both filament and plate windings. 1 R.C.A. Magnetic Modulator model U.T. 1643 $6.00. 1 75 watt Acme filament transformer giving either 8 or 10 volts, $8.00. 1 Jewell thermo-couple ammeter 0-3 $8.00. 1 Jewell 0-15 A.C. Volt Meter $5.75. 1 AMRAD single tube REFLEX receiver cost $40.00 for $22.50. All the above are practically new and guaranteed to be in first class condition. Terms C.O.D. Elmer Scharbach, Hobart, Ind.

BARGAINS: Western Electric VT2, $6.50. Genuine Telefunken tubes, $3.75, fine for Radio Frequency. Acme and Rasla Radio Frequency Transformer, $2.50. Three Tube Cockaday 4 circuit tuner in cabinet $25. Four tube Reflex 3 R.F. and 2A.F. with fine loop, $45. Also 4 tube R.F. set in cabinet with loop, $35. Power Speaker Magnavox LS2, $45. 1/3 Cash with order. All letters answered. S. W. Mayer, Beechmont, New Rochelle, N. Y.

R.C.A. POWER TRANSFORMER U.P. 1368, $15.00. Large transmitter inductance with grid coil $3.00. What have you to trade? F. O. Reine, Brooten, Minn.

NAVY CW-936 transmitter-receiver with two dynamotors, power switchboard and filter, two microphones, extension box, control button, antenna switch and spare parts box. Only slightly used and in fine working condition. $195. Write: John Reid, 126-A Division St., Amsterdam, N. Y.

FOR SALE: Grebe CR3, good condition. Forty Bucks. James Marx, 932 North Fifth St., Reading, Pa.

NAVY TYPE CW 936 transmitter and receiver complete. Includes receiving and transmitting cabinets, power amplifier, loud speaker, two generators and switchboard, remote control box, 5 VT 1 and 3 VT 2 and phone transmitter. $150 without batteries, $225 with Edison Storage Batteries and Tungar charger. S. Miller, 303 Fourth Avenue, New York.

NEUTRODYNE COILS (neutroformers) correctly wound on best grade natural bakelite tubing, set of three $4.50. 13 plate variable condensers to go with coils, best grade $2.25 each. Neutralizing condensers (neutrodons) $1.00 per pair. Money refunded if not satisfactory. Add postage. H. Butterworth, 331 Quincy St., Brooklyn, N. Y.

FOR SALE: New Grebe CR9 receivers $90.00. New 10-A Western Electric power amplifiers complete with horn and tubes $100.00. Dakota Radio Apparatus Co.. Yankton, So. Dak.

WANTED: All A.R.R.L. members to know that we have a complete stock of radio parts and give mail orders special attention. Write, phone or wire. Hardsocg Mfg. Co., Radio Division, K.F.J.L., Ottumwa, Iowa.

FIFTY ASSORTED FLAT HEAD solid brass machine screws, nuts, washers, copper lugs, 50¢. Eight initial binding posts, set 60¢. Twelve nickeled binding posts 50¢. All three items $1.50. RADIO LIST for stamp. All prepaid. Stamps accepted. Kladag Radio Laboratories, Kent, Ohio.

$12. EACH takes Ohio or Wagner 110 volt sixty cycle eighteen hundred R.P.M. motors built in ¼ H.P. frames. Can be used as power motors. Type G Edison elements per pair 3½¢. Highest quality ⅛" x6" test tubes $3.00 gross. Perforated hard rubber separators 1¼¢. No. 20 99% pure nickel wire $1.50 per hundred feet. 25% off on 4 new Acme ½ and ¼ K.W. Plate transformers. Kimley Electric Company, Inc., 2665 Main St.. Buffalo, N. Y.

RADIO GENERATORS—500 Volt 100 Watt $28.50 each. Battery Chargers $12.50. High Speed Motors, Motor-Generator Sets, all sizes. Motor Specialties Co. Crafton, Penna.

HAMS WHO DESIRE SPEED—a moment's attention. Brother Ham whose limit was 15 words doubled his speed in One Evening. Send your Call and ask for the facts as told by himself. Dodge Radio Shortkut, Dept. SC, Mamaroneck, N. Y.

TELEGRAPHY—Morse and Wireless—taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U.S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U.S. Catalog free. Omnigraph Mfg. Co., 16M Hudson St., New York.

SELL: New Grebe CR-5 $55.00, RORN $40.00, R-3 Magnavox old style $22.50, DeForest D-4 $22.00 (used), RCA chopper Signal motor $12.00, C-303 (12 hours) $20.00, Acme 150 watt filament transformer $13.00, General Electric motor generator, 3450 R.P.M. 69 segment commutator, 500 volt, 100 watt $49.00. What do you need? Terms: C.O.D. ¼ cash with orders. 8CDC, John Taylor Galey, Third and Taylor, Beaver, Pa.

SIG CARDS 500 POSTCARD SIZE PRINTED IN BLACK INK WITH LARGE RED CALL LETTERS $4.00; 500 GOVERNMENT POSTALS $8.50 NOT OVER TEN LINES. CASH WITH ORDER. BY A.R.R.L. MEMBER. CURTIS, 1109 EIGHTH AVENUE, FORT WORTH.

QST HAM ADVERTISERS

Radio men are notoriously poor penmen. Some of the HAM ADS we get in here are almost illegible. Please co-operate with us and the printers and insure your ads being printed absolutely correctly by sending in your HAM ADS typewritten and double spaced, if you can possibly do so. Be sure and give your complete address. Thanks—QST Advertising Department.

WANTED—about 3,000 members of the League to pay some attention to our attempts to get information on the location of dead spots. So far all hands have acted as if they never heard of a dead spot. Address the Technical Editor.

WANTED—Urgent need of comparative tests showing some method of filtering synchronous rectifiers so as to give good note locally. Address Technical Editor.

HAVE YOU SPENT HOURS trying to cut peep and meter holes in panels. I have a tool that drills them one to five ins. in diameter as easily as quarter in. ones. Only $2.50 Post-paid. Homer H. Malcomb, Whitewater, Wis.

QRA SECTION

50c straight, with copy in following form only: CALL—NAME—ADDRESS. Any other form takes regular HAM-AD rates.

1AID—Miss Mildred S. Lorentson, 23 Braman St., Providence, R. I.

1ZD es 1CAK—John M. Wells, 40 Main Street, Southbridge, Mass.

2ADU—W. Constantinides, 137 Woodland Ave., Rutherford, New Jersey.

2AT—Robert H. Butler, 1324 River Road, Edgewater, N. J.

2CIL—M. Eugene Bussey, 16 Cedar Place, Yonkers, New York.

2CJ—N. Dmytrow, Jr., 507 Elm St., Cranford, N. J.

2JD—J. F. Rodenbach, 171 Norfolk Street, Manhattan Beach, Brooklyn, N. Y.

3KO—Paul R. Kern, 1030 N. 10th St., Reading, Pa.

4KW—W. Mulford Marsh, 1654 College St., Jacksonville, Florida.

4SN—Clifford O. Tritchler, 26 Todd Road, Atlanta, Georgia.

5ABU—J. A. Harvey, 728 So. 6th St., Baton, New Mex.

5KQ—McIlvaine and Breedlove, 106 W. Third St., Sheffield, Alabama.

5KV—M. E. Eaton, Box 384, Henrietta, Texas.

5BS—F. G. Atwater, 406 W. Main St., Houston, Tex.

5MN—Tom Lytle and Horace Biddy, 545 Hicks Ave., San Antonio, Texas.

5TO—D. C. Mast, Nacogdoches, Texas.

6ADH—H. D. Wilson, Box 8, Phoenix, Arizona.

6ZBH—James F. Brady, 2012 Pacific Ave., Alameda, Calif.

6DO—Norman A. Woodford, 440 Tenth Street, Richmond, Calif.

6ZAT—Lyndon Farwell, Los Gatos, Calif.

ALASKAN 7MN—F. H. Stephens, Box 356, Ketchikan, Alaska.

8AFM—Eugene B. Etchells, Yale, Mich.

8ANM—H. J. Crisick, W. Washington St., Medina, Ohio.

8FJ (Ex 8AXC)—Edward Manley, 214 Fifth St., Marietta, Ohio.

8BNA, 103 N. Main St., London, Ohio.

8CMH—Connell H. Miller, Sligo, Pa.

8XBP-8WA—1549 Tempie, Detroit, Mich.

9ANX—R. B. Frank, 6440 Parnell Avenue, Chicago, Ill.

9BPT—Harry Clingenpeel, Flora, Indiana.

9CEL—C. Houghton Will, 1210 Boundary St., Red Oak, Iowa.

9CHV—Glen W. Earnhart, 508 Harvey Avenue, West LaFayette, Indiana.

G2SZ—C. W. Goyder, 44 Hale Lane, Mill Hill, London, England.

Can 3AFV—K. Drummond, 63 Inglewood Dr., Toronto.

Through an error the call letters of S. Forrest Martin, were given as 1BJD. These are the call letters of Willard S. Felch, 69 Bay View Ave., Winthrop, Mass. 1BJB is S. Forrest Martin, The Choate School, Wallingford, Conn.

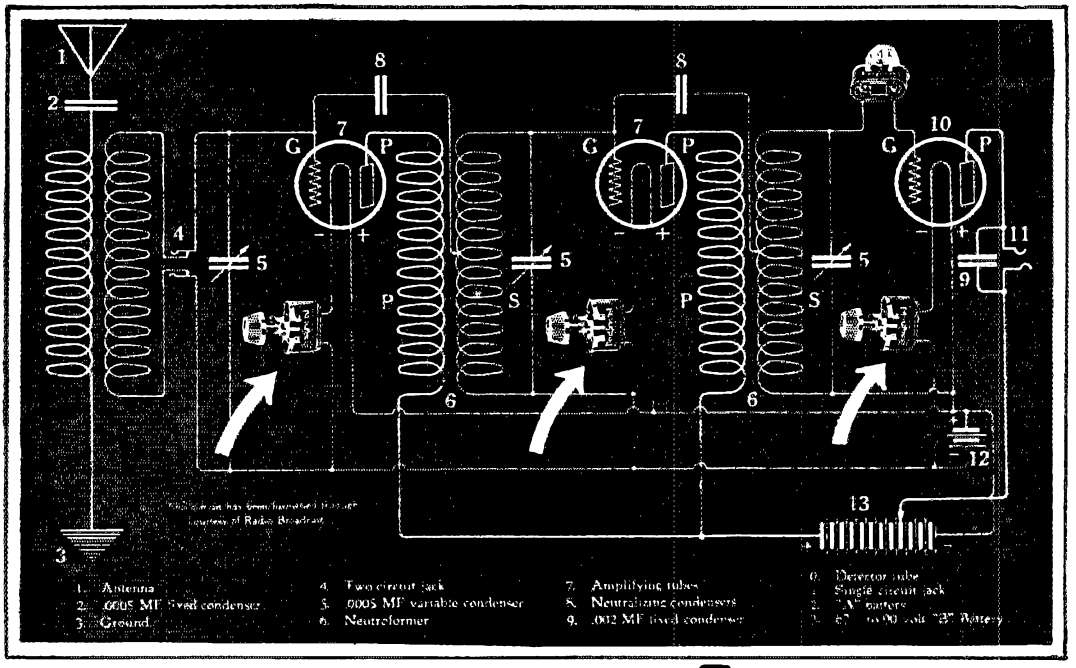
Through an error in the February QRA section, the call letters of 8XBL were given as 8BXL. His ad should read as follows:—8XBL, below 100 meters, 8AGF, 1025 Baldwin, Ann Arbor, Mich.

—FOR YOUR CONVENIENCE—

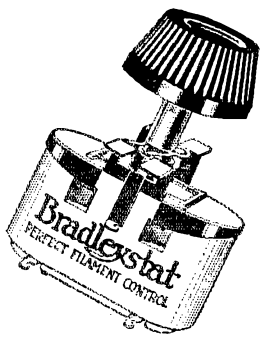
QST'S INDEX OF ADVERTISERS

IN THIS ISSUE

ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS



Use the Bradleystat in the Neutrodyne



THE discriminating radio fan is forever improving his set. At first, the actual accomplishment of radio reception is all that is asked, but in a short time new hookups are tried or new equipment is used to improve reception.

A good hookup is worthless without good equipment and, of all things, perfect filament control is most important. The high efficiency of a good tuner is quickly lost with poor filament control.

The Universal Bradleystat makes any radio set better. Its noiseless, stepless control never fails to surprise and delight the radio fan trying to make long distance records. The recent Radio Broadcast long distance contest gave the Bradleystat first place for superior performance. Replace your present rheostat with Bradleystats and enjoy better radio.

WHEN YOU BUY A RADIO SET, ASK FOR BRADLEYSTATS

In U. S. A.
$1.85
at all dealers

Allen-Bradley Co.
Electric Controlling Apparatus
277 Greenfield Ave. A-B Milwaukee, Wisconsin

In Canada
$2.50
at all dealers

MANUFACTURERS OF GRAPHITE DISC RHEOSTATS FOR OVER 20 YEARS

Mail This Coupon—TODAY!

Allen-Bradley Co.,
277 Greenfield Ave., Milwaukee

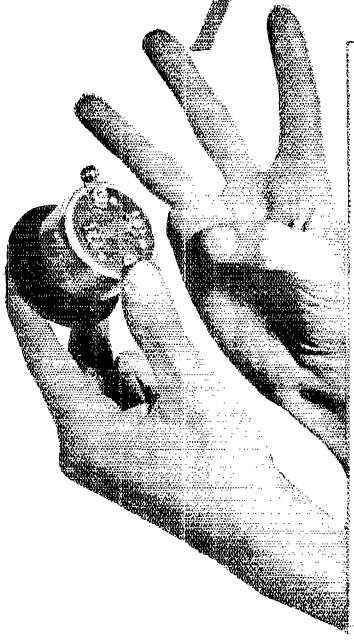
Please send me information about the Universal Bradleystat, the perfect filament control. I want better radio reception.

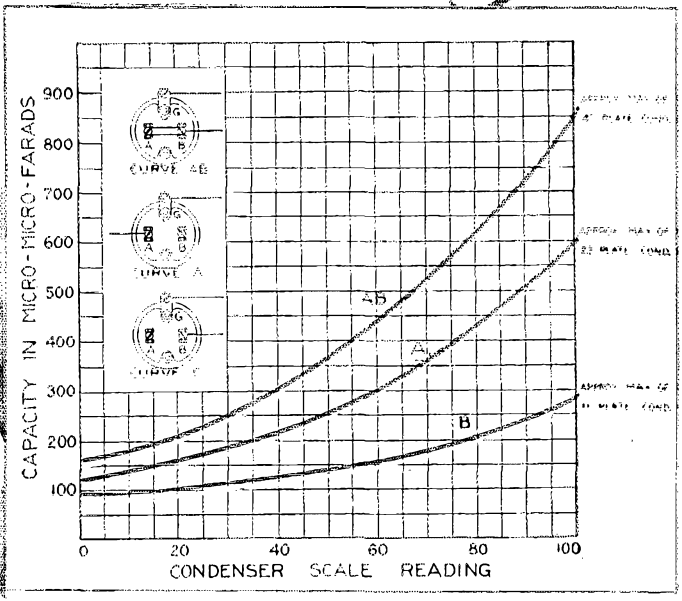
Name .....

Address .....

.....

Triple Range





Three Condensers in One

Here it is—just what you've been looking for—

The Connecticut D-10 Triple Range Variable Condenser—

A single unit that takes the place of the eleven, the twenty-three and forty-three plate condensers of the ordinary type—

A neat compact instrument that covers the full field of usefulness—With all the advantages that go with full scale rotation, perfect shielding, complete housing and one hole mounting.

The chart tells the story—

The range indicated by Curve B—from .000075 to .000275 mfd.—approximately that of an eleven plate condenser, is secured by wiring into the circuit from posts G and B. The range indicated by Curve A—from .0001 to .0006 mfd.—approximately that of a twenty-three plate condenser, is secured by wiring into the circuit from posts G and A.

The range indicated by Curve AB—from .00015 to .00085—approximately that of a forty-three plate condenser is secured by bussing A and B and wiring into the circuit from G and B.

A most practical adaptation of a research laboratory instrument. Just the thing for the *amateur*, the *experimenter*, and the man who likes to develop his own hook-ups.

COMPACTNESS

Diameter of case.....2 9/32"
Depth of case.....1 3/8"

EASE OF MOUNTING

Condenser is mounted on threaded bushing and clamped to panel between two units. Adapted for installation on 1/8", 3/16", or 1/4" panels.

COMPLETE SHIELDING

Since terminal G is common with the case, as well as with two sections of the condenser, a connection from G to A ground or a negative battery terminal automatically shields the condenser against body capacity and capacity coupling.

VERNIER SCALE

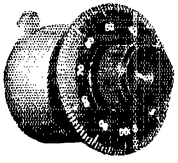
Design which provides 846° of dial rotation as against the usual 180° gives a vernier ratio of about 2 to 1, and permits correspondingly chosen settings.

AUXILIARY EQUIPMENT

A dial, index stud, spacing washers for less than ¼" panels and buss bar for connecting A and B in parallel as shown in diagram AB, furnished with condenser.

Price $4.50 Complete

Bulletin A-104 upon request.



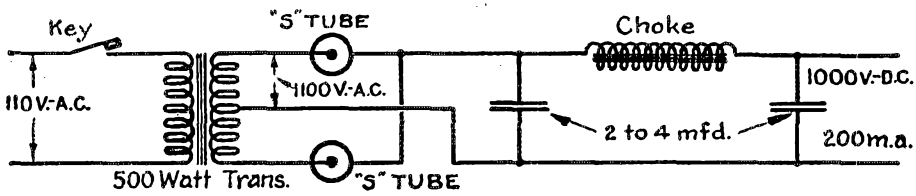
Type D-10
Variable Condenser
$4.50 Complete

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
MERIDEN CONNECTICUT

RADIO DIVISION

AMRAD

"S" - TUBE



Typical Circuit for Using AMRAD "S" Tube Rectifiers.

"Manufacturers of the Famous
AMRAD "S" Tube:— Jan. 16, 1924

You are to be complimented on your AMRAD "S" Tubes. I'll tell the world they are quite the berries. I bought a pair and have had them in use for just about three months. The first time I put them in my circuit they worked F.B. As for tone, well, every station that I work gives me a report as "PURE DC". As for DX, I don't see how they can be beat. I have worked 1700 miles on 5 watts. I have been heard in all districts, Mexico, Canada and forty States. I have worked 9BZI, Ackley, Ia., and 9DDJ, Lankford, S. D., on 5 watts, loop modulation. In daylight I have worked 1,000 miles often."

P. B. Ward, Jr., (5AFH)
610 N. Main St.,
Cleburne, Texas.

SPECIFICATIONS

(Improved Type #4000)

No Filament to Burn Out.

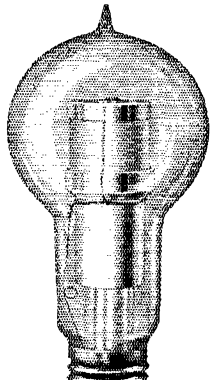
Operates CW transmitters utilizing either 5 or 50 watt power tubes.

May be used to charge storage "B" Batteries.

Fits standard base.

A 100% Rectifier

Ratings per Tube—
Current: 100 miliamps
Voltage: Up to 1000 volts DC
Life: 3000 hours (very conservative).



Improved AMRAD "S" TUBE #4000. Price $10.00 each.

SEND FOR FREE BULLETIN J-2

Users of "S" Tubes are our be advertisers. Read editorial art cles in QST and Popular Radi for February, to see widespread interest "S" Tubes are provoking From time to time we publis in this space letters from own ers of "S" Tubes. It is signifi cant that most of these publishe so far refer to the old type #300 which is greatly improved i #4000, here illustrated.

Order from your Dealer or rem to

AMERICAN RADIO AND RESEARCH CORPORATION

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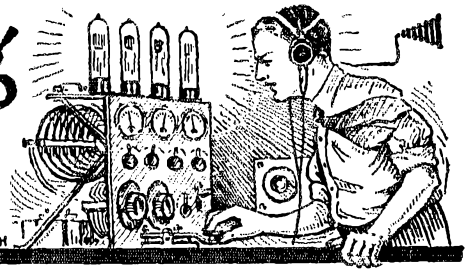

Look! The message traffic figures are back! They are back to a decent figure—lets don't let them get inflated again with a lot of nonsense. Delivery is improving, but we haven't reached the high standard which we would like to see. Apparently the "rubber stamp messages" have passed away for which we must be thankful and we hope they remain out of amateur traffic. The gang requested the individual message figures for the reason it gives credit to those men for the amount of work they do each month. Be reasonable!

In spite of a good number of suggestions as to how to eliminate the long "CQ" and the short sign, about the best we could dope out of them in the sense of a practical suggestion is to watch your own step in this respect and don't become a "CQ Hound."

What is attracting a great deal of attention is the sloppy way some of us have in using our keys. One hears a variety of the supposed "individuality" on the air, but what really happens is that some of us are getting to be bum operators. So much so that foreign amateurs criticise us and complain of our "key manipulation" and wonder why we don't use international morse telegraphy. Many calls are lost or are beyond identification because of rotten sending. It is time we looked into it and corrected it before it takes a good hold on us.

We must give more attention to the handling of our keys. Many times messages must be repeated not because of the inability of the receiving operator to copy, but because the sending is so perfectly awful that no man could read it. What is the result? We get into the habit of sending each word twice and repeating everything. We don't trust ourselves—how can you trust the receiving operator?

In practically every case of communication, except under unfavorable conditions, transmission could be words once and there isn't much excuse for double transmission if some thought is given to the sending end.

Characters should be made clearly and distinctly and the proper amount of spacing should be used. Don't make a dot out of a dash—a dash should be about three times the length of a dot; spacing between letters should be equivalent to the length of a dash, and between words about the length of two dashes.

It is with the greatest reluctance that we announce the resignation of George S. Turner, manager of the Midwest Division. No man gave more of his time to A.R.R.L. affairs than did Turner—always ready to serve his men, fight for them, and share their squabbles with a smile. When he took over what was known as the Midwest Division there wasn't any organization—practically a division in name only. He made the Midwest what it is today—dear to the heart of every man in it something to be proud of if you live in the "ole Midwest"—where the A.R.R.L. Spirit never dies. Turner had his ups and downs, but he always came out on top. If he had any pet peeves, he kept them to himself and thrashed them out to a finish with the interested parties. Turner has by no means deserted the A.R.R.L. He has been a loyal member and always will be and we know the Midwest men will miss him. Just why Turner is resigning is a bit of a secret—but secrets will out in time—you know! Thanks to you, OM, for the condition in which you leave the Midwest—it is 1000 percent better than when you took hold of it.

TRAFFIC REPORTS FROM A.R.R.L. OFFICIAL RELAY STATIONS

CENTRAL DIVISION: 8JJ, 315; 8CED, 256; 8YN, 169; 8NX, 150; 8CZZ, 141; 8AFS, 141; 8DFB, 135; 8CGM, 100; 8AEB, 79; 8AIH, 76; 8DDT, 66; 8BGQ, 47; 8CPD, 45; 8ZZ, 37; 8CPY, 37; 8ZF-8BEZ, 34; 8AAB, 30; 8DBO, 28; 8DRR, 27; 8DIL, 25; 8BGO, 24; 8ZAG, 21; 8CWK, 20; 8RXA, 14; 8ZH, 14; 8BBI, 12; 8BWR, 6; 9DWA, 204; 9DYT, 132; 9EHI, 126; 9CP, 124; 9MM, 86; 9AFY, 80; 8BDR, 13; 9BON, 70; 9DKV, 52; 9AZX, 40; 9UB, 19; 9YB, 11; 8GZ, 637; 8CHY, 355; 8BYN, 327; 8CWR, 309; 8CKV, 217; 8CHY, 207; 8AIB, 200; 8ANB, 200; 8FU, 177; 8YAE, 141; 8COJ, 129; 8ZY, 125; 8IJ, 120; 8DBM, 118; 8DLS, 116; 8EB, 102; 8AIB, 100; 8AAJ, 95; 8CXU, 86; 8PL, 75; 8RN, 74; 8CWP, 65; 8BKM, 62; 8BHE, 61; 8ANL, 46; 8BXX, 41; 8ACY, 40; 8CDZ, 37; 8DDQ, 36; 8AA, 33; 8AGP, 29; 8CMU, 28; 8CYT, 21; 8AL, 19; 8CCI, 18; 8CQS, 18; 8AJD, 17; 8QK, 14; 8GD, 14; 8AVN, 14; 8BCF, 14; 8CNL, 13; 8RY, 10; 8BCE, 8; 8CIE, 8; 8HZ, 5; 8BJL, 5; 8DC, 5; 8CVN, 2; 8CBX, 1; 8CSK, 1; 9CZL, 597; 9VM, 300; 9AWU, 228; 9AUS, 216; 9DQU, 203; 9AWQ, 203; 9MC, 202; 9EAC, 185; 9AYX, 163; 9EHQ, 108; 9KD, 108; 9CFK, 105; 9CMC, 100; 9CLJ, 92; 9BWA, 84; 9RWO, 84; 9DBP, 82; 9AUS, 72; 9CLZ, 70; 9AQD, 68; 9DVW, 67; 9DAY, 67; 9BHH, 64; 9TW, 64; 9CMN, 63; 9AYX, 62; 9DHZ, 60; 9BYX, 57; 9ATT, 56; 9BHD, 55; 9DBN, 55; 9CDB, 50; 9DKH, 50; 9AAW, 49; 9CTC, 47; 9DLR, 46; 9CAX, 45; 9DAP, 43; 9CED, 42; 9DG, 40; 9BIJ, 40; 9BUH, 40; 9AKU, 34; 9ARM, 33; 9CFD, 31; 9DCR, 30; 9DBF, 30; 9COL, 27; 9DBA, 26; 9CXT, 25; 9BLH, 23; 9CSW, 18; 9EBH, 18; 9BGC, 18; 9DPV, 16; 9CXH, 16; 9BGC, 16; 9DGA, 16; 9DHX, 15; 9BFO, 15; 9ELB, 15; 9AGS, 14; 9DMY, 12; 9PE, 11; 9POX, 11; 9OP, 10; 9BXD, 9; 9BZQ, 8; 9DWX, 5; 9ALW, 4; 9DIL, 104; 9NQ, 88; 9BEF, 17; 9AOY, 17; 9BAM, 11; 9ALI, 238; 9CWZ, 208; 9ECW, 174; 9BFY, 174; 9CGB, 136; 9BKR, 111; 9AOX, 107; 9BLF, 101; 9CJI, 86; 9ATO, 83; 9EIL, 78; 9EAR, 70; 9GO, 72; 9CKW, 64; 9CVI, 60; 9AZN, 58; 9ELV, 55; 9DHG, 53; 9BIB, 50; 9BMU, 48; 9CCD, 45; 9BQG, 43; 9AGT,

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ATLANTIC DIVISION: 3BNU, 24; 8DHV, 41; 3CJN, 56; 3BAQ, 9; 8AVL, 11; 3YO, 24; 3CDN, 65; 3BLP, 220; 3AUV, 43; 3ZO, 100; 3ACY, 27; 3BVA, 263; 3ACY, 55; 3CCX, 16; 3BBV, 4; 8BQ, 14; 3CDG, 54; 3ADV, 50; 3BPM, 30; 3BJI, 12; 3HD, 14; 3FS, 17; 3ACQ, 36; 3BEI, 50; 3BWJ, 13; 3ADP, 43; 3ADQ, 9; 3BTL, 56; 3HH, 135; 3AEN, 53; 3ZM, 11; 3BSF, 16; 3WF, 203; 3LG, 153; 3DQ, 25; 3AEK, 24; 3CDU, 23; 3PG, 2; 3LL, 1; 3HG, 94; 3DU, 1; 3APT, 27; 2BRB, 153; 2CJR, 41; 2CHY, 50; 2BPF, 24; 2PF, 5; 2CPQ, 71; 2AAY, 73; 2KU, 38; 2CDP, 48; 2BL, 18; 2WZ, 23; 2AX, 10; 2CQE, 10; 2DL, 10; 2CRB, 2; 2GHQ, 4; 2BNC, 4; 2BCK, 19; 2CTW, 16; 2WZ, 45; 2BEG, 1; 2CRQ, 48; 2CIZ, 21; 2FZ, 21; 2BBX, 48; 2CWR, 19; 2CYX, 2CIZ, 21; 2FZ, 21; 2BBX, 48; 2CWR, 19; 2CYX, 88, 2KR, 47; 2XNA, 71; 2CHK, 22; 2BNL, 4; 2DI, 24; 2BY, 15; 2CPA, 85; 2ACS, 37; 2GK, 54; 2BXW, 42; 8APU, 11; 8AVJ, 46; 2CGH, 21; 2CSX, 1.

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ROCKY MOUNTAIN DIVISION: 9AMB, 225; 9AVU, 144; 9BJI, 60; 9BJK, 65; 9BUN, 13; 9BXQ, 1; 9CAA, 201; 9EEA, 15; 9QL, 30; 9APF, 150; 9CJY, 52; 9AZG, 176; 9DTE, 146; 9DFH, 26; 9CLD, 10; 9EAE, 193; 9ODE, 24; 6CJB, 27; 6CBU, 14; 6BLH, 209; 6BUH, 125; 6AJA, 105; 6RM, 102; 6AED, 23; 6CHW, 182; 6PE, 448.

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Cancellations and Corrections in and Additions to Traffic Department, Directory Printed in October, 1923, and January, 1924, Issues of QST.

Cancellations

SO. INDIANA: A.D.M., J. E. Hall, Seymour Elec. Co., Seymour, Ind. Dist. No. 3: D.S.—C. J. Butler, Crothersvill.

ILLINOIS—Dist. No. 1: O.R.S.—9ARB. Dist. No. 7: D.S.—J. E. Brennan, 5714 W. Race St., Chicago. C.M. CHICAGO—J. E. Brennan, 5714 W. Race St.

WISCONSIN—Dist. No. 1: O.R.S.—9FI, 9AHO, 9DHM. Dist. No. 2: O.R.S.—9EEY.

OHIO—Dist. No. 4: O.R.S.—8AWN.

MISSOURI—Dist. No. 2: C.M. ST. JOSEPH—Duncan Cox.

KANSAS: R.M.—Clifford Peters, Tonganoxie.

CENTRAL ONTARIO: C.M. KITCHENER—H. S. Gowan, 120 West King St., Kitchener, Ont.

Corrections

ILLINOIS—Dist. No. 3: D.S.—Jas. A. Wilson, address changed to 911 Lay Blvd., Kalamazoo. A.D.M. N. C. Smith, address changed to 1036 N. Dearborn St., Chicago.

Additions

OHIO—Dist. No. 1: O.R.S.—8BJL, 8CHY, 8CQS, 8CXU. Dist. No. 2: O.R.S.—8BIE, 8CTD. Dist. No. 4: O.R.S.—8AIW. Dist. No. 6: D.S.—W. E. Weckel, 2118 Tuscarawas St., W. Canton. O.R.S.—8AK.

NO. INDIANA—Dist. No. 1: D.S.—H. G. Tudor, 3620 Washington St., Marion, Ind. O.R.S.—9CUI, 8CUS. Dist. No. 2: O.R.S. 9DKV.

SO. INDIANA: A.D.M.—D. J. Angus, Room 66, Y.M.C.A. Indianapolis, Ind. Dist. No. 5: O.R.S.—9BW.

ILLINOIS—Dist. No. 1: O.R.S.—9EIB, 9LE. Dist. No. 6: O.R.S.—9ABB. Dist. No. 7: D.S.—W. E. Schweitzer, 4246 Hazel Ave., Chicago.

MICHIGAN—Dist. No. 2: O.R.S.—8DCW, 8BNC. Dist. No. 3: O.R.S.—8DDT.

WISCONSIN—Dist. No. 2: O.R.S.—9CCF, 9DKS. Dist. No. 3: Add county "Marathon". Dist. No. 8: O.R.S.—9AGT. Dist. No. 4: 9PJ. Dist. No. 5: O.R.S.—9GD, 9CYG.

MINNESOTA—Dist. 3: O.R.S. 9BLY, 9BEP, 9BFI.

FLORIDA—Dist. No. 4: C.M. TAMPA—Houston Wall, 1407 Nance Ave., Tampa, Florida.

KANSAS—R.M.—Vertice D. Wilson, Ottawa, Kansas (128 N. Cedar St.) Dist. No. 1: C.M. LAWRENCE—N. Douglas, 1622 New Hampshire St.

MISSOURI—Dist. No. 2: C.M. ST. JOSEPH—J. Abercrombie, Felix St., St. Joseph. O.R.S.—9DOJ.

ONTARIO: C.M. KITCHENER—H. M. Linke, 80 Wellington St., Kitchener.

NORTHWESTERN DIVISION

Personnel

Idaho, Montana, Oregon and Washington

Manager—Glenn E. West, Polytechnic, Mont.

Idaho—Dists. No. 1 and No. 2

A.D.M.—LaVerne Martin, 423 14th Ave. S., Nampa. Dist. No. 1: Counties (not complete as yet).

D.S.—C. Anderson, 509 So. Washington St., Moscow.
Dist. No. 2: Counties (Not complete as yet).
D.S.—E. M. Wright, Nampa.
O.R.S.—7OT, 7IO, 7OB, 7YA, 7AGR.

Montana—Dists. No. 1 to No. 4

A.D.M.—H. E. Cutting, Box 517, Bozeman.
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D.S.—M. Amdahl, Box 433, Great Falls.
O.R.S.—7ZQ, 7WP, 7AGF, 7ZC.
Dist. No. 2 Counties: Ravalli, Granite, Silver Bow, Deer Lodge, Jefferson, Broadwater, Gallatin, Madison, Beaverhead and Park.
D.S.—F. F. Gray, 3200 Richardson St., Butte.
O.R.S.—7ZL, 7ZF, 7II, 7NT, 7IT, 7EL, 7ACI.
Dist. No. 3 Counties: Blaine, Phillips, Valley, Sheridan, Roosevelt, Richland, McCone, Dawson, Fergus, Garfield, Prairie and Wiebeaux.
Dist. No. 4 Counties: Wheatland, Sweetgrass, Stillwater, Carbon, Valley, Musselshell, Wellowstone, Treasure, Big Horn, Rosebud, Custer, Fallon and Carter.
D.S.—L. S. Crouter, Y.M.C.A., Billings, Mon.
O.R.S.—7AJD, 7ZU, 7CO.

Oregon—District No. 1 to No. 9

A.D.M.—P. R. Hoppe, 1633 Williamette St., Eugene,
Dist. No. 1 Counties: Lane, Douglas.
D.S.—L. Starr, 1093 5th St., Eugene.
O.R.S.—7LR, 7NL.
Dist. No. 2 Counties: Linn, Lincoln, Benton, Polk and Marian.
D.S.—B. Mitchell, 515 Center St., Salem.
C.M.—G. Feikert, 402 N. 17th St., CORVALIS.
O.R.S.—7AGE, 7HA, 7QT, 7OH.
Dist. No. 3 Counties: Yamhill, Tillmook, Washington, Clatsop and Columbia.
D.S.—A. H. Whittle, 7 Grand Ave., Astoria.
O.R.S.—7KS.
Dist. No. 4 Counties: Multnomah, Clackmas, Hood River, Wasco, and Sherman.
D.S.—Arvar Herner, 321 23rd St. E., Portland.
C.M.—R. P. Farrington, 502 Oregon Bldg., PORTLAND.
O.R.S.—7TO.
Dist. No. 5 Counties: Jefferson, Deschutes and Crook.
O.R.S.—7IW.
Dist. No. 7 Counties: Jackson, Klamth and Lake.
D.S.—H. H. Howell, Rt. 2, Box 15, Medford.
O.R.S.—7TQ.
Dist. No. 8 Counties: Harney, Malheur, Baker, Grand and Wheeler.
Dist. No. 9 Counties: Wallowa, Union, Umatilla, Morrow and Gilliam Counties.
D.S.—James Rice, 301 N. Main St., Pendleton.
O.R.S.—7JE.

Washington—Dists. No. 1 to No. 12

A.D.M.—K. W. Weingarten, 3219 N. 24th St., Tacoma.
Dist. No. 1 Counties: Watcome, Skagit, and San Juan.
D.S.—Leonard Tate, 807 6th St., Anacortes.
O.R.S.—7RC.
Dist. No. 2: Counties: Clallam, Jefferson, King, Snohomish.
D.S.—E. Kick, 3802 Hoyt Ave., Everett.
Dist. No. 3 Counties: Kitsap.
D.S.—J. A. Rutledge, 1035 Pacific Ave., Bremerton.
Dist. No. 4 Counties: Mason, Grays Harbor and Pacific.
D.S.—W. Hemrich, Box 511, Aberdeen.
Dist. No. 5 Counties: Pierce, Thurston and Lewis.
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Dist. No. 6 Counties: Wahkiakum, Clarke, Cowlitz, Skamania.
D.S.—Geo. Sturley, 205 E. 17th St., Vancouver.
Dist. No. 7 Counties: Okanogan, Douglas, Chelan and Grant.
O.R.S.—7OM.
Dist. No. 8 Counties: Kittitas, Yakima, Klickitat, Benton.
D.S.—E. L. Waggner, Box 542, Toppenish.
Dist. No. 9 Counties: Franklin, Asotin, Walla Walla, Columbia and Garfield.
D.S.—L. C. Maybee, 110 So. 7th St., Pasco.
Dist. No. 10 Counties: Whitman, Adams, Lincoln, Spokane, Ferry, Stevens, Pend and Oreille.
D.S.—F. M. Curtin, E. 618 Wabash Ave., Spokane.
O.R.S.—7WA, 7SZ.

ATLANTIC DIVISION

Chas. H. Stewart, Mgr.

No one so completely disappeared from the amateurs ranks as did Ostman (2OM) E.A. of the Northern Section. Everybody has been left in complete darkness as to how, why, when, or where. The result has been distressing on the many amateurs in and around the territory under Ostman's jurisdiction. Reports have been sent in, so it is said, and nothing ever came of them. At any rate they never reached the D.M. or T.M. Let this be said in justice to the men who stuck to their guns during the time there have been no reports—no doubt 2OM will find a flock of them waiting for him—that some quick changes have been made where necessary and next month should show a decided improvement in reports for QST.

Around Brooklyn way, 2BRB was the bambino with a nice flock of messages. A new stick is up there and the old 50-watter and 250-watter are poking them out all over the country. 2KU sawed off a game of chess with a Schenectady future Capablanca. 2WZ is using C.W. now. (Isn't is about time somebody down in the 2nd district tied a can to those birds who continue to blat up the air with a spark set? It is commonly boasted that C.W. started in the Second District—it will be commonly boasted that spark lingered longer in the Second District unless somebody has an awakening doggone soon. Why even out in some of the wilds of the wooly west there are complete states which boast "no sparks." Trying to get traffic into the Second District with those antiques blatting away is the most horrible thing one can attempt. C'mon Second District—don't get caught sleeping—snap out of it and get rid of the spark.—T.M.) No wonder everybody sets up a wild yell of glee when another spark shifts over to C.W. The day will come, too, when we will get rid of the dizzy plate supplies we now have—but not until the air is free from sparks.

2CJR is rather QRW with school and other (???) work! 2AJ is setting up in a new location. 2AAY gets over to the west coast quite ok. 2AX got to messing around with a phone and blew his transformer. 2BL grinds out a mean signal with his 100-watter. 2BPF is getting a rep for having nice pure C.W.

Dist. No. 5 of N. Y. State comes forth with some fine stations. 2BY has been reaching Hawaii and New Zealand, but traffic is light. 2CPA has worked several 6's on his 50-watter. 2GK calls England and West Coast local since he got the 250 watter going on D.C. 2BXW is increasing his power to 100 watts. 8APU reaches out better with his new antenna. 8BXP is a newcomer in the district. 8AVJ is one of our most consistent men—always on the job. 2CGH was just discovered—will be a station regularly heard from. We're going to try to uncover some new ones in 2ADM, 2ALK, 2CZH, and 2CGJ.

East Bronx is bothered with too many phones who give no support, according to 2CWR.

Northern Manhattan: 2DI has his M-G working ok and is getting out considerably better. 2XNA has a bunch of operators which is the reason the station is on the air so consistently.

Queens: 2AVE has been inactive because of remodeling. The rest of the gang seems dead! A report slipped thru that 2AWS was QSO Europe on short waves.

DISTRICT OF COLUMBIA—3AB has been off lately on account of antenna trouble. 3BWT has also had trouble 3ALN, with an experimental license, 3XAO, has hooked up with 2 British stations on 100 meters, being the first in his locality to do so. Probably the best reception in this section was done by 3APV who has logged many Dutch, British and French hams. 3ZW has opened up signing 3BE, on two 50-watters. The Y.L. 3CDQ, seems to have trouble raising her OW friends, but little trouble getting the OMs to answer. NKF is doing some wonderful daylight work on a very short wave. 3AJD with 100 watts, and 3TE with 200 self-rectified, are still pushing messages to the west coast. 3LG has worked 6LV and is one of the best stations in the state. 3WF has 100 watts and is handling a great volume of traffic. 3DQ has a terrific punch and is reaching out FB. 3PH also with two 50's is doing excellent work. 3MF is on again for a spell with an even better kick than formerly. His two 5-watters are blushing with 1000 volts on the plates. 3BCK, 3AEK, 3CDU, 3UZ and

3FB are doing the usual good work on 10 watts. 3BMO has completely overhauled his station. 3LL is doing good work with a 5 watt tube and is rapidly qualifying as a "boiled owl." 3APT has again resumed his schedules and is reaching out as usual. 3SQ will soon be in a new location and will assuredly prove a valuable station for this section. 3HG is breaking out to the west coast on 100 watts and 3SF and 3DU, the spark hounds, are doing good work as per usual. 3EM-3XX-3CJC is shut down with antenna trouble. 3BUR is doing excellent work whenever NSS shuts down.

DELAWARE—3AFB is on the air again. A new station. 3SL, is hitting up in great style. 3AIS has come back and is pulling off 1200 miles with six tenths of an amp. in the antenna. 3AFB reports using one 50-watter. He has experienced antenna trouble with a broken mast, but is getting out with a temporary antenna in a tree.

EASTERN PENNSYLVANIA—Station activities have taken a decided jump for this report and it is more than pleasing to note the many records attained with the same.

Dist. No. 1: 3BTL is to be commended for the wonderful performance of his station, relayed a message from Alaska to Philadelphia in two jumps and then phoned the message—thats the A.R.R.L. spirit. Was also heard in England by 2JF. 3HH made a big showing and is installing two 50-watters. 3ZM is trying shorter antenna. (FB, on low waves, OM.)

Dist. No. 2: 3BNU installed a sink rectifier and 100 watts.

Dist. No. 4: 3ZO is working with a portable station in Florida. 3AUV logged f8BF.

Dist. No. 5: 3ACY is working hard with both C.W. and the rock crusher. 3BVA sends in a good report. 3CCX and 3BBY are working overtime on 100 watts.

Dist. No. 6: 8AFR is back on the air again. Lewisburg is warming up for DX. The D.S. and ex-3ABD are searching for a bad power leak that QRM's their DX working.

PHILADELPHIA—Most stations are experimenting on the low waves and greatly surprised at the increased range obtained. 3CDG using two 50-watters was recently heard on the Pacific coast, 100 meters. Get busy, gang, and report your station activities.

DAKOTA DIVISION
N. H. Jensen, Mgr.

This division continues to maintain regular contact with WNP through 9DKB. He has no trouble working WNP and has taken numerous messages and also PX from him.

MINNESOTA—Dist. No. 1: 9CDV pounded out a total of 477 messages during the month. 9DOE is squeezing 3½ amps out of a 5 watt tube and has been heard by WNP. 9ZC has not been on the past month. On account of the frigid weather at Bandette the messages have been frozen in his receiver and ZC does not dare thaw them out for fear of an explosion due to the great amount of accumulated racket. Hi! The fellows are continuing to kick about non-delivery of messages and those in this district are following a policy of mailing messages if unable to relay promptly.

Dist. No. 2: 9AXS is now on with battery C.W. and is getting out well, which makes a splendid outlet for west and north traffic. 9DCH is reaching out to all points, and 9BNF and 9CEH are shoving traffic in all directions consistently. 9DYR is on every Saturday night, also early morning and early evening on other days. Clarence Rogness (9EGG) operates 9DYR every morning and operates his own station at Kenneth over weekends. 9AJV is doing very good work. 9AEP is a secluded sort of a ham, but he worked WNP on the 15th of January at 5 A.M. He is using three 5 watt tubes and makes an awful noise with D.C.C.W. 9ANJ with two 5-watt tubes works a thousand miles consistently every night. 9MB (formerly 9XT) at Collegeville is on the air with two 50-watters every morning from 6:30 to 8 and has started handling traffic. Both C.W. and I.C.W. are being used. The C.W. has punctured the ether a distance of 800 miles in daytime. The old rock-crusher will be used only in cases of emergency.

Dist. No. 3: 9DPX is still wondering how to get that skyscraper mast of his up, and the rest of the town is wondering how long it will stay there when it goes up. 9ZG is putting 2.2 amps into the aerial on 220 meters with 400 volts battery D.C. on plates. 9BPN leads in amount of traffic handled in St. Paul and reports regular DX being worked almost every afternoon and evening. 9APE is doing work at lower wave-lengths and is getting out fine. 9DGW blew his 50-watter and is squeezing 2.5 amps out of a lone 5. Rumor has it that 9DZF is putting in a 900-cycle generator, but the rest of the St. Paul gang might change his mind. 9BTL, on 10 watts was heard in New Zealand. 9ZT has been working 1XAM on 56 meters and has working 1XW (break-in) and many 2's and 3's in the vicinity of 100 meters. Both coasts are worked regularly on 200 meters. Many reports have been received by 9ZT from European amateurs.

NORTH DAKOTA—Dist. No. 1: 9AEJ is on the air regularly after a long absence. A newcomer among the key pounders, 9AMP, has taken the lead for the month with a total of 92 messages, while second high is held by 9DLI with 85 to his credit. Another new man, 9CSI, has made an excellent start having 56 messages. 9DNX, also making his first appearance in the report, is developing into a first class relay man. 9EBT is back on the air with his usual regularity, but 9UH had the misfortunte of having a pole guy break and his aerial drop during a recent sleet storm.

Dist. No. 2: 9DKB deserves a lot of credit for his consistent work with WNP. He handled many messages and press and is making Can. 9BP step some to retain his laurels. 9ACK is doing very good work and leads in the amount of traffic handled in the district. 9FX is building a tube set. 9DUM and 9DMV are starting out in good shape.

SOUTH DAKOTA—Dist. No. 1: 9BG worked 6CEU twice during the latter part of December. 9CKT blew his only 5-watter and consequently his traffic total suffered. 9BOF is QSO both coasts and is on the air nearly every morning from 1 to 2:30. 9YAM and 9CKA are heard occasionally. Active stations in Sioux Falls are 9BNH, 9BLC, 9DKQ, 9BCG, 9AQE and 9AYD. The latter has worked 1YB. 9DKQ is on regularly and works every district. 9BNH is getting out in good shape. 9BCG has the best radio shack in the state. Hams are being entertained regularly at all night sessions.

Dist. No. 2: 9DWN leads the district again in amount of traffic handled. He is using 50 watts now and is getting out in good shape. 9BRI is second in amount of traffic and leads the state in DX work. Inside of four hours he worked eight U.S. districts and 6CEU. 9AHT has worked all districts with a 5-watt tube. His Mother has joined him and operates under the call 9TM. She and Mrs. 9BLC appear to be the only OW's in the state. 9CGA is now on with 100 watts. 9AYI handled considerable traffic during a recent vacation. 9AGL and 9ABY are doing good work.

DELTA DIVISION
W. W. Rodgers, Mgr.

In the Delta division we have abolished the old system of handling the reports of the stations and have substituted one that has the ear marks of being much better for this territory. The new O.R.S. appointments will be made shortly and it will pay all stations to try for one of these appointments.

Let me warn you, Delta officers, too many of you are sleeping on the job. Unless we get full co-operation out of you, we will ask for your certificate. Those of you who are helping have my thanks for some of you are real A.R.R.L. workers.

TENNESSEE—Dist. No. 1: 5EK has handled many rubber stamp messages but won't report them as traffic. (FB, OM—D.M.) 5NT reports a 50-watter gone west, but will be on with 15 soon. 5PF blew his bottles: ND here. 5NZ handled 48 messages. 5KA is getting out well on fifteen watts. 5ZB is working on a cage antenna with no messages so far. 5RZ has wound the transformer and is looking for some tall timbers.

Dist. No. 2: The Chattanooga gang had the pleasure of meeting Mr. and Mrs. Reinartz (1QP) recently and lost some messages arranging for their reception. Many of the stations are being changed since the visit of Reinartz and we hope the change will be for the better. 5MB is being "Reinartzized" and will be on soon. 5ANT handled 84 messages in two weeks. (FB—D.M.) 5ABN reports 43 messages on 10 watts. 5ALT has opened up in Franklin with 5 watts. 5HL, the traffic slugger, is silent.

Dist. No. 3: 5DA is busy with his coal mines—no stuff here.

MISSISSIPPI—5AGV reports 18 messages. 5KR handled 88 during the past month. 5KR has been heard 5500 miles south. 5AFV has opened up with 5 watts with 500 volt storage battery plate current and works DX day and night. 5AIR, we are proud to state, has relayed or delivered all messages reaching his station, numbering 30. (Atta boy, Ramey—D.M.)

LOUISIANA—Dist. No. 1: 5ZS is back on the air. 5BB is a new one here and we hope he will grow rapidly. 5WY lost a 5-watter and is off the air. 5WG is in the same fix—no bottles.

Dist. No. 2: (Full House) 5PW has a new 100-watt outfit and will be able to do better work with it. He handled 42 messages last month. 5ABH wants to swap a 100-watt set for a keen looking dame. 5UA is getting good DX on a 20-watt German tube. 5AU too busy with experiments to handle traffic. 5AA uses his set for BCL music and is afraid to lose his adjustments. 5UK does his work after 4 A.M. and recently worked all districts between that time and 6:30 A.M., on 50 watts. 5AAY is away at sea. 5KC says that the new power plant being installed in Plaquemine blew all his bottles. 5YW handled 74 messages, 5AAT, 30 and 5ABC, 18.

EAST GULF DIVISION
H. L. Reid, Mgr.

SOUTH CAROLINA—School exams are hitting all the hams in this part of the country and is mostly the reason why the report has fallen off so. 4KE has been in the hospital for quite a while. They claim it is some kind of eye trouble, but we are tempted to believe that it is a nervous break-down due to the fact that he thought he was gonig to be murdered during the Wouff Hong Initiation.

4RR, D.S. of Dist. No. 2, says things are moving FB in his part of the state. 4IT is pulling some of that 4HW stuff and is putting 4.0 amps into the antenna from two 5-watters. By the way, 4HW is in Spartanburg and not in Atlanta any more.

FLORIDA—January was the best month in the history of the state. 23 active stations handled over 800 msgs. and claim to be going over 1000 next month. Several stations are QSO with Porto Rico and traffic for the Island is safe in the hands of Jacksonville and St. Augustine stations.

Dist. No. 1: Jacksonville handled 57% of the state's traffic. 4IU is QSO 30 days a month with Miami, Tampa and other points, and maintains iron-clad schedules with 4SB, 4SH, 4IZ, and 4BL. This is done in daylight. He has worked Oklahoma City in daylight, Porto Rico at night and reported many times QSA in California using 20 watts. You fellows handling rubber stamps msgs just listen to 4IU for a few minutes and take a tip, his traffic is genuine business matters of some importance. 4FS handled 249 msgs and worked 6CMR. 4OI, 4BP and 4EZ started up on spark but have changed to 10 watts C.W. 4BA has filtered his 100-watter and is now handling traffic. 4KW is a new 20-watt station and his sigs sound like his call. 4IK and 4LS are new 5-watters. 4SB and 4PI of St. Augustine are still holding them in the road. 4SB with 15 watts is regularly SO with Porto Ricon spark stations, and considerable traffic has been handled with him. 4OH is a new 10-watter. 4SD is still doing good DX but no traffic this month.

Dist. No. 2: Tampa has five active stations. 4PT has 20 watts and PU 10 watts. They are new stations and have started out like them mean business. 4IZ keeps a daylight schedule with 4IU. 4XJ and 4OB are still the "old reliables." 4BL handled 102 on spark and maintains schedules with Jax. stations. 4NS is a new station in St. Petersburg. He and 4JZ are both active. 4PB is doing wicked work with 100 watts and is regularly QSO with all Florida. 4II-4RO combination are doing some good work on short waves.

Dist. No. 3: 4IH is a new station and has made a good start.

Dist. No. 4: Miami has come to the front with four good stations. 4HN has worked 6AWT and handled 40 msgs. 4CH is a "HE" spark station and keeps a schedule with 4IU of Jax. 4DP gets out well with his 100-watter as does 4NZ with his 250-watt spark. Traffic can be passed to Miami any night with ease. This is the first time in history that this has been possible. 4PY is a reliable station.

PORTO RICO—(Welcome back, again fellows.—D.M.) At present there are only two stations capable of handling traffic with the U.S.—4OI and 4JE. 4JE has established communication with 4SB, 4HN, 4FT, 4IU, 3BCO, 1BES and 1CI, but the transmitter is not giving all its capable of due to lack of experience and dope. 4OI is using the Hartley circuit this year with motor-generator, and is of course down to 200 meters. Don't know whether he is going to have the same luck this year as last as he was on a much higher wave and less QRM. The rest of the gang are using the sure fire circuit, ten watts, most of them. They are 4BJ, 4JA, 4RX, 4RL, and 4GJ. 4KT is now ni Europe.

GEORGIA—4FZ of Macon has been appointed D.S. of district No. 2, for Georgia and promises to have things running decently in a few weeks. 4IO is getting out fine on his new 50-watter, working every district and proudly boasts a report from France. 4QF is doing excellent work on his 100-watter but due to many objections of heavy school work, hasn't been able to be on regularly. 4EH and 4EQ have combined and are now pushing 100 watts. 4MY is doing excellent work but has burnt out five 50-watters doing same. 4CS now has a 250-watter and is getting everywhere. He is being reported consistently in Alaska on fone and C.W. 4ME, 4RH, 4MB, 4BG, 4SI, 4JL and 4GO are doing fine work on 10 watts power. 4HS with 50 watts C.W., and 1000 watts spark cops the honors this month with 276 msgs. 4KU has moved to 76 East 12th St. Apt. 6, Atlanta, Ga. 4FG is working 6XAD on spark.

Macon is sure getting on the map, too. 4FZ and 4AY shot a whale of a bunch of traffic through the southern part of the state.

MIDWEST DIVISION
G. S. Turner, Mgr.

Time in passing has written of our mistakes and our accomplishments. Time is passing, and the beginning of the end is at hand. Yes, it has already come to pass. Even now as you read this report, a new division manager is at the head of the Midwest. My mistakes and accomplishments are history. My last report unfolds:

Missouri—"The A.D.M. resigns."

Iowa—"The YL of Iowa, Miss Maxine Whitney of 9AOU."

Kansas—"100% C.W."

Nebraska—"News of a DX transmitting circuit for short waves."

MISSOURI—9AOA is on the air. The C.M. of

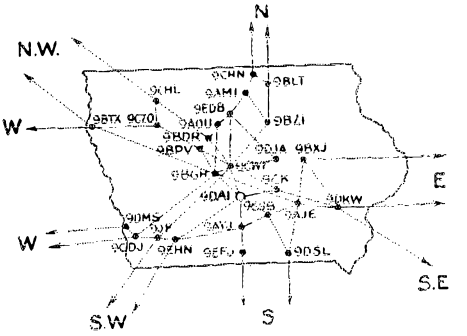
Miss Maxine Whitney of 9AOU

Joplin has started a code class. 9DWK bought a new inductance to replace his oat box contraption with the result that his radiation dropped off .5 amps. Hi! The supt of the Western half reports Springfield asleep. However, he learned that the local B.C.L.s are being influenced by the Radio Club. (Teach 'em the code like Joplin is doing.) 9CRM has been reported 500 miles east of New York. 9DAE, on spark, is still active. 9DUX is still on at 9CKS's station using only 5 watts. He works the west coast regularly, too. The R.M. is having his troubles at Columbia. He is also conducting a code class. The C.M. of Kansas City sent in a traffic report but no details, job with a number of active stations. 9ST, 9AHZ From his report of traffic, it seems KC is on the and 9FM seem to be the stars. 9DOJ now has a WE 50, but seems to be having considerable trouble getting it to perk. The D.S. of Eastern half reports his district O.K. 9BRU handled 95 messages. St. Louis is F.B. now. The C.M. is doing good work. A new good fellowship organization, the ROH has added materially to the interest. Code classes are also in progress in St. Louis. The local public schools are giving a course in radio open to the public. A total of forty-three stations in Missouri handled 1578 messages during January. By the time this report appears in print, a new A.D.M. will be in charge of affairs in this station. Dr. C. L. Klenk, the best A.D.M. this division has ever produced, has resigned. He has stepped out of the A.D.M. job but the good work that he has done for his state and for the A.R.R.L. will continue to bear fruit. Dr. Klenk has given up his time for the good of the amateur cause in Missouri. That he has succeeded is written in his reports to QST during the past year or more. They are his memorial. (You have made for yourself, a place in the hearts of your fellow hams.– D.M.)

KANSAS—The A.D.M. has been very busy with a sort of invoice of the states personal. Several appointments have been made and several cancelled. If some of you other O.R.S. don't make yourselves heard, down comes your sheepskin. (Watch you step!) 9CFI has been appointed R.M. 9EHT is C.M. of Lawrence with a bunch of active stations behind him. 9CFI uses 150 watts 50. Here is some good news, Kansas is 100% and is making records. 9AEY is back with a C.W. this month. Nebraska has nothing on us. 9DEX, 9AVG and 9EFU are promising stations. Old reliable, 9CCS is adding another 50 and a chopper. 9AYP continues on the air despite a flock of blown tubes. 9AIM reported direct. He has only one 50 left. The other four are "Cold and still." 9CAC is on again. 9AVG and 9DES reported hearing Trans-Alt sigs. Now gang, aren't you ashamed of this report. Shame on you for starting the New York in this fashion. You fellows know there isn't a better state in the Union than Kansas, but no one will believe it with such a slim report. Nine stations reported a total of 536 messages.

NEBRASKA—Nebraska again plays in tough luck! The A.D.M. failed to report. The D.S. of district No. 2 had a good report worked up but it was lost in the mails. The C.M. of Omaha is in Wyoming visiting 7ZV and 7ZO. Even tho he is so far from home, his report savors of the usual Quinby flavor. Wish we had more like him. He reports 9AQK, 9EES and 9CMK working occasionally. Quinby still swings a wicked loop (Similar to his stunt at the Chicago convention when he broke up the party by walking off with the first prize) in keeping wave-lengths and decrements within the law in Omaha. On one 50 he has doped up a new circuit with which he is able to work all districts and at the same time keep his wave at the fundamental of his antenna or below. 9AQC and 9AHK have consolidated. They have a 10 watt C.W., I.C.W. and phone in operation.

IOWA—An honest to goodness report this month. 9DSL is rebuilding. 9CHN has established an enviable record to Victoria, Australia on 10 watts. 9AXD is using 50 watts and MG. 9HK still hears WNP. 9CS is audible 14 feet from phones in Washington, D.C. using spark. Yee Kawds! 9DC is FB on mod C.W. 9DJA and 9DPW are active. 9AMU uses 100 watts. 9ATN has a new WE 50 going great. 9BIK heard in Australia using 100 watts. 9BWC works all districts on 5 watts. After being heard in New Zealand 9DKY lost a 50 and will be off the air until he can get a 5 watter, awaiting repairs to the 50. 9AMI has 150 watts going. 9ELG was going great until "it" blew. 9DSM is now co-op with 9AMI which probably accounts for 150 watts there. 9ASI is now using a five. 9BSX is working a lot of schedules. 9BCX uses 650 volts Edison "B" bats on his 10 watter. Great! 9CZO using two amplifier tubes worked all districts east. 9BGH our R.M. is doing good work. He is scheduled up with all directions and is sure lining up our state. C.M. of Des Moines reports that 9CLQ blew one of his fifties but handled a large amount of traffic regardless. 9CSY handled more than his share of traffic. 9LR was active. 9BIF will be on soon but with a new call. 9BRS using a 100 on self-rectification is getting out good. 9APM and 9DIP are new comers. C.M.



of Eagle Grove reports the gang going strong, especially 9AOU and 9DXU. 9DXU has another op and is on with a pair of WE fifties.

Iowa has the right to boast of a YL op who is located at Eagle Grove. Her name is Maxine. She is a sister of Jack Whitney of 9AOU. She knows the code quite well. This is proven out by the fact that she has been operating at 9AOU occasionally during the past several months. Jack and Maxine are getting 7 amps in the air. (FB)

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

Message reports and general activity is certainly gaining ground. The results this past month show great work on the part of our faithful brass-pounders.

MAINE—1BUB seems to head the list with 141 messages, while 1CRU follows him with 96. 1ACO has a schedule with Canadian 1KV. 1AUC was reported in England on 20 watts. 1BDI worked British 2SH. 1BQL is still expecting his 50-watt W.E. tube. 1CGU must be lonesome. 1CRU is rebuilding his set. 1KX has remedied his transmitter troubles and is on again. He has a new call, 1ALK for his spark coil C.W.

NEW HAMPSHIRE—We missed out on a report from this state last month. The A.D.M. reports the men did not report. This is no excuse at all, men, and I am going to take this opportunity to issue a warning which is likewise meant for all New England. You fellows with O.R.S. certificates will simply have to report each month if you expect to hold your certificate. Hereafter an O.R.S. missing two reports in succession will be immediately cancelled. This will be carried out, even if there is only an A.D.M. left in the state. If you did not handle any messages, report anyway. We don't demand that you work or do any certain amount of message traffic, but we do believe that we should get a regular report from each of you. The reports should cover from the 15th of one month to the 15th of the next month, and should be mailed from your station at least by the 17th or 18th. Now, bear this in mind, fellows, this is the last call. A housecleaning is certainly in order, and due.

A.D.M. Stevens reports 331 messages for his state this month. 1YB carrying off the honors with 155. 1BNK has brought Concord back on the map in fine shape. Three stations are on the air regularly and messages are moving northward for the first time in history.

VERMONT—While this state does not boast any brass-pounders league men, still the few scattered stations that are here are up and wide awake. 1ARY is on from 5 to 6 each morning. 1AJG and 1FN are on fairly often and are doing

very well considering their power. 1YD is planning to come on the air with 200 watts.

MASSACHUSETTS—Far be it from us to blow our own horn, etc., but in order to put some of you inkslingers on the right track, so that you will not write stories for newspapers about a 500 watt station that is going to be built, going to be the "most powerful amateur station in the world, etc.", we want to say that your D.M. 1ZE, 1XAL, and WBBG, probably has that station at his home in Mattapoisett. 1ZE is only a 1000-watt C.W. station, not very active at present, but always ready. Its wave is 215 meters. However, 1XAL, which is still and experimental A.R.R.L. amateur station has a power of 4500 watts, and it is guaranteed to reach across the pond and then some more on most any night. This station also operates on various waves from 150 to 500. Incidentally, we can show any doubting Thomas an antenna radiation of 22 amperes any time they desire to call. The antenna system boasts of a 125 foot steel self-supporting tower. Now, will you inkslingers please remember these figures when you write your next story? We can show cards from Honolulu to Italy.

1SK hands in 125. Chase reports a total of 891 for his district. Many O.R.S. are not reporting and this is to notify you D.H. fellows to hop to it for there is surely going to be some wholesale cancellations unless you do. Don't cry when its too late. 1CPI is on 15 meters and working 3's with ease. 1BT only uses 5 watts, but he handled 71 messages. 1AAC blew three 5-watters, but he still QSO nines with one UV 201, on 175 meters. That's going some! 1CJR is getting 2.5 amps on 10 watts. 1KA has blown up a couple of 50 watters. (Tough luck, OM.) 1BFA is hearing many sixes and Europeans, and says his transmitter does good daylight work. 1BEC is using a Telefunken 20-watter and reports fine results. 1VV does remarkable work when he is on the job. 1AGS gets 4.6 on a Telefunken 20-watter. 1IW, a new station in Gloucester, is doing fine work on a 50-watter. 1BNT is changing his set all over. 1AJA is increasing to 100 watts and would like some schedules with A.R.R.L. stations. 1COT's antenna blew down in a recent storm. 1ALL is doing some fine work on 50 watts. He has worked all districts but the 6th, and has been heard there often. 1BBM worked 8BWC during daylight. Three cheers for Cape Cod. He also hands in a very good report. C.M. Holbrook of Attleboro also came through with a fine report. 1BCF heard 24 foreign stations during the tests. A.S. McLean of Western Mass. also hands in a very good report. Dist. No. 3 is still without a D.S. as there seems to be no activity there at all—therefore, no report.

Dist. No. 4: 1AAW is really the most consistent station here. He is on the air about all the time and is mighty prompt in his reports. Also 1VU, up in the Monson Hills.

Dist. No. 5: A report received from 1KC, only. This station has been completely rebuilt with a new operating house right under a big 150-foot pole-tower. 1II and 3CDK assisted in putting the outfit into operation, during which time they used up four 50-watt tubes and a wind nipped off 30-foot of the pole, but the pulley caught at the break so the antenna is now about 115 ft. 1KC worked Dutch PCII in Holland and g2KW England.

Dist. No. 6: 1BOM for the second time blew a tube on the 13th of the month, so he will be off the air on the 13th of each month hereafter. 1BSZ has a 250-watt bottle peeping a little, but not going full blast yet. There was a darned interesting "Boiled Owl" party held at 1BSZ recently with refreshments, including a white owl shot off the back porch. 1JQ states that he is particularly fond of this delicacy when prepared correctly, and he is seriously considering it for the New England Convention banquet.

Dist. No. 7: 1DB has received appointment as C.M. of Worcester. Is to be congratulated on a board which has been formed of 1JV, 1CPN, 1AQM and 1BKQ for the government if all city stations. 1BKQ holds Worcester honors for foreign reception having copied French 8AB every night for over a week. 1ADN also logged 8AB with the addition of English 2KW.

While none of Mac's men seem to want to set the world on fire with their totals, there is such a flock of stations that it brings the grand total for Western Massachusetts way over 1200. We sure appreciate how all the O.R.S. in this territory report regularly.

RHODE ISLAND—Everything is lovely down here once more. Nobody seems to want to kill anyone else, and the B.C.L.s and the brass-pounders are living in the same block with each other. The only kick we heard the last week was that 1BES was sending on 3000 meters, but—the B.C.L. had a wooden tuner, get that—it "woodn't" tune.

Dist. No. 1: 1AWV sent in a fair report and says that he is putting up a 75 foot mast with which he is going to serenade the B.C.L. crowd. 1ABC, the stuttering wonder of East Prov. reports that he has been tickling the cans of our English friends. 1CAB is blasting the air wide open down there and is QSA most of the U.S.A. 1GV doesn't get much time for operating, due to B.C.L. biz. 1CMP has been doing some snappy work since the rebuilding of his station. 1OW, the trusty and sleepless C.M. is an honest to God ham and one the New England division may be pround of. 1II has been doing more experimenting than relay work, but is now down to biz.

Dist. No. 2: Another station going full blast now and doing some exceptionally good work on 10 watts, is 1AAP. 1BVB is doing about the average and has rebuilt the station. 1II wins the "brown derby" by shooting off 332 without having his antenna cut by a B.C.L. 1BQD, 1BVB, and 1CMP follow with 222, 185, and 161, respectively.

CONNECTICUT—Dist. No. 1: 1IV is the star traffic man, logging British 5AT. 1AJP worked 6XAD and got a message through to Mix. 1AVW worked 74 stations with his 5-watter. 1BGQ is a new 100-watt set and warns the 6th district to report his signals with one card per station only. 1CAC now has a 50-watter and a new motor-generator.

Dist. No. 3: 1XW-1MO logged a bunch of foreign amateurs during the tests, and worked PCII in Holland. 1CDE is a new one. 1BAG, the Candy Kid, is always having hard luck. The latest tragedy is that he was playing ball with his 50 watter and it struck the home plate. 1APQ is one of the debutantes in the amatuer ranks. 1BIY, C.M., froze his rectifier and claims he will use denatured alcohol in the next one. Hi. 1AVJ, D.S. says his 20 watts are too QSA in the 5th district. 1APC also has 20 watts and has been reported FB in the 7th district. 1QP alias 1XAM, alias "Kewpie" has been gallavanting in the South and claims the hospitality there can't be beat. John reports a great time with 5MB. 1CKP has been rebuilt to 1QP's balanced circuit. 1AW has gone to Europe. A. A. Hebert will operate in his absence. 1AP is another 20-watt booster. 1ARP worked 5AMH with 10 watts and his antenna tied on a copper roof. Con you beat it? 1AYR is increasing his power, erecting two 60-foot masts and giving his station a general overhauling. 1MY has been completely overhauled. His set has been rebuilt to 1QP's balanced circuit, and is using 150 watts.

Dist. No. 8: 1AJT is installing a 2000-volt Edison Battery for plate supply and also an Edison Battery for filament supply. Ought to make some noise. 1AWI and 1BIH have both changed over to 1QP's circuit.

NORTHWESTERN DIVISION

Glenn E. West, Mgr.

WNP's traffic still goes thru the Northwestern division. Both 7ABB and 7CO seem to work him with ease. Surely the NW division is reaping her share of the laurels. (FB, men, keep it up!)

WASHINGTON—On account of sickness, Weingarten, A.D.M. was not able to submit his report. He wired that reports were in his hands from all districts and traffic showed a large increase over last month. Weingarten has resigned as A.D.M. His duties as Director keep him more than busy and the A.D.M. job was one too many. We regret his loss very much. In leaving the A.D.M. job Weingarten wishes to thank all the fellows in the state of Washington for the co-operation and support they have given him during his term of office. Mr. Everett Kick, 7ABB, has been appointed to take the position of A.D.M. In 7ABB we have a man beloved by all, a veteran brass-pounder and a truly hard boiled owl.

OREGON—Dist. No. 1: 7AHZ has three ops now and is doing lots of work, but owing to the death of the "lone" bottle will be off the air for a short time. 7SQ is doing good work. 7IW and 7SY are the old stand-bys. 7HF is on again (?) with 5 watts and raised a nine the first night. 7LR and 7EZ have the commercial bug and

are on their way to Seattle to go to radio school. 7GQ is working local with a 70-volt "B" battery, awaiting a new fiver.

Dist. No. 2: 7AGE is getting 5.4 amps out of his 50 (?) now, and is saving the other one for immediate use. 7QU and 7ZE are doing good work. 7QT recently copied the "O.A.C." Hawaii football score from 6CEU, arranged through a schedule for the local papers and college. More of this kind of work and the amateur will gain a better footing with the public as a very valuable asset.

Dist. No. 3: 7SN and 7ALD are on regularly. 7KS lost his 70-footer in a recent storm.

Dist. No. 4: A short time ago someone stole 7TO's receiver, transmitter and everything. He wasn't long without a set, due to the goodfellowship among the amateurs, as a number of the fellows in the town all brought parts of a five-watt set and a receiver for his use until he could get his old set back or build another. This shows the fraternalism among a bunch of "Boiled Owls."

Dist. No. 6: A D.S. has at last been found in 7IQ who has a set that will be perking shortly. Co-operate with the D.S. and send in your reports to BX 306, Reedsport, in the counties of Josephine, Curry and Coos.

Dist. No. 7: Everyone in the district has been too busy trying to log Europeans to handle much traffic.

Dist. No. 9: 7JE says there are good prospects for the future, but things are kind of dead now. 7ABY was the star station for the last month. 7KR and 7AJQ are pounding brass again.

IDAHO—Hurrah, for Idaho! We thot the gang over there was dead, but they have turned the tables on us.

Dist. No. 1: With great pleasure we welcome our long lost 7JF back on the air. Anderson has completely remodeled his set and has built a semicircular counterpoise with 50-foot radius. 7JF is exceedingly fortunate in having an old 9th district operator to serve as second op. Ex-9JN can take all you can send and then some. This is the first active station in northern Idaho since the famous 7ZM quit the game.

Dist. No. 2: 7OT has been keeping things lively in Boise. He has been on practically every night and shoots messages through like greased lightning. 7OB has been steppin' on 'em. 7FT reports he is ready with a single 5-watter and is rarin' to handle some traffic. 7FT is our old friend Teed, famous in the days of the spark. He owned the first C.W. station in Idaho. 7YA is a powerful station but is not on the air very often. 7JP is a good station but for some reason (women?) he is not on the air very often. 7PX comes in very strong but has not been on the air long enough to make any exceptional DX records. 7GW has been heard on the air the last few nights. He is the first amateur in Pocatello to handle any traffic. 7OL has been working very little of late. 7IO is the same old station on the air regularly and doing fine work with his ten watts. 7LN has had a lot of trouble with his transmitter lately.

MONTANA—Dist. No. 1: 7AGF is getting out in better shape through the use of lower wavelengths. He has worked the first district on 175 meters and the eighth on 165. 7WP lost 4 rectifier tubes at one pop, but reports doing some daylight work with 9AMP.

Dist. No. 3: Personally gathered 7MP's message report and here at 7ZL, etc., have been listening in to the short wave artists, or harmonic artists, and every now and then poking the key in the lead to the 50-watter. Don't see why the rush to overload the 50-watters for 7ZL has had cards from all but the first district, while using one 50-watter with 120 mills and 500 volts of MG on it. Antenna current is 2.4 TCA wave 212 meters and there is a 50-henry choke in the positive lead and oddles of condenser before, after, and during.

Dist. No. 3: How sweetly sleep the dead.

Dist. No. 4: And the last shall be first. Yes they are.

7CO is trying to personify the last QST cover, and seems to be getting away with it. Has worked all the districts there are to work, WNP, etc. Not once but often. All this on one VU203, and the report is that he is adding another—wonder what for? 7ZU still has been able to find time in between being D.M., getting soup out of the souper, teaching family, etc., to shake a few wicked wiggles on the brass. Needless to say he is still QSO anywhere there is a receiver and transmitter.

PACIFIC DIVISION
J. V. Wise, Mgr.

CALIFORNIA—Dist. No. 1: No reports received from any of the counties this month other than 6ALK. Another new place heard of is San Jacinto. Radio activities in this section seem to be moving along very nicely. 6BKX is using a 50-watter. 6BNY has junked his spark set and is installing a 100-watt bottle set. 6BOQ has just completed a 10 watt set and is using batteries for power supply. 6CIA is using a 10 watter with farm lightning outfit for plate supply. He is getting one and 5/10 amps and has been reported in Massachusetts. (FB, OM!)

San Diego seems to be dead as far as radio is concerned. Most of this is due to the mush from NPL which is so bad it is almost impossible to hear stations out of the state.

6AHU has been appointed C.M. of Anaheim. 6AWX has been appointed C.M. for San Bernardino, Redlands, Pomona, Riverside and Ontario.

Dist. No. 1-A: This is a new district just created this month. The A.D.M. hardly knew what to do with this particular territory, but deemed the best way to handle it was to create a new district, called 1-A. This is the first traffic report, we believe, that the A.R.R.L. has ever received from Mott. The A.D.M. is glad to see this record breaking station in with the gang, and he sincerely hopes that Mott will be one of the boys for a long time to come. (So do we—T.M.) The following is Mott's first report: The following group of stations were worked from November 27th to December 27th inclusive: First district—7; second district—7; third district—7; fourth district—3; fifth district—5; sixth district—1; seventh district—5; eighth district—32; ninth district—25.

6XAD with WNP, has been fairly consistent many messages having been handled. For several nights his signals disappeared entirely, later to be found again at the same receiver markings as QSA as ever. Lately it has been noticed that WNP swings to a greater degree than early in middle November. Rather complete performance achieved on Christmas morning between 12:01 and 4:00 A.M. P.S.T., when all districts were worked including 1CMP—2BSC—3ZL—Can. 3QV—4KU—Can. 4HH—6ZP—6CET—7EB—8BRM—and 9ZT.

Dist. No. 2: 6PL occupys the box seat in traffic handled with 531 messages. The next best was 6BRF with 225. 6PL is the C.M. for Los Angeles and turning in this month one of the best reports any D.S. received from a C.M. (I wish the rest of you fellows you take pattern after him.—A.D.M.)

DX weather is improving all the time and many east coast stations are worked. A storm hit the city of Los Angeles and vicinity which wrecked many an antenna. Some of the unfortunates are 6BEG, 6BQC, 6CHV, 6CHU, 6BRF, 6BWL, 6ZR, 6UP, and 6ALG, also 6ZBB. 6BRK had his counterpoise blown away. 6BVG has been off an on at different times and worked 2RK twice handling traffic. 6LJ got his spark working and works up the coast in daylight very easy. He also has C.W. that gets out good when he is on. 6BEG raised another stick and is going strong again. 6BQC did likewise and has also been reported in Australia. 6BRF got another antenna up and fills in his spare moments by "CQing". 6MH is getting out in good shape and handles a ton of traffic. 6CBB changed the style of his antenna and is working out better. 6AFG is working east quite often. 6CHU, since having his whole antenna system blown down, doesn't know whether to quit or not. He has been heard in Porto Rico recently. Los Angeles has lost one of its hams by 6CEL passing away. 6CMR had his tower blown down and it also took some high voltage lines with it. Hi.! 6KA hasn't been on the air this month on account of moving. 6NB blew all his tubes and was off for a short while. 6DFM finally put in a rectifier. 6BIC got his heap going again for the winter and is handling a lot of traffic. 6BNZ came on like a shot and went off quick again. (Mystery.) 6CU hasn't been on very much this winter. 6EA and 6EB have both been on but not getting out as well as last winter. 6AQT has hopes of coming on with 100 watts some time in the next century. 6PI comes on often and handles traffic. 6AQD handles a lot of traffic and also 6BRA. 6ZAR visited a bunch of stations in the south when he was down. 6CNL has 20 watts and is getting out better. 6UP gets lost in the tullies often and the bunch have to give

a million QST's to find him. 6AIC is usually with him. 6UP is a full fledged spark and wouldn't have a C.W. Traffic moves to Hawaii quite often through 6CEU. 6PL and 6MG are handling traffic in all directions. WNP has been heard by several LA hams. Almost every 5-watter has been heard by WNP. 6CNM is quite bashful on the air on account of not enough speed at copying. 6CHJ has the call 6PQ now, and likes to QRM the bunch with his spark when he could use C.W. 6CBN can't forget his spark either. 6BKO finally got his set up and going again. 6BWE clears a lot of traffic and 6BWD has a new generator added to his heap. 6KE came on with his spark and claims he will show us all how to get out when he gets his 500 watts C.W. going. Reports were also received from 6AAK at Santa Barbara who is C.M. for that territory, wherein he states that the Santa Barbara Radio Assn. set (6DZ) will be on the air as soon as a pole trans is set up for a plate supply. He states that no great amount of traffic was handled in Santa Barbara this month, 6AAK doing all the work.

A report was also received from 6BUR, wherein he states that the two best stations in that territory were put out of commission, namely, 6BVW and 6BUR, due to the high winds experienced lately in Southern Calif. However, both have 70' sticks up again and that the rest of the boys will have to watch their dust.

Dist. No. 3: 6BLZ is using one 5-watter and a Hartley circuit with 500 volts R.A.C. on the plate. 6CDG reports one 50-watter gone and one 50-watter left. He has a new portable call, 6ALJ. 6CDG is to be complimented on his steady reports each month. 6CMD is working good distance with a 5 watt phone. 6AVV will have 3 ops on the job and will be on every night from 12:00 to 4:00 A.M. They have three transmitters and 50-100-250 watts. 6AAN is on the air occasionally. 6AVV would like to state that there are some mistakes in reports for districts 3 in QST this month. 6BIH is reported as outstanding station for district 3. (We would like to swipe 6BIH for our district 3, but we are afraid 6ZAR might raise a rumpas.—A.D.M.) Also 6ABX and 6ARF, none of which are inthe 3rd district.

Reports have been few and far between this month. No message report from San Francisco seems to be the rule rather than the exception. Somebody needs waking up.

Dist. No. 4: 6AME is being heard all over the country on 36 watts input. 6AOI in the same town says that henceforth he be known as 6ZBN. Pending the appointment of a C.M., 6BIH is keeping a watchful eye on A.R.R.L. business in Merced. He reports that 6CIB, 6AMG and 6CJD are on the job and hustling for traffic. 6FY is QSO 6CU. 6CJJ is on the air but not doing much work. Modesto boasts a new A.R.R.L. station, 6BDS.

A good route to 6CEU it through 6ZBA-6CFI. He is QSO every Wednesday and Saturday night. 6CEI reports hearing many east reports hearing many east coast stations. 6BCL is chasing messages as usual. 6HC is still using 10 watts and seems to do about as well as the average 50 watt set. 6BON has gone back to 5-watters until he can get enough power to run his fifty. 6AGJ lost several fifties and a 250 this month, but managed to work into New York and Honolulu. 6NX has put in remote control so he can stay in where it is warm. 6ZAH continues to do good DX, but is handicapped by school work. 6ZAR and 6ZAU have been fighting power line leaks.

Dist. No. 6: The only station reporting to the D.S. this month was the ever faithful 6BIQ. Let's hope they send in reports of their activities EVERY month.

Dist. No. 7: 6FH and 6CEU report working each easily on 10 watts, both having suffered casualties with their 50-watters. 6CBW is underloading a 50 watt tube now instead of overloading three 5's, and is getting the same results. 6ABX has been off the air entirely due to Xmas QRM in his business. 6ARF is heard frequently.

Dist. No. 8: 6BNC got reports from 38 states the first week he was in operation. 6BUA has been holding his own but lost his aerial during a recent snow storm. A new antenna is under construction to consist of 2 poles 70 feet high by 160 feet apart to support a "T" type aerial. 6TC and 6CC have been on more or less all month but are still devoting most of their time to the search for the apparently undiscoverable thing—a receiver that will work as well as their transmitters.

ARIZONA—Very bad storms here all month. 6ADH is a 20-watter. Ex-6ZD 6ASA is out of tubes temporarily. 6AAM is just starting up. 6CMG is moving but expects to be on soon. F. A. Miller, Flagstaff expects to be on soon. Paul Merrill Pima expects to get going in near future. (Is this old kind Miller of Belmar fame—T.M.)

ROANOKE DIVISION
W. T. Gravely, Mgr.

WEST VIRGINIA—8SP is running tests with Leland Stanford University. 8CQH has installed a sink rectifier and says it is FB. 8BAG says his DX is inversely proportional to his plate current. Hi! 8BDA is on every night. His DX is New Zealand, Spain, England and WNP. (FB, OM) 8AUE, with a 100-watter is doing some good DX.

NORTH CAROLINA—Dist. No. 1: 4MV is using a rock-crusher and getting out in fine shape, also causing the neighbors some inconvenience. (Make it C.W., OM, and R.I.P.)

Dist. No. 2: 4GW leads the gang in traffic handled. 4CM and 4KC were reported in France. 4MI reaches out FB, and is on the job nightly.

Dist. No. 3: 4SF is D.S. in this district. 4JS is getting out nicely. 4JR is doping out a high power set.

VIRGINIA—Dist. No. 1: Stations in this district suffered from a recent storm. 3BNE had pole down and pulled over the chimney, then had to bury a fiver.

Dist. No. 4: 3ATB is doing good DX and now covers the whole of U.S. in all directions. He also logged 8AB. 3BCH is punching out very consistently now. 3BGQ lost his mast in a recent, storm. 3BMN has a 100-watter under construction. This station has a portable set, call 3CCJ, five-watter. He logged Dutch PA-9, English 2SZ and French 8AB.

Dist. No. 5: 3IW shows a fairly good traffic report. This station has recently worked 6XAD also works sevens.

ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

UTAH:

6PE C.W. 448 Msgs.
Salt Lake City, Utah

Glory be to Utah! They take the box seat for most messages handled the last month, and much credit is due 6PE for breaking the deadlock on the box seat occupied for more than six consecutive months by a Colorado station. Second to 6PE comes 6BLH with 209 messages and 6CHW comes third with 182. 6AJA, 6RM-6ZBS, 6BUH each put through more than 100 messages. The total for the state is 1235 messages, the greatest in Utah's amateur history.

Evan Seegmiller, D.S. Dist. No. 2, has resigned and a new man will be appointed as soon as possible. A new C.M. for Ogden is being looked for also.

COLORADO—Denver stations put through 956 messages with 9AMB as the high marker with 225. 9CAA follows with 291 messages. 9BJK has left for parts in the 6th district for a few months. 9AMB is again using 5 watts and seems to get out as good as on 50. 9EEA, 9RXM are buying land on the outskirts of the city for a shack and a 100% perfect antenna system. 9RXQ is heavily engaged in publicity work and traffic has suffered. 9DTE is remodeling his antenna and also the near-by trees to improve the field in the vicinity of the anteena. 9AVU has been hard at work and got through 144 messages. 9BJI, 9BJK, 9BUN, 9AFP, 9CJY and 9QL all have been on the job.

Dist. No. 1: 9AZG and 9DTE put through 322 for this district, which is good for only two stations.

Dist. No. 2: D.S. Davis, reports considerable activity in his district and real interest in the storm routes that are now complete throughout the entire division. 9EAE leads in this district with 193 messages. The stations in this district are installing auxiliary power to supply their sets in case of power house failure in emergencies. Here is where the flivvers get belted to a H.V. gen.

WYOMING: 7LU-7ZD is about the only active station in this state. 7ZV has moved to Casper and as yet has no ham set on the air. 7HW at Laramie is a most active 5-watt plant. 7ZO has been building and rebuilding tuners with the

avowed purpose of hearing WNP, and traffic this month here is almost nil.

WEST GULF DIVISION
F. M. Corlett, Mgr.

Standing by during our efforts to hear the European Amateurs did not knock such a whale of a hole in our message traffic or in the number of stations reporting, fact is we made a pretty good showing.

The Star "message pushers" of the division are: 5LR, 1091; 5QW, 210; 5QY, 180; 5VF, 172; 5VM, 154; 5ZG, 125.

This makes the third consecutive month that 5LR has held first place, looks like some of you fellows would "root" him out of it.

Just a word about how the new O.R.S. may be obtained. The present holders of O.R.S. certificates who have been reporting regularly, whose station complies with the radio laws and regulations as regards wave-length, quiet hour observance, and who is not an everlasting "CQer", and who DID NOT transmit during the Transatlantic listening tests, will be issued the new certificates as soon as they are available. If you do not now hold an O.R.S., and your station is a consistent reliable relay station and meets all the requirements, make your application to your D.S. or C.M., or direct to your D.M. In either case, your D.M., as soon as your request is received, will send you a blank certificate to be signed by you and returned to the D.M., to be filled out by him, a serial number assigned, and the D.M.'s signature affixed, provided your request has been approved by your C.M. or D.S., as the case may be, and your A.D.M. in charge of your section. The system works out like this, while the blank certificate is on the way to the applicant for his signature, the D.M., advises the A.D.M., who in turn advises his D.S. or C.M., that you have made application for an O.R.S., they investigate your application, satisfy themselves that your station complies with the U.S. Radio Laws and Regulations as to wave-length and quiet hour observance and orderly operation, that your station is one that will reflect only credit to Amateur radio, they, the C.M., D.S., and A.D.M., will then pass their approval to the D.M. Your O.R.S. certificate is then forwarded to you. To possess an O.R.S. certificate is an honor second only to the winning of the Hoover Cup, it is a certificate of MERIT and proclaims to all amateurs that your station is one of the IDEAL amateur stations, that you represent the cream of the amateur fraternity. Just because you happen to be a friend of the C.M., D.S., A.D.M., or the D.M., will not get you an O.R.S. appointment, the way your station is operated alone determines this. Likewise not being a particular friend of any traffic officer will not keep you from securing an O.R.S. if your station meets the requirements, for any traffic officer found to be so narrow as that will immediately cease to be a traffic officer in the West Gulf Division.

Now just a word about reports. Our opreating month in this division is from the 20th to 20th of each month. Each individual station reports by post card or letter direct to the division traffic manager, 2515 Catherine St., Dallas, Texas, immediately after the 20th. Get the report in the mail on or before the 22nd. Official Relay Stations are furnished a stamped addressed post card each month for this purpose, other relay stations furnished their own cards. From these reports the D.M. makes up this report for QST, he then forwards the report cards to the A.D.M.'s, who look them over to see what the stations of their sections are doing, the A.D.M. then separates the report cards by districts and sends them to his respective D.S.'s, or C.M.'s so that they may see the nature of the reports of the stations in their district or city as the case may be. This system has been in effect in this division for over a year and accounts for the almost complete reports from every city, district or section every month. C.M.'s and D.S.'s should make a general report of conditions in their respective cities or districts to their A.D.M. each month. The A.D.M.s should likewise make a general report of their sections to the D.M. each month. Detailed reports of individual stations are made by the INDIVIDUAL OWNERS direct to the D.M. If the activities of your station does not appear in QST, you, the INDIVIDUAL, failed to report it, thats all. Now for the reports, is yours among them?

NORTHERN TEXAS—Two stations report no traffic, 5VA rebuilding, another mast going up soon. 5CT sea-sawing from spark to C.W. and C.W. to spark, nil. 5LR leads the city, district, section and division with a total of 1091, divided thus, sent from Dallas 115, received from Dallas and delivered 178, relayed 798. 5NY and 5NW heard CQing all the time. 5VT slipped 172 along their way. 5HY gives an "OS" on another tube past the divide, handled 100. 5JY moved 35 and is moving to a new location, 6109 Linden Ave. He worked 17 states and 4 districts on a single 5, at the old location. 5JL reports a new generator and 32 sent along their way. 5AJJ has been away, up New York and Hartford way. He visited the bunch at Headquarters 'n everything. Just 8 messages this time. 5AHT is the relay station for the "Panther City". He has a total of 31. 5TC is out of the game awhile, attending A & M. 5AER closed indefinitely. 5ALI takes 'em for here on a "13". 5JH, with a 10-watter is going now. 5UD managed t hoandle 22. 5GN passed along 16 of 'em and is wondering where the rest of the "Greentown" gang is. 5AL has C.W. going now. 5NW has been trying to get a 50 to do its stuff. His message total is not so high, but those handled were of more importance and totalled 53. 5NY, with a 10-watter works 5YAE in daylight. He handled 51 and adds some confidental dope on, the prospects of signing up a new operator, a Y.L. I think but I won't tell. 5AHC is out of commission. 5AMB received 16 and relayed 11.

Dist. No. 2: A total of 151 messages were handled by stations in Waxahachie. 5AJT, 80; 5KX, 44; and 5QT, 27. 5AET received 2 and sent 2. 5UY is trying some early morning relaying. 5AFH seems to be the convenient fellow for the B.C.L.'s to call when ever they hear a foreign noise. He relayed 45. 5ADV handled 35. 5ADV is hollering for message traffic. He has a 50-watter and is QSR just anywhere. He only reports 58 this time. (Let's have 'em fellows.) 5FA reports 17 passed along. 5ADQ is holding down the relay game in Hillsboro. He handled 55 and has morning schedules with 9CNT, 9DCH and 9CVC. 5QW is on Saturdays and Sundays. 5CV is also on with 10 watts and moved 73. 5SD ditto on power (both attending school). He handled 61 while on a single 5, was heard by WNP, also in Canada, Cuba and Mexico. 5QY takes third place in the division with 180 mags. He has a regular schedule now from 2:00 A.M. to 5:00 A.M., and is QSO the 9th district stations in daylight. Shoot your traffic to him. 5PH is back on CRAC with 4.5 amps. 5ADH works a regular schedule, 5:00 P.M. to 8:00 P.M. 5AAF is on after school from 5:00 P.M. to 7:00 P.M. 5ALJ, with a 20-watter, takes them for Marshall. He has been all piled up with school exams and school play, but is ready to go now.

Dist. No. 3: 5UO helped 103 along their way. 5UN with a couple of 50-watt bottles, is getting lined up and will be on consistently soon. This said 5HQ is going to start up again. Old 5LL's familiar fist was heard in the air during the holidays. 5KV is under construction.

Dist. No. 4: 5XAJ received 35 and sent 10.

Dist. No. 5: 5ZH is having trouble with some 50 watt bottles. 5VD is in th eexperimental stage. 5AIJ has trouble clearing to the West, El Paso and State College, N. M.

SOUTHERN TEXAS—Dist. No. 6: 5ZG leads Southern Texas by handling a total of 125 messages. 5ZX seems to have it all to himself if we go by the reports received, just one from Houston. He does quite a bit of "hamming" on fone and the message total is only 5. 5OC is breaking in two 50's, in a 1DH circuit.

Dist. No. 7: 5ALR handled 32. 5RN is out of commission. 5JF reports 6. 5YK lost an aerial in a storm, but moved 21 anyway.

Dist. No. 8: 5AEW has been acting as D.S. in the absence of D.S. Wall. He reports that he is selling out on account of school work, and has surrendered his O.R.S. (Sorry, OM.—D.M.) 5KG follows suit, pressing school duties also the cause. He surrenders his O.R.S. and OB.S. appointments. 5VO has collected the necessary sheckes for a 50-watt tube and will be back on shortly. Old 5MN of Ft. Worth, has gone in with Tom M. Lytle and 5MN and will be on the air again.

A 50-watter went into service. 5ADI lost his antenna in a storm, but is up and going again now. He handled 10 and wants a schedule at 6:15 P.M. 5MT, Sr., reports 21 received and 32 sent and some of the fast hams are about to run him ragged. He wants some four-wheel brakes put on

'em. (The Sr. is a little new in the game, fellows, spinach report to WCM every morning at 7:30 have a heart.—D.M.) 5MT passes the daily FOB for the state Bureau of Markets, something new in the field of A.R.R.L. work. The service is good to date. 5MT, Jr. is at Texas University. 5GE handled 20 while he was at home during the holidays. 5JT has been on about two weeks and handled about 30, all real messages. His two five watters died of old age, 201's put in their place worked BX and 6XAD, also 8VY, with the quarter amp. in antenna. 5JC handled 17.

Dist. No. 5: 5ADB handled 98 this time. 5DE is on only Saturday and Sunday.

OKLAHOMA—Dist. No. 1: 5AJB is the only station reporting from Oklahoma City this month. He handled 61 messages and is on regular from 4:00 A.M. to 7:00 A.M. 5JE leads this gang here with 34. 5ANC was on only 5 days but handled 32. 5ZM has been all piled up with work and handled only 7.

Dist. No. 2: 5BM reports 23. 5AJQ is knocking 'em cold, handled 39 this time and they don't stay on the hook a week at a time either. 5GA has a total of 53—all fine biz. 5EJ has a 100-watter going and wants schedules east and west, north and south. Get lined up with him. 5SG is nil, rectifier trouble. 5XBF handled 6. 5AAW handled 4.

Dist. No. 3: 5AGA handled 15. Blew up a 5 and will be on with a 50 soon.

Dsit. No. 4: 5VM takes first place in the Oklahoma section and fifth place in the division in message traffic. He received 74 and sent 80. They tried out a ¼ arc set and it worked FB on 185 meters. Are building a 1 k.w. now to bust WNP's fones. 5AHD has been trying some low power work and covered 78 miles on .6 watt, 60 volts at 10 MA., daylight. 5AGZ works 500 to 900 miles consistently.

NEW MEXICO—5ADO worked 1000 miles daylight with 9VM. 5LG went home for vacation and found both masts down, two tubes deceased, a VT2 and a 202. Thought he was a "blowed up sucker" but tried a lonely 5-watter and handed 1ER three messages in a string.

MEXICO—The revolution is still on. That's the last report received.

HAWAIIAN DIVISION
K. A. Cantin, Acting Mgr.

District "A" Honolulu: 6ASR, 6CCR and 6TQ continue to handle mainland traffic from 6CEU. 6CMH is on again but confines his time to experimenting with CW. 6OA, 6EG, 6AFF, 6ADO and 6AJL are new addition to the list of local transmitting stations.

District "B" Hilo, Hawaii: Smith, 6CEU with his 15 watter continues to establish new DX work by being QSO with 9DUG, 9BRI, 9EKY, 9DLI, (Can) 9BP, 7IW, 7QT, 7SC, 7KS, 7BJ, 7HJ, 7HG, 5AMU, 5HT and (Can) 5GO. Also logged in N.Z., Alaska, New York and WNP.

CANADIAN SECTION
A. H. K. Russell, Can. Gen. Mgr.

Sometime ago a circular letter was sent to all owners of transmitting stations in Canada, inquiring whether they considered the time now ripe for the abandonment of the present relationship between Canada and the United States in the American Radio Relay League and the formation of a separate and distinct Canadian Radio Relay League. A very large number of replies since that time came to hand of the Canadian General Manager. Of this number of replies two only were in favour of breaking away from the American Radio Relay League and forming a separate organization. These two were both under the impression that the circular letter from the Canadian General Manager had been a boost for the C.R.R.L. In view of this unanimity of opinion, we think that the subject of the desirability of a separate Canadian organization has been settled in the negative.

January has been a month of excellent progress for Canadian amateur traffic. The Maritime Division is leading the way for the whole of the East by being constantly in touch with Europe. 1BQ and 1AR particularly distinguishing themselves in this way. In the Quebec Division 2BG and 2BN have both worked stations in England. 2CG is down on short waves as well and more to follow. In Ontario the short wave bug is also catching the boys. 3BP and 9AL have both been QSO England and 3BP has also worked France. 3OJ and 3BQ, 3WS and 3NI have all just taken the plunge from 200 down to the short wave. Come on in, the water's fine.

In the West we are unfortunate in Manitoba in losing 4DY, who has moved and says he is, temporarily at least, out of the game.

Besides 9BP, who continues his good work with WNP, we have 4CL and 4HH working WNP more or less regularly, the latter particularly doing excellent work, who has the advantage of having a job which keeps him up all night (no, he's not a married man.)

We are trying to establish a trans-Canada short wave route for rapid and efficient relay work all we are waiting for now is the West from Port Arthur to the Pacific. Come on Fellows, let's go!

MARITIME DIVISION
W. C. Borrett, Mgr.

This is the greatest month in the history of the Maritime division. We are no longer a remote link of the A.R.R.L. system, but a very necessary link for European traffic. We have handled over 100 messages for U.S.A., Canada, and Europe. The Transatlantic tests of course gave all stations an incentive to spruce up their receivers and some splendid work was done. The following European stations having been logged by us: British 2SH, 2SZ, 2KF, 2NM, 2NA, 2OD, 2KO, 5BV. French 8AB, 8BF, 8JL, 8ARA. Dutch PA 9, PA ODV, PC II, PAR 14.

The honors for the month go to 1BQ. He has worked as many European stations as any station in North America and has a nightly schedule with British 2OD. Over fifty messages have been forwarded to Europe by 1BQ and other stations can be heard asking him to help to put them through to Europe. Greig has done more to bring the division to the front than any other station. Our old friend, Joe Fassett, reports a new Junior operator at his house and is receiving congratulations from the gang. 1AR will be one of the Trans-Canada relay stations working on 160 meters. 1DQ worked British 2SZ for a short period one night and has been reported by several other stations over there. 1DD was copied by British 5US and is now tearing his hair trying to get over every night a la Greig. Not much luck as yet though, but has great hopes. By the way 1DD is a Major now, but the gang refuse to take any notice of it and still call him by the popular term of "Cap."

1BV is about to get on the air. His pole is up and if he does not have more trouble should be on by the time this is printed. 1DT has a schedule with 1AUR and has worked several other U.S.A. stations. He is now one of the best low powered stations in the division. 1EF surprised the gang including himself, by working 9AK in P.E.I. and several U.S.A. stations. 1EB is an-

other station that has done things this month and is now running a close race with 1DT for the Northern Electric Tube. He has worked over 500 miles with one 5-watter. 9BAL has four 5-watters going and is vy QSA as far west as Detroit. 1DJ, 1BK and 1CM are, as yet, unhatched.

His Worship, Mayor Murphy of Halifax, is much interested in our work and has had many messages sent to prominent public men through A.R.R.L. stations, among them being Governor Channing Cox of Massachusetts and the Mayor of Philadelphia and also the Mayor of Halifax, England. 1EI wins another certificate, having worked 9AK of P.E.I. and thereby connecting P.E.I. and N.B. by amateur radio for the first time. 1DN has worked Canadian threes and is very QSA in other parts of the division. 1AF is QSA in Halifax and forms the necessary link for summer trans-Canada work.

Prince Edward Island now has two good stations working. 1BZ who made his debut last month and 9AK who has come to life again in real good style. Both have handled traffic and are very welcome back on the air.

1DD has heard every district in the U.S.A. and the first, 2nd and 3rd in Canada and is only awaiting cards to confirm his reception before claiming the General Electric tube.

We hope to have a real good convention in Halifax this year with members from all the Provinces in attendance. It has been suggested that we hold one on April 4th and 5th, and the Division Manager would like a letter from every A.R.R.L. member in the Maritime Provinces stating whether he could come or not on those dates or any other dates and suggestions. Write as soon as you get this copy of QST as it only gives us thirty days to get ready. If it is thought better to hold it later, we will do so. All letters will be answered.

ONTARIO DIVISION

C. H. Langford, Mgr.

EASTERN ONTARIO—Everything is going fine. Traffic is being moved regularly, showing an improvement over last month, even with the tests. 3MP likes daylight best and is doing fine. In Ottawa the winter sports are drawing some attention, but the gang seem to be doing good work in between times. 3AF is chasing short waves. In Kingston the most consistent worker is 3NF. Others working are 3HO, 3AFZ and 3AEL. 3HE is working on 150 meters with great success.

Well it happened all right. We have another break. Absolutely no report from Central Ontario with the exception of Hamilton. Something is going to happen if it is pulled again. 3HT reports air gapin' filament, but handled 41 messages nevertheless. 3DB on 100 watts has worked 7 districts. 3OY requested more traffic be sent via Hamilton. 3AA is keeping Galt on the map by working 6BCL on 15 watts. Yes, sir, we have a report from Kitchener this time. Gowan resigned on account of other duties claiming his attention. He is still with us on relay work, however. 3BQ has been appointed in his place. 3YH and 3ADU are doing good work. 3HH is around 100 meters on 10 watts. 3HI a commercial op has started on 5 watts. From Sarnia comes the report that 3AD has been reported in Australia, all this from a 5-watt set. 3TB and 3XN are on short waves with 3ADN up on the scale. The St. Thomas gang are so busy wrecking up the air that a report failed to arrive. 3BG of Saulte Ste Marie reports spark coil QRM. Your R.I. can close 'em up, OM, go after it.

NORTHERN ONTARIO—3WS tops the traffic gang with a total of 103. He has worked all U.S. districts and all except first Canadian. 3NI complains of lack of traffic on 125 meters.

QUEBEC DIVISION

J. V. Argyle, Mgr.

We have started off this year by sticking half a dozen new feathers in our cap. This division may not have many big stations but those it has got, do perform big works. We have four stations down on 125 meters and who STAY down there; if you want to work 2BG, 2BN or 2CG get down below 175 meters, for they use tuners that go no higher these days. 2BN was the first station to work across, having worked British 2OD, and was closely followed by 2BG who has worked Dutch PCII and British 5KO with four UV 202's. 2BE gets special mention for working Porto Rico. 2BV is using C.W. at last and is reaping the benefit. 2HG, 2GL, 2DN, 2EI, 2AZ and 2HM are to be heard most nights and are handling what traffic there is. 2HM ran a good part for the gang. Kicks were delivered and honey was spread on those deserving. The bunch is getting big these days, but they all keep the golden rule "silence 7:30 to 10:00." Our new ultra-reliable route across Canada on the low wave is coming along; the east is all lined up. Come along Winnipeg and west, we are impatient!

Traffic to 1BQ and 1DD is easy.

The noise from the west about forming an independent C.R.R.L. has died out here as was prophesied, the real bunch out there seem to agree with Quebec that the old tried and trusted A.R.R.L. is all we need.

Co-operation amongst divisions is greatly on the increase due to better communication on the 125 meter wave. With the new relay going our pals out in Vancouver will be as close as the fine old gang in N.S. and Ontario.

WINNIPEG DIVISION

J. E. Brickett, Mgr.

MANITOBA: We lost two good boosters, in 4DY, A.D.M. Manitoba, and 4DK who has decided to quit the game. (Wonder how long it will last?—D.M.) 4CN is getting around the country FB, and shooting messages, too. 4CO is working great DX on spark but is hustling to get his 50 watts going again. 4DY has been reported by 6CRU and WNP. 4EA on 5 watts works 1000 miles right along and handles lots of traffic. 4FZ, 4AL and 4CH are reaching out fine on 5 watts. 4AW still has power trouble. 4CR works all districts FB, and is reported QSA in Vancouver and Montreal.

SASKATCHEWAN—Frozen rectifiers seem to be the main report this month. 4FC is looking for some way to keep his rectifier above 32 degrees. 4DG has a mast up and will be going soon. 4AM is working hard on 5 watts. From his call letters he will be a real owl. 4FH and 4GR have joined forces and are getting together for low power set. 4GH at Buchanan is working all over the 9th district with 2 amps of spark C.W. 4EZ is on the air again with low power set. (Hi, another come back. They all do it.) 4FV is getting out fine with 5 watts, working both coasts. 4AJ is getting a new filter system going good. Using "S" tubes (keep a log on the activities of those "S" tubes please, OM, its good reference dope—OM) 4HH is going strong, working every thing in North America, especially WNP with great success a number of times. 9BX is going when time permits.

4AO our D.S. and R.I. has been off a lot with sickness but says he is coming back, OK. 4ER is the busiest young fellow in Moose Jaw. Trying to keep up his College studies, keep his mother from the fact that he is burning so much midnight oil, and trying to convince the district R.I. that his A.C.C.W. is closely tuned. But he seems to be getting away with it. (FB.)

VANCOUVER DIVISION

A. J. Ober, Mgr.

The Star station again is 5GO. For Alberta 4CL takes the cake. He works all districts, WNP consistently, and has been heard in Hawaii. (FB, Field—D.M.)

VANCOUVER DISTRICT—5AS, ex-5AT, is the only station on the air and is knocking 'em dead with his 50-watter. 5EB and 5CN have not been on the air. 5AH is remodeling his station. 5AK was on the air for two weeks and did some good traffic work. 5EJ is not on much. (Hw cum—D.M.) 5EF seems to clear traffic in fine shape.

VANCOUVER ISLAND DISTRICT—5CT and 5HK are the only active stations on the Island.

ALBERTA DISTRICT—4AB mixes prescriptions with his fones on cause he's got callouses on his ears, and fones look better than a toque. 4IO is going right after DX and traffic, when he isn't winding transformers. 4IC is a new station to hand in a report, using 10 watts. 4CW would like to borrow a spare 50-watt bottle to calibrate his T.C. ammeter. 4DQ is waiting for plate batts from 8NL.

Calls Heard

HEARD DURING JANUARY
Unless Otherwise Specified

Juan E. Chibas, 8GT
Gral. Portuendo baja 12, Santiago, Cuba

1ALJ, 1AXN, 1BGF, 1CI, 2BQH, 2CEE, 3BMN, 3BUY, 3CKG, 3XM, 4CH, 4FT, 4GZ, 4HN, 4HS, 4IO, 4IU, 4IZ, 4JE, 4MB, 4MI, 4PK, 4QL, 4QW, 4SB, 4XJ, 4OI, 5BM, 5BZ, 5CM, 5MM, 5RD, 5RH, 5SP, 5SZ, 5XA, 6AWT, 6BRF, 6BVE, 6CFZ, 6CGW, 6FP, 8AQ, 8APV, 8BZT, 8KG, 8ZZ, 9AQB, 9ASR, 9BCE, 9BGH, 9BRK, 9CEQ, 9CGN, 9CHG, 9CKD, 9EBT, 9EEH, 9EHJ, 9EJA, 9ELL, 9ELV, 9VZ, 9WU.
Cuban: 2BY.

F. L. Hogg, 2SH
37 Bishop's Rd., Highgate, London, N.C. England
(Nov. 25 to Dec. 19th)

1ARY, 1AWW, 1CMP, 1CPN, (1MO), 1XAE, 1XAM, 1XAQ, 1YB, 1ZI, (2AGB), 2BY, 2CFB, 2CUR, 2CXD, 2RB, 2RK, 2XAQ, 4JJ, 5EH, 5JB, 8UF, 8FM.
Can.: (3BP).
Am working on 100 meters every Sunday, Monday and Friday night from 10:30 EST on. I QSL every card.

S. K. Lewer, 6LJ, 32 Gascony Ave.,
West Hampstead, London N.W. 6, England

1AL, 1AN, 1AR, 1BQ, 1DW, 1FK, 1KC, 1MO, 1MY, 1OW, 1PA, 1RD, 1SN, 1VV, 1XM, 1YB, 1YK, 1ZP, 1ALL, 1ALU, 1AOL, 1ARC, 1AVR, 1BBL, 1BWJ, 1CMP, 1JLF, 1XAM, 2AL, 2BY, 2FT, 2FX, 2GK, 2IO, 2WA, 2WR, 2ADW, 2AJP, 2AVR, 2ANA, 2BAR, 2BQH, 2CCX, 2DAC, 2XAP, 3BG, 3BT, 3CK, 3HG, 3WB, 3ADB, 3BKT, 3CBZ, 4FT, 4RH, 4RI, 5AB, 5CC, 5FG, 5ML, 5AIV, 6AM, 6ZZ, 6AOS, 6CMP, 7AF, 7BF, 8CB, 8DA, 8FF, 8VY, 8WZ, 8ANM, 8AWF, 8BOA, 8BTM, 8COM, 8CXY, 9CX, 9CY, 9DL, 9TA, 9ZT, 9AVR, 9AON, 9APS, 9COL, 9CRA, 9DIB, 9DJX, 9DRW, 9DWX, 9EDN, 9EFE.

H. J. Swift, Kassala,
77 Upper Tulse Hill, London, S.W. 2, England

1AW, 1CJ, 1FD, 1FS, 1GK, 1LK, 1LZ, 1SN, 1WO, 1XD, 1XM, 1YB, 1YK, 1YQ, 1ZE, 1ZI, 1ADN, 1AJX, 1ALL, 1AMF, 1AQM, 1ARY 1ASU, 1AUD, 1AUR, 1BCN, 1BDA, 1BDI, 1BDT, 1BGC, 1BGQ, 1BQB, 1BSC, 1BSG, 1BSQ, 1BSZ, 1BVB, 1CDO, 1CIV, 1CKP, 1CMJ, 1CMP, 1CNP, 1CRU, 1XAM, 2AI, 2BY, 2GK, 2KO, 2KU, 2RK, 2WR, 2WX, 2AGB, 2ANA, 2AWF, 2BDI, 2BGV, 2BLH, 2BLP, 2BQH, 2BRB, 2BSC, 2BUM, 2CEI, 2CJX, 2CLA, 2CPA, 2CPD, 2CQZ, 2CRB, 2CUR, 2CVU, 2CXW, 2CXY, 2CZW, 3DE, 3LG, 3OT, 3TE, 3YO, 3ADB, 3ATB, 3BGG, 3BJ1, 3CBX, 3CKG, 3CKP, 3XAO, 4FT, 4IO, 4KU, 5EK, 8BY, 8CT, 8FM, 8FU, 8QM, 8TC, 8UK, 8WZ, 8AFN, 8ANM, 8APT, 8AQC, 8BDA, 8BFH, 8BSC, 8CEI, 8CEN, 8CFT, 8CJY, 8COM, 8CQS, 8CTP, 8CWU, 8CXM, 8DXJ, 8XAN, 8ZAE, 9NC, 9VM, 9AWV, 9BFJ, 9XAC, 9XAX, 9XW.

A. Ducati, ACD
Bologna (29) 3 via Garibaldi, Italy

1AOD, 1BMA, 1BRB, 1BSC, 1XW, 2AGB, 2AJF, 2BMO, 2BSC, 2BSY, 2CUW, 3FG, 4LA, 8DAA, 9BTT.

F. D. Bell, 4AA
Palmerston South, New Zealand (Dec. 8th to 27th)

1AO, 1FD, 1HX, 1MY, 2AFP, 2AYV, 2BY, 2RK, 3YO, 4AB, 4CL, 5FS, 4FT, 4HH, 5AGT, 5AIU, 5HT 5HZ, 5IN, 5LR, 5MN, 5PH, 5TJ, 5UO, 5VM, 5XAP 6AAK, 6ACN, 6ACZ, 6ADM, 6AIV, 6AKZ, 6ALK, 6LV, 6AOL, 6AOS, 6ARB, 6AWT, 6BBC, 6BEO, 6BIH, 6BIQ, 6BON, 6BPZ, 6BRF, 6BUO, 6BVG, 6BE, 6CBB, 6CEU, 6CFZ, 6CGW, 6CHL, 6CKP, 6CNC, 6DD, 6FY, 6GR, 6HC, 6KA, 6LV, 6NE, 6NX, 6PL, 6TN, 6ZAR, 6ZBC, 6ZBA, 7AFN, 7AHS, 7AKK, 7ASI, 7CO, 7HG, 7NY, 7QJ, 7SC, 7TO, 7WN, 7ZU, 8AA, 8AM 8ADG, 8BDA, 8CEI, 8CP, 8LA, 8YN, 8YV, 9AN, 9AIM, 9AAQ, 9BRW, 9BLY, 9BRI, 9BRK, 9BSG, 9BVW, 9BZO, 9BUH, 9CDO, 9CIP, 9CJC, 9CLQ, 9DKY, 9DLI, 9DOE, 9DYR, 9DYZ, 9EAK, 9EKY, 9ELV, 9GEZ, 9MC, 9VM, 9ZT.
Can.: 5GO, 9BP.

Harold T. Mapes, BX
Guanajuato, Gto., Mexico

1BGQ, 2BSC, 2BRB, 2BGJ, 2RK, 3AJD, 3FS, 3LG, 3YO, 4CS, 4CR, 4ER, 4EQ, (4FT), 4FS, 4GZ, 4HS, 4IO, 4IU, 4JZ, 4OA, 4PT, 4XJ, 5ADO, 5ADB, 5AKN, 5AJU, 5ADC, 5AMK, 5AGT, 5AIC, 5AFH, 5ALJ, (5AKN), 5AHJ, 5AMW, 5AOM, 5AS, 5AIU, 5ADV, 5AJT, 5AMU, 5AU, 5ANC, 5AHR, 5AAT, 5ABN, 5AES, 5AWM Fone, 5AKJ, 5ALX, (5AHT, 5AJV, 5AMW Dalite), 5ANA, 5ACR, 5ANA Voice, 5BZ, 5BX, 5CM, 5CV, 5DR, 5DW, 5EK, 5EI, 5EZ, 5EH, (5FT), 5FM, 5GG, 5GA, 5GJ, 5HW, 5HZ, 5HT, 5IQ, (5JC), (5JF), 5JL, 5KG, 5KP, 5KH, (5LR), 5LG, 5MO, (5MT), 5MM, 5NA, (5NK), (5NH), (5NN), (5OV), 5OQ, 5PY, 5PH, 5QT, 5QL, (5QW), 5QX, 5RB, 5RQ, 5RG, 5SP, 5SD, 5SX, 5TJ, (5TM), 5TO, 5UO, 5UA, 5VF, 5VM, 5VO Dalite, 5XAP, 5XD, 5XT, 5XV, 5XAQ, 5XA, 5YG, 5YT, 5YW, 5YK, 5ZU, 5XBF, 5ZH, 5ZX, 5ZA, 5ZAV, 5ZAX, 6AUU, 6AWT, 6AHU, 6AOS, 6AAM, (6ALK), 6AVR, 6AAK, 6AS, 6ACM, 6ANI, 6AJA, 6BBH, 6BRF, 6BVG, 6BPZ, 6BIC, 6BEO, 6BUO, 6BWZ, 6BAH, 6BJJ, 6BRK, 6BUF, 6BDT, 6BEO, 6CGW, 6CNG, 6CMR, 6CDG, 6CFY, 6CGD, 6CLR, 6CBD, 6CAX, 6CBB, 6CEI, 6CEK 6CHL, 6CEU, 6FP, 6FT, 6GT, 6JZ, 6KJ, 6LA, 6MH, 6NX, 6NE, 6OL, 6PL, 6RN, 6SU, 6UX, (6XAD), 7AGV, 7CO, 7CS, 7FQ, 7KS, 7SN, 7SC, 8AME, 8ALF, 8APN, 8APT, 8AGP, 8AIG, 8BXX, 8BDA, 8BYN, 8BUL, 8AMM, 8BDE, 8BZD, 8BYF, 8CGJ, 8CKV, 8DDC, 8EF, 8GZ, 8JY, 8JO, 8OA, 8OE, 8VQ, 8YN, 9AND, 9AIM, 9ATO, 9AHZ, 9AVN, 9APF, 9AVZ, 9ADP, 9AWP, 9AQB, 9AUS, 9ASX, 9AEC, 9AAU, 9AEY, 9AMI, 9BJI, 9BEZ, 9BSG, 9BZS, 9BLY, 9BP, 9BOZ, 9BRK, 9BMX, 9BTH, 9BOF, 9BEY, 9BRS, 9BAL, 9BYC, 9WC, 9CDJ, 9CIP, 9CDO, 9CRR, 9CIL, 9CHT, 9CAA, 9CHG, 9CHJ, 9CLQ, 9CCM, 9CFK, 9CXP, 9CVS, 9CGN, 9CJI, 9CGN, 9DUG, 9DOE, 9DAY, 9DQW, 9DLI, 9DZY, 9DHW, 9DQU, 9EHJ, 9EAK, 9EKY, 9EQ, 9ELV, 9EEG, 9EDB, 9EAK, (9FM), 9MC, 9PQ, 9VM, 9VE, 9WU, 9XM, 9ZT, 9ZY.
Mexican: (1B), (1K), (AX), MM.
"BX" is closed down at present, QRM Fm Revolution Hi.

R. L. Butler, at sea near Amapala, Honduras, C.A.
Dec. 28th: 1ML, 2RB, 2RK, 3AHP, 4IZ, 5ABY, 5AMH, 5NMS? 5LR, 5RB, 5ZAV, 8BNH, 8ES, 8RM, 8GH, 8ZZ, 9AIM, 9BOF, 9CAA, 9MC.
Dec. 29th: 2AJW, 2CEE, 2CLA, 3TA, Can. 3CO, 4HR, 4PY, 5ALJ, 5ANA fone and CW, 5GNE? 5EI, 5ML, 5QW, 5RB, 5APV, 8ATP, 8CPP, 8ZO, 9AND, 9BRX, 9DVW, 9DNX, 9DHG, 9DXN, 9EER, 9VZ, 8YSQ? Particulars from 5ZAV.

6RX at Sea Off Cape Horn

Hrd. between 11:20 P.M. Jan. 5th and 1:10 A.M. Jan. 6th, 1924. 120th Meridian Time. Off Cape Horn.
4FT, 5VF, 5VM, 5YW, 6AO, 6AAK, 6AWT, 6BPZ, 6BRF, 6BUO, 6CGW, 6KA, 6LV, 6RN, 8BDA, 8BYN, 9AIM, 9CCS, 9CVC, 9CVS, 9VM.
Will QSL questions re above. 6RX, 734 W. 6th St., Los Angele, Calif.

S. S. Claremont

Between S.F. and Grays Hbr., January. 2AWF, 4IO, 5BZ, 5CV, 5LR, 5MT, 5QW, 5VF, 5YW, 5AAT, 5AIQ, (6's and 7's too numerous) 8DO, 8JJ, 8PU, 8RJ, 8AIB, 8AIN, 8APT, 8ARD, 8BHO, 8BMG, 8BUL 8BWB, 8CGJ, 8CGX, 8CHY, 8CPD, 8CWR, 8DDC, 9VN, 9VZ, 9ADY, 9AEM, 9BED, 9BEZ, 9BOK, 9BTH, 9CAA, 9CKM, 9CMM, 9CVS, 9DRW, 9DYR, 9EER.
Can.: 4CR, 4CW, 4DY, 4IO, 5CP, 5CT.

SS. Myriam

December 20-21. 2180 miles WSW Ouessant (France), 500 miles S Newfoundland. *QRN bad:*

G2FQ (QSA, working 8CJ and 5NN), F8CT (QSA), 2FM, 2BM, 2SQ. (probably American).

December 23. 1730 miles WSW Ouessant, 530 miles W. Fayal (Azores Islands). QRN vy bad. Transatlantic Tests. With code word: 2FP, 2FQ, 2IN, NAB2, 2OD, 2SZ, 5AT, 5HI, 5KO, 5NNG, 5PU, 5QV, 6NI, 6XX, 8BM, 8CT. Without code: 6AM. The best are: 2FP, 2FQ, (vy QSA), 2OO, 2SZ, 5AT, 5PU, (QN) (vy QSA), 6XX, 8BM (vy QSA), 8CT.

December 23-24. 1520 miles WSW Ouessant. With code word: 2NM, 2ON, 2WJ, 5AT, 5CX, 5HI, 5KO, 5LC, 5NNG, 5RZ, 6NI, 6XX, 8AE, 8AP, 8AQ, 8ARA, 8BE, 8BM, 8CM, 8CS, 8CT, 8LY, PA9, NAB2. Without code: 2MT, 5FD, 5SZ, 5PU. Strongest are: 2NM, 2ON, 5LC, 6NI, 8AE (with Merry Xmas for American amateurs), 8BM, 8CT, PA9, 8BM and 8BE have the same wave length and they QRM vy much.

December 24-25. 1300 miles WSW Ouessant. With code word: 2FU, 2IN, 2KW, 2OD, 2ON, 2NM, 2SZ, 2WJ, 5AT, 5LC, 5NNG, 5PU, 5RZ, 6NI, 6XX, 8AB, 8BE, 8EB, 8CS, 8CT, PCII, PAOYS (!) PA9, ACD. Without code: 2CW, 2FN, 2SH, 2VF, 2VS, 2ZK, 5KO, 5SZ, 8ARA, 8LS, OFN. The best (Extremely loud) are: 2OD, 2SZ, 5LC, PA9. Strongest of all is 2SZ, readable 30 feet from phones.

December 26. 1080 miles WSW Ouessant. With code word: 2IN, 2KW, 2NM, 2SZ, 2UF, 2WJ, 5AT, 5CX, 5KO, 5NNG, 5WR, 6NI, 6XX, 8AB, 8AP, 8AQ, 8ARA, 8BF, 8BM, 8CD, 8CK, 8CT, 8LY, PA9, ACD. Strongest are: 2KW, 2SZ, 8BF, 8BM, PA9, with 2SZ again the best of all.

No reception of U.S. Stations on account of the tests.

Canadian 3DU, London, Ont.

5BX, 5CM, 5HE, 5HT, 5HY, 5JC, 5JH, 5JL, 5JW, 5KA, 5KC, 5KN, 5KU, 5LO, 5LR, 5MA (CW and Fone), 5MQ, 5NN, 5NW, 5OV, 5PN, 5QL, 5RG, 5RH, 5SK, 5SZ, 5TC, 5UK, 5VA, 5VF, 5XD, 5XK, 5YW, 5ZA, 5ZG, 5ZU, 5AAR, 5ABC, 5ACF, 5ADO, 5AIC, 5AKF, 5AKI, 5AKN, 5ALJ, 5AMG, 5AMK, 5AMW, 5ANY, 6AK?, 6CC, 6GT, 6GR, 6FP, 6IF, 6LV, 6LX, 6NX, 6OD, 6OH, 6OL, 6PL, 6RN, 6ZH, 6ZU, 6AAO, 6ABK, 6ACM, 6AGE, 6AHU, 6AKZ, 6ANB, 6ARF, 6AUU, 6AVV, 6AWT, 6BIC, 6BIH, 6BJJ, 6BJR, 6BQL, 6BRB, 6BRF, 6BUD, 6BUY, 6BVE, 6BWE, 6CFZ, 6CDG, 6CGD, 6CGG, 6CGW, 6CJB, 6CKR, 6CMR, 6CMT, 6XAD, 6ZAH, 6ZAR, 6ZBI, 6ZBU, 7AW, 7BJ, 7CO, 7FQ, 7MW, 7NT, 7OT, 7QC, 7QD, 7QU, 7SF, 7WS, 7ZL, 7ZU, 7ABB, 7ADH, 7AHV, 7AOD, 9AMB, 9AUY, 9AVS, 9BJI, 9BJK, 9BKF, 9BVO, 9CDE, 9CZG, 9DFH, 9DTE, 9EAE, 9EEA.

Can.: 4CL, 4CR, 4DY, 4EA.

Canadian 4AH, Edmonton S. Alta.

1CRS, 1FS, 1IO, 2BPF, 2BQU, 2CAK, 2CCD, 2COA, 2QM, 2RK, 3ATS, 3CIL, 4BT, 4BY, 4CK, 4EL, 4EQ, 4FT, 4HS, 4QW, 4ZA, 5ACM, 5ADO, 5AF, 5AL, 5AM, 5AMB, 5BRI, 5CE, 5CN, 5CV, 5EF, 5FA, 5JC, 5JL, 5LB, 5LR, 5LU, 5NA, 5OA, 5OV, 5PH, 5PU, 5PW, 5QD, 5QW, 5QY, 5RW, 5SD, 5UN, 5UP, 5VR, 5XD, 5YW, 5ZA, 5ZG, 6ABC, 6ACM, 6AJA, 6AKZ, 6AME, 6AOI, 6AOS, 6ARF, 6AUU, 6AWC, 6AWT, 6BCU, 6BGC, 6BJR, 6BJJ, 6BM, 6BNF, 6BNI, 6BO, 6BOF, 6BP, 6BRF, 6BUH, 6BUI, 6BUY, 6BWP, 6CBW, 6CC, 6CCS, 6CDG, 6CEK, 6CGW, 6CJR, 6CLD, 6CQD, 6FM, 6MF, 6MH, 6NX, 6PE, 6RN, 6SV, 6UO, 6UX, 6ZH, 8AOQ, 8APT, 8ARD, 8AV, 8AZM, 8BCP, 8BDA, 8BDE, 8BDU, 8BKN, 8BLG, 8BPC, 8CMX, 8CO, 8COM, 8COW, 8CRW, 8CV, 8CWK, 8CWV, 8CXW, 8DAW, 8DFA, 8DHQ, 8DJF, 8ES, 8OE, 8RJ, 8RY, 8WA, 8YN, 8ZZ, 9AAP, 9AAQ, 9AAU, 9ACL, 9ADP, 9AEC, 9AED, 9AGE, 9AHR, 9AHW, 9AHV, 9AIO, 9AIM, 9AJA, 9AJV, 9AMI, 9AHU, 9ANF, 9AOE, 9AP, 9APF, 9AQB, 9AQC, 9AQH, 9ATO, 9AUA, 9AVG, 9AVL, 9AVN, 9AWI, 9AXS, 9AXX, 9AYD, 9AYJ, 9AZG, 9BAL, 9BDR, 9BDT, 9BEY, 9BEZ, 9BG, 9BGF, 9BGH, 9BGK, 9BGY, 9BHX, 9BIZ, 9BJB, 9BMX, 9BNU, 9BOZ, 9BRS, 9BST, 9BTO, 9BUN, 9BWC, 9BWN, 9BXQ, 9BYW, 9BZ, 9CAA, 9CDJ, 9CDV, 9CE, 9CEA, 9CFK, 9CFT, 9CFY, 9CGV, 9CHC, 9CHN, 9CJH, 9CKI, 9CKS, 9CLD, 9CNJ, 9CNY, 9CO, 9COL, 9CPO, 9CR, 9CRR, 9CRS, 9CRV, 9CSI, 9CUD, 9CVT, 9CWM 9CZM, 9DAL, 9DAY, 9DBR, 9DCE, 9DCT, 9DEC, 9DLU, 9DEQ, 9DGV, 9DK, 9DKB, 9DKI, 9DKW, 9DMC, 9DMF, 9DN, 9DOE, 9DPU, 9DQE, 9DRW, 9DST, 9DSW, 9DTE, 9DUG, 9DVG, 9DVN, 9DVW, 9DWN, 9DX, 9DYR, 9EA, 9EAC, 9EAI, 9EAK, 9EBY, 9EDB, 9EDO, 9EEA, 9EEP, 9EGW, 9EHJ, 9EJC, 9EKF, 9EKY, 9EQ, 9ETC, 9FM, 9HG, 9HK, 9LM, 9PQ, 9QE, 9QW, 9BC, 9VK, 9XR, 9ZT.

Cuban: 2BY (?).

Fone: 5AMA, 6AWC, 6BJB, 6FM, 9AQH.

1AF, Harvard Radio Club, Cambridge, Mass.

5ADB, 5ADV, 5AHR, 5AIU, 5ALX, 5AVR, 5EK, 5GA, 5GG, 5GJ, 5GM, 5HS, 5NN, 5SP, 5UP, 5VM, 5XA, 5YT, 5ZAV, 6ACM, 6AHU, 6AJF, 6AOS, 6BSH, 6CFZ, 6CMT, 6CGW, 6CMR, 6GN, 6OL, 6RN, 6XL, 6ZAH, 6ZBL, 6ZP, 7CO, 7FQ, 7YI, 7ZB, 7ZU, 9AEL, 9AEY, 9AHH, 9APE, 9AMF, 9BDS, 9BED, 9BLY, 9BMW, 9BMX, 9BOF, 9BRK, 9BRN, 9CDE, 9CGY, 9CPC, 9CRR, 9DHG, 9DJN, 9DKY, 9DXU.

1BFA, Arlington Hts., Mass.

4AF, 4BG, 4CL, 4CP, 4DB, 4DY, 4EA, 4ER, 4JE, 4HR, 4QW, 5ABN, 5AJB, 5AIU, 5JL, 5ML, 5NN, 5RH, 5SK, 5UP, 5VV, 5XD, 5ZS, 6AAO, 6AHV, 6AND, 6ARH, 6APC, 6AFQ, 6AOH, 6AKZ, 6AWT, 6AJA, 6BIC, 6BRF, 6BRT, 6BGC, 6BIH, 6BLM, 6BVE, 6BCL, 6BUY, 6BM, 6CKL, 6CGD, 6CC, 6CGG, 6CMU, 6CNQ, 6FP, 6LV, 6GT, 6GR, 6NX, 6PL, 6WB, 6ZAR, 6ZAH, 6ZBJ 6ZBH, 6ZH, 6OD, 7AIM, 7FQ, 7CO, 7QD, 7UM, 7ZU, (8BPN) QRA?, 9ARU, 9ARF, 9AXD, 9BWC, 9BAK, 9BTZ, 9BKU, 9BIZ, 9BGH, 9BKF, 9CGR, 9CEA, 9CLD, 9DYY, 9DYZ, 9DNI, 9DUJ, 9DFH, 9BEX, 9EEG, 9EFT, 9ZL.

Spk.: 3BRL, 9DJN.

Can.: 2BE, 2IC, 2JF, 3AD, 3NF, 3XI, 3OJ, 3TM, 3FC, 3YV, 4CW, 4A.

British: 2SZ, 6XX.

2CYH, Troy, N. Y.

4AF, 4AI, 4AIA, 4ALE, 4AMY, 4AR, 4AX, 4BX, 4CI, 4CQ, 4CS, 4DB, 4DJ, 4EA, 4EF, 4EM, 4FA, 4GO, 4HS, 4IO, 4IZ, 4JE, 4JK, 4KX, 4MB, 4MD, 4ME, 4MI, 4NA, 4ND, 4PD, 4QF, 4QR, 4QW, 4TR, 4WS, 4YV, 5AB, 5AC, 5AJ, 5AJ?, 5AR, 5AT, 5AAC, 5AAD, 5AAV, 5ABC, 5ABY, 5ADF, 5ADH, 5ADN, 5ADS, 5AEC, 5AGD, 5AGE, 5AGI, 5AGN, 5AIC, 5AIJ 5AIN, 5AIU, 5AKN, 5AMH 5AMJ, 5AMS, 5APU, 5ASN, 5AUI, 5AYD, 5CC, 5EQ, 5HK, 5HS, 5IN, 5IW, 5JE, 5JF, 5KC, 5KR, 5ML, 5MU, 5NU, 5NV, 5OF, 5OS, 5OV, 5QL, 5QP, 5QW, 5RG, 5RO, 5SK, 5SU, 5TK, 5TT, 5UF, 5UP, 5VC, 5VT, 5WK, 5WS, 5WT, 5WU, 5XA, 5XK, 5XU, 5XV, 5YA, 5YK, 5YW, 5ZAS, 5ZL, 5ZQ, 5ZX, 6AFV, 6AHY, 6AJA, 6AJK, 6ARF, 6ASA, 6BQ, 6BHY, 6BRY, 6CC, 6CFZ, 6CGN, 6CCKW, 6CRE, 6FT, 6KV, 6LD, 6LJ, 6NR, 6SY, 6VU, 6WK, 6ZH, 6ZO, 7CB, 7CO, 7LQ, 7LT, 7LV, 7LW, 7ME, 7NR, 7RC, 7RW, 7WV, 7WY, (over 500 9's).

English: 5AT. Cuban: 2BY. Can.: 3ADN, 4XI, 9BL. Phone: Can. 1OAR.

3AEH, Fenns Grove, N. J.

5AKF, 5ZA, 5ZAV, 5ZC, 6ACQ, 6ANT, 6AWN, 6BEL, 6CAP, 6CC, 6CGW, 6CHO, 6CKC, 6CNG, 6CPD, 6CR, 6FP, 6GT, 6KA, 6LV, 6NP, 6NX, 6YB, 6ZB, 6ZZ, 7ABB, 7AD, 7AFO, 7CO, 7CX, 7EI, 7FQ, 7OC, 7VP, 7ZI, 9AAU, 9ARY, 9AXA, 9AXQ, 9BGQ, 9BHY, 9BKY, 9BSV, 9CDE, 9CXO, 9CZM, 9DBD, 9DKX, 9DPX, 9ECV, 9EKP, 9EKY.

Can.: 4AW, 4HD.

Mex.: HV.

3BDO and 3CIA, Vineland, N. J.

(4AB), 4AI, (4CL), (4CS), (4EB), 4ER, (4FS), (4FT), (4HS), 4HW, 4IO, (4IT), 4IZ, 4JE, 4JS, (4LJ), 4MB, (4MY), 4OA, (4OI), 4PB, 4PD, (4PK), 4PV, 4QF, (4QW), 4QY, 4RH, 5AAC, 5AC, 5ABT, 5ADC, 5AFQ, 5AGI, 5AGJ, 5AGN, 5AHJ, 5AUI, 5AJT, 5AKN 5AMB, 5AMF, 5AMH, 5AMW, 5BM, 5DQ, 5EK, 5FV, (5GJ), 5KC, 5LR, 5NK, 5NN, 5NV, 5OO, 5QL, 5QQ, 5UK, 5UV, (5UP), 5VC, 5VV, 5WV, 5XD, 5XK, 5ZA, 5ZAS, 5ZAV, 5ZB, 5ZG, 5ZS, 6ACM, 6AKZ, 6AO, 6AOS, 6AUU, 6AWT, 6BCL, 6BM, 6BVE, 6CBU, 6CFZ, 6CKP, 6CGW, 6CHV, 6EN, 6FP, 6LV, 6PL, 6TV, 6UX, 6XAD, 6ZAH, 6ZAR, 6ZH, 7AHV, 7CO, 7QC, 7ZD, 7ZU, (9AAD), (9AAL), (9AAQ), (9AAU), (9AAV), 9ACI 9ADY, 9AEK, (9AEM), (9AER), 9AFI, 9AFR, 9AFY 9AGB, 9AGY, 9AHJ, (9AHQ), 9AHY, 9AIM, 9AKA, 9AKD, 9AMB, 9AMF, 9AMI, 9AMK, 9AOA, 9AOX, 9APD, 9AQA, 9AQB, (9AQD), 9AQM, 9ARF, 9ARL, 9ARR, 9ARU, (9ASH), 9AST, 9ATN, 9ATO, 9AUE, 9AUS, 9AWO, 9AWG, 9AWI, 9AXA, 9AXB, 9AXX, 9AYP, 9AZJ, (9AZP), (9AZX), (9BAB), 9BAT, 9BCB, 9BCE, 9BCS, 9BCX, 9BDB, 9BDR, (9BED), 9BEH, 9BEP, 9BEX, 9BEZ, (9BGD), 9BGH, 9BGK, 9BGX(9BHH), 9BHL, 9BHQ, 9BHX, 9BJI, 9BJL,9BKX 9BLT, (9BLY), 9BMR, 9BMU, 9BOF, 9BOO, 9BOQ, 9BOZ, 9BQJ, (9BRE), 9BRU, 9BRX, 9RY, 9BUO, (9BWF), (9BWJ), 9BWP, (9BZQ), 9CAA, (9CAH), 9CCS, 9CCW, 9CDO, 9CDQ, 9EAE, 9CEE, 9CFI, 9CFK, 9CGM, 9CGR, (9CGY), 9CHK, (9CHN), 9CIM, 9CIV, 9CIW, (9CJC), 9CJM, 9CJJ, 9CKH, 9CLD, (9CLJ), 9CMC, 9CMK, 9CMN, (9CNB), 9CNV, 9COG, 9COW, 9COZ, 9CPE, 9CRR, 9CSB, 9TE, (9CTR), 9CUI, 9CVE, 9CVI, 9CVO, 9CWF, 9CWL, 9CZM, 9CZN, 9CZS, 9CY, 9DAY, 9DBF, 9DBN, 9DCT, 9DDA,

9DDG, 9DGF, (9DHG), 9DHL, (9DHR), 9DID, 9DIH 9DJR, 9DJX, 9DJZ, 9DKX, (9DKV), (9DKY), 9DLW 9DNF, 9DNI, 9DNN, 9DOC, (9DON), (9DPC), 9DSQ (9DSV), 9DTS, 9DUJ, 9DUO, 9DVM, 9DVW, 9DWK 9DWZ, (9DXS), (9DXV), 9DYZ, 9EAC, (9EAR), 9EBH, (9EBV), 9EDB), 9EDM, 9EER, 9EFQ, 9EGA, 9EGQ, 9EGW, (9EHI), 9EHQ, 9EI, 9EJI, 9EJX, (9EKY), 9ELA, 9ELD, 9ELV, 9EMB, 9EMZ, 9EQ, 9ER, 9ESI, 9FM, 9GT, 9IR, 9KD, 9LB, 9LE, 9LW, 9MC, 9PF, 9SO, 9UR, (9VK), (9VM), (9VZ), 9YY, (WZV), KDEF, NG QRA?

Can.: 1AR, 1DD, 2AZ, 2BE, (2BG), 2BN, 2BY, 2CE, 2HM, 3AA, 3ADV, 3AFP, 3AFZ, 3AY, 3DB, (3IF), (3MN), 3MS, (3NF), (3OY), (3RG), (3WS), 3XI, 3YH, 3YV, 4CR, 9AK, 9BJ.

Cuban: 9DW QRA?

Fone: 4AI, 5AMF, 5EK, (5XK), (Can. 2BG).

4RP, Wofford Campus, Spartanburg, S. C.

6AAO, 6ACM, 6ADH, 6AKZ, 6ALV, 6ARU, 6AUU, 6AWQ, 6AWT, 6AWY, 6BBW?, 6BDX, 6BEG, 6BGC, 6BIC, 6BIH, 6BJJ, 6BKX, 6BMH, 6BPZ, 6BRF, 6BUY, 6BVE, 6BM, 6CDG, 6CDM, 6CGD, 6CGG, 6CGW, 6CHV, 6CMP, 6CMR, 6CMT, 6EB, 6FF, 6FP, 6GT, 6HZ, 6KU, 6LV, 6MH, 6MF, 6NB, 6PL, 6QJ, 6UX, 6WT, 6XAD, 6ZAR, 6ZH, 6ZZ, 6ZP, 7AFC, 7CO, 7IO, 7SO, 7ZU.

5AC, Mobile, Ala.

1AJX, 1ALJ, 1AQM, 1AUR, 1CMP, 1FM, 1II, 1IV, 1PA, 1SF, 1XAE, 2AGB, 2ATZ, (2AZY), 2BBX, 2BL, 2BQB, 2BQU, 2BRB, 2BUM, 2COH, 2CQI, 2CRQ, 2CXL, 2RB, 2WB, (3LG), (3QV), 6AAM, 6ABC, 6ABK, 6ACM, 6ADH, 6ADT, 6AGE, 6AGK, 6AHU, 6AJD, 6AJF, 6AJJ, 6AK, 6ANI, 6AOI, 6AOL 6AOS, 6APW, 6ARB, 6AUP, 6AUR, 6AUU, 6AUY, 6AVV, 6AWS, 6AWT, 6BAH, 6BBC, 6BBO, 6BEO, 6BFG, 6BGC, 6BH, 6BIC, 6BIH, 6BJJ, 6BLW, 6BM, 6BMN, 6BNC, 6BRF, 6BRK, 6BQE, 6BUH, 6BUO, 6BVE, 6BVG, 6CAE, 6CBD, 6CBU, 6CC, 6CDE, 6CDG, 6CEK, 6CFZ, 6CGW, 6CHL, 6CHU, 6CJB, 6CKR, 6CKW, 6CIR, 6MA, 6CMO, 6CMR, 6CMT, 6CNH, 6FH, 6FP, 6GR, 6JT, 6LU, 6LV, 6LX, 6MH, 6NX, 6OL, 6PE, 6PL, 6SU, 6VD, 6XD, 6ZAH, 6ZAR, 6ZBD, 6ZG, 6ZH, 6ZR, 7ABB, 7ADR, 7AEA, 7AEL, 7AGE, 7AGR, 7AIY, 7AKH, 7CO, 7JD, 7LN, 7OB, 7QC, 7QT, 7SC, 7SF, 7SO, 7WM, 7ZD, 7ZO, 7ZR, 7ZU, (8ACY), (8ALF), (8APT), (8BDA), (8CDZ), (8CJD), (8VN), (9AQK), (9AUS) (9AWG), (9BIJ), (9BHI), (9BRX), (9CGN), (9CZO) (9DMJ), (9DXS), (9DXU), (9DYY), (9DZO).

Canadians: 2IC, (3AD), 3CO, 3LL, 3NF, 3OH, 3PG, 3TB, 3WS, (3XI), 3ZI, 5GO, 5HK. Cuban: 5JA. Mex.: AX, BX. Fone: 5AMW, 5GD, 5ZA, 8DAT. Spark: 8BAH, 8BDA, 8TH, 9DWK. Dalite CW: 8CPN, 8FM, 9ADY, 9AOJ, 9CUR. French: 8F.

5JF, San Angelo, Texas

1AF, 1ACX, 1AKL, 1AWE, 1BD, 1BGF, 1BGQ, 1CAZ, 1CDO, 1CMP, 1CPN, 1ER, 1GV, 1JV, 1MV, 1PA, 1XG, 1YB, 1ZE, 1ZL, 2BE, 2BLP, 2CEE, 2CJ, 2CJQ, 2CRP, 2CWJ, 2EL, 2KF, 2LE, 2RK, 2TS, 3AA, 3ACK, 3AOR, 3BG, 3BQU, 3HUY, 3COR, 3DZ, 3FC, 3GO, 3HH, 3LG, 3LX, 3QV, 3RV, 3ZO, 4AF, 4AG, 4AY, 4BA, 4BK, 4BY, 4CL, (4DB), 4ER, 4FG, 4FS, 4FT, 4GW, 4GX, 4GZ, 4HR, 4HS, 4IT, 4IZ, 4MB, 4OI, 4PB, 4PK, 4QF, 4QL, 4QW, 4RF, 4RU, 4XJ, 5AAQ, 6AGE, 6AGK, 6AHU, 6AIB, 6AJA, 6AJU, 6AKZ, 6ALV, 6ALJ, 6ANB, 6AO, 6AOS, 6ARB, (6ARU), 6ATN, 6AUU, 6AVV, 6BAF, 6BBC, 6BCL, 6BEL, 6FG, 6BJQ, 6BBJ, 6BJR, 6BLG, 6BM, 6BNC, (6BPI), 6BPZ, 6BQE, 6BRF, 6BRK, 6BSH, 6BSQ, 6BTS, 6BUO, 6BUR, 6BUY, (6BWD), 6BWU, (6CBB), 6CBE, 6CBW, 6CCG, 6COG, 6CEI, 6CEJ, 6CEK, 6CFS, 6CFZ, 6CKR, 6MO, (6MU), 6CNG, 6CNL, 6CQE, 6GG, 6GR, 6GT, 6JA, 6KW, 6LW, 6LX, 6QJ, 6RN, 6TF, 6VF, (6XAD), 6YB, 6YC, 6ZAX, 6ZB, 6ZH, 6ZU, 6ZX, 7ADS, 7AGV, 7AKH, 7CO, 7FY, 7HG, 7HW, 7IW, 7OT, 7QU, 7RY, 7SY, 8AA, 8ACN, 8AFD, 8AFI, 8AHQ, 8AIH, 8AJE, 8ANB, (8ANM), 8APN, 8APT, 8ATC, 8ATP, 8AVT, 8AZM, 8BAU, 8BCI, 8BDA, 8BDM, 8BJV, 8BLG, 8BMR, 8BMY, 8BNN, 8BQI, 8BT, 8BZD, (8CDZ), 8CGU, 8CLF, 8CLK, 8COM, 8CP, 8CQJ, 8CRF, 8CRN, 8CSE, 8CTP, 8CUM, 8CUS, 8CWR, 8CXU, 8CZZ, 8DDC, 8DFW, 8DGJ, 8DHN, 8FC, 8FM, 8II, 8JC, 8KJ, 8OA, 8OE, 8OM, 8OZ, 8PD, 8PL, 8QA, 8RJ, 8RN, 8TT, (8VY), 8WG, 8XAW, 8YAE, 8YV, 8ZC, 8ZZ.

Canadians: 2BG, 3GE, 3PZ, 4EA, 4EQ, 5GO, 9BJ.

Mexican: (BX).

6CEU—November 13-December 15, 1923

1YB, 1AQM, 2AYV, 2RK, 2CCX, 2EL, 2BY, 3IR, 3JJ, 3HG, 4GX, 4KU, 4CS, 5GJ, 5AHD, 5OV, 5HT, 5LR, 5TJ, 5ZH, 5PH, 5ZAX, 5ZAV, 5QY, 5AHD, 5AIU, 6CLR, 6BCJ, 6AHU, 6CEE, (6CKP), (6AUY), (6ARB), (6CGW), (6CNH), (6BVG), (6BUY), (6AFZ), (6AOS), (6CKR), (6AME), (6AGE), (6CNC), (6AHP), (6CNG), (6BUZ), (6AJF), (6BQL), (6ZBA), 6AOQ), (6CKP), (6ATZ), (6AGJ) (6QM), 6EA, 6NX, 7AGR, 7ZX, 7QJ, 7SF, 7LR, 7JD, 7ZU, 7SO, 7OT, 7SN, 7SC, 7QC, 7IO, 7HG, 8XE, 8BDA 8BGO, 8MZ, 8BF, 8AGP, 8ZY, 8ZZ, 8FU, 8JJ, 8WX, 8AIM, 8YN, 8CBI, 8CUQ, 8TT, 8CEI, 8COI,8AAF 8WA, 8OA,8BFQ,8CKO, 8CHD, 8CMY, 8AMM,8UE,9LZ 9SS, 9DRO, 9AOU, 9APS, 9AVZ, 9NR, 9CDB, 9DJB, 9CR, 9LY, 9CVS, 9AHZ, 9ACM, 9AWK, 9DKQ, 9CLQ 9DTE, 9BTT, 9CJR, 9DJB, 9DXY, 9DHU, 9EDB, 9CEU, 9CVC, 9AON, 9BQ, (9EKY), 9BP.

Canadian: 2BN, 3BP, 3TB, 3CO, 4DY, 4CN, 4DX, 5CN, (5GO), 5HK, 9SS, 9BP.

Spark: 6AQU.

Broadcasting Stations: WGY, KDKA, KGW, WBAP, WLAG, WDAF, WDAP, KFI, KPO, and KLX.

Pse. QSL if u hr. 6CEU. 15 watts DC-CW used. Above DX record on honeycomb type receiver and one step amplification. QRA 113 Ululani Street, Hilo, Hawaii, U.S.A.

6ARU, Price, Utah

1ACB, 1AJP, 1AJX, 1CMP, 1CMX, 1ER, 1FD, 1KC, 1YB, 1ZD, 1ZI, 2AAR, 2AAY, 2ACO, 2AMV, 2BLP, 2BSC, 2HXW, 2BY, 2CEE, 2CJR, 2CPA, (2RK), 2WB, 2XQ, (3AB), 3ABW, 3AFU, (3AHP), (3AQR), 3BDO, 3BIF, 3BTA, 3BVL, 3CVJ, 3HG, 3HJ, (3HS), 3QV, 3TR, 3VM, 4AF, 4BDO, 4CL, 4HS, 4IO, 4IZ, 4JK, (4KU), 4PV, (5AAT), 5ABB, 5ADB, 5ADC, 5ADH, 5AFG, (5AFH), 5AGN, (5AHD), 5AHG, 5AHN, 5AHR, 5AIC, 5AIJ, 5AIR, 5AIU, (5AJI), 5AKI, 5AKN, 5AKR, 5AMB, 5AMJ, 5AMU, 5ANC, 5BM, 5FA, 5FT, 5HQ, 5HT, 5IN, 5IO, 5IV, 5JC, (5JE), 5KN, (5LG), 5LR, 5MM, 5MT, 5NN, (5NW), 5PE, 5PB, 5QH, 5QI, (5QL), 5QQ, 5QT, 5QX, 5QY, 5RB, 5RG, 5RH, 5RW, (5SD), 5SG, 5XD, 5XT, (5ZA), 5ZAV, 5ZG, 6BDT, (6CEU) 8AA, 8ACM, 8ACY, 8AEB, 8AGP, 8AIB, 8AJE, 8AKI, 8AL, 8APN, 8APT, 8ARD, 8AWJ, 8AXN, 8BFH, 8BFN, 8BHO, 8BMB, 8BNH, 8BOB, 8BOS, 8BQY, 8BUH, 8BXX, 8BZT, 8CMU, 8CNU, 8COM, 8CP, 8CPU, 8CSE, 8CVA, 8CZZ, 8DAC, 8DDT, 8DFW, 8DGO, 8DGP, 8DHQ, 8DJF, 8DO, 8DPF, 8DPT (8ES), 8FU, 8GZ, 8HN, 8JJ, 8KH, 8OM, (8PU), 8PW, 8SP, 8SW, 8TR, 8VN, 8VQ, 8VY, 8WX, 8WX, 8XAN, 8XE, 8YN, 8ZZ, 9AAW, 9ACH, 9ACK, 9ADC, (9AEC), 9AE, 9AED, 9AEP, 9AFM, 9AFR, 9AFU, 9AGB, (9AGL), 9AHT, 9AHV, (9AIM), 9AKI, 9AKU, (9AMB), 9AMI, 9AMK, 9AMP, 9ANY, 9AON, (9APF), 9APV, 9AQD, 9AQK, 9ARK, 9ASN, 9ATN, 9ATO, 9AUY, 9AVC, 9AVN, 9AVS, 9AVU, 9AWU, 9AWV, (9AXS), 9AYJ, (9AYL), 9AYP, 9AZG, (9AZP), 9BBW, 9BCG, 9BCX, 9BDR, 9BEG, 9BEZ, 9BFF, 9BFI, 9BFP, 9BG, 9BGI, 9BHD, 9BHX (9BIS), (9BJI), (9BJK), 9BKO, 9BKP, 9BLY, 9BMU 9BMX, 9BMZ, 9BNF, 9BOF, 9BPF, 9BPV, 9BQJ, 9BQY, (9BRI), 9BRU, 9BSG, 9BSP, 9BTH, 9BUH, 9BUX, (9BUK), 9BVN, 9BVU, (9BWC), 9BX, (9BXM), 9BXQ, (9BXT), 9BYC, 9BYW, 9BZE, 9BZG, (9BZI), 9CAA, 9CAJ, (9CBF), 9CBL, (9CCS, 9CCZ, (9CDE), 9CDO, 9CEA, (9CEE), (9CEH), (9CEL), 9CGA, 9CGM, 9CGN, 9CGQ, 9CGU, 9CGW, 9CHO, 9CIN, 9CIP, 9CJA, 9CJS, 9CJY, 9CKS, 9CL, 9CLD, (9CLE), 9CLQ, 9CLZ, 9CML, 9CMM, 9CMN, 9CMT, 9CNB, 9CNN, 9COL, (9CP), 9CPB, 9CQJ, 9CRR, 9CRW, 9CSY, 9CUC, 9CVC, 9CVI (9CVO), 9CVV, 9CWC, 9CXP, 9CYD, 9CYW, 9CZG, (9CZI), 9CZM, 9DAW, 9DAY ,9DCW, 9GID,9DGV,9DHZ, 9DID, 9DIW 9DJB, 9DJP, 9DKB, 9DKX, 9DLI, 9DMS, 9DNX, 9DOE 9DRO, 9DRT, (9DSW), (9DTE), (9DUN), 9DWN, 9DXR, 9DXY, 9DYR, (9DYZ), 9EAK, 9EDB, 9EEA, 9EER, 9EFC, 9EFE, 9EFH, 9EFU, 9EGG, 9EHI, 9EHN, (9EHT), 9EJZ, (9EKF), (9EKY), 9EL, 9ELD 9ELW, 9EYZ, 9HG, 9IR, 9LZ, 9MC, 9MF, (9MM), 9QL, 9RU, 9ST, (9VM), 9XAQ, 9VZ, 9YU, 9YY, 9ZT, 9ZY.

Can.: 3GG, 3HI, 3NI, 3WS, 4CL, 4CN, (4EA), 4ER, 4FN, (4FV), 4FT, 4FZ, 4GH, 4GL, 4HH, 5CN, (5GO).

7ZU, Polytechnic, Mont.

1AW, 1ADK, 1AJP, 1AKL, 1ANA, 1BCN, 1BES, 1BJ, 1BGG, 1CNU, 1HW, 1JI, 1JV, 1KC, 1KX, 1ML, 1MM, 1RZ, 1TS, 1UK, 1XW, 1VB, (1YB), 1YK, 2AGB, 2AWF, 2AJK, 2AZY, 2BAQ, 2BGY, 2BTE, 2CEI, 2CPD, 2CPT, 2CYS, 2DY, 2GK, 2RK, snk., 2QV, 2TS, 3AB, 3ADP, 3AQR, 3ARM, 3BCO, 3BK, 3BN, 3BQ, 3BTA,3CAH, 3CGN, 3CWX, 3FA, 3GC 3HG, 3IW, 3LQ, 3ME, 3OI, 3PG, 3SL, 3TI, 3VM, 3WH, 3ZL, 4ABU, 4AH, 4AF, 4AW, 4AY, 4BCJ, 4BK, 4CAU, 4CR, 4CY, 4CE, 4EE, 4ER, 4FT, 4GR, 4IO, 4IT, 4IU, 4JK, 4NR, 4OH, 4PB, 4QF, 4QL, 4QR, 4RU, 4TI, 4XJ, 4XT, 5AAC, 4ADC, 4AFQ,

5AGO, 5AHD, 5AHR, 4AIU, 5AIV, 5AJB, 5AJD, 5AJQ, 5AKF, 5AKI, 5AKN, 5AMU, 5ANS, 5BC, 5BN, 5BON, 5CE, 5DR, 5EF, 5EK, 5FJ, 5GG, 5HW, 5IN, 5JE, 5JC, 5JF, 5JV, 5KL 5KX, 5LQ, 5LR, 5NN, 5NA, 5NG, 5MM, 5OA, 5PA, 5PH, 5PX, 5PY, 5QL, 5QY, 5RO, 5RW, 5TJ, 5TM, 5TW, 5UD, 5UF, 5UP, 5VF 5VG, 5VN, 5XA, 5XB, (5ZAV), 6AAQ, 6AAY, 6ACM, 6ADM, 6AFG, 6AGE, 6AH, 6AHU, 6AJA, 6AJU, 6AK, 6ALN, 6ANB, 6ANG, (6AO), 6AOB, 6AOL, 6AOS, (6ARF), 6ARQ, 6ARU, 6ATN, 6AUT, 6AUU, 6AVH, (6AVV), 6BDT, 6BEF, 6BGC (6BIC), 6BIH, 6BIR, 6BJJ, 6BLG, 6BLH, 6BLM, 6BLW, 6BM, (6BNT), 6BPZ, 6BQE, (6BRF), 6BRK, 6BRT, 6BU, 6BUO, 6BUF, 6BUH, 6BUM, 6BUN, 6BUR, 6BUY, 6BWU, 6CAF, 6CAQ, 6CAW, 6CBB, 6CBE, 6CBW, 6CCY, 6CDG, 6CEB, 6CEK, 6CFJ, ..CFS, 6CFQ, 6CFY, 6CGD, 6CGW, 6CHN, (6CHV), 6CJD, 6CJJ, 6CJU, 6CKR, 6CKX, (6MR), 6CMU, 6CNC, 6CDAT, 6EA, 6EN, 6ERK, 6FM, 6FY, 6GR, (6GT), 6JX, (6LV), 6MF, 6MH, 6NX, 6OL, (6PE), 6SU, 6TN, 6VF, 6WT, (6XAD), (6ZAI), 6ZAM, 6ZAR, 6ZF, 6ZL, 6ZP, (6ZU), (6ZW), (7ABB), 7ABY, (7ACI), 7ACK, 7ADS, 9AEK, (7AFM), 7AFO (7AGF), (7AGV), 7AHS, 7AHW, 7AIY, (7AJD), (7AJP), 7AJY, (7AK), 7ALD, 7ANA, 7ARV, 7BO, 7BR, 7BZ, (7CO), 7DR, 7EM, 7FA, 7FB, 7FL, 7FO, 7FP, 7FY, (7HF), 7HI, 7IP, 7IW, (7JF), 7KR, 7LN, 7IQ, 7LU, 7LY, (7MP), 7NO, (7NT), 7OB, 7OC, 7OM, 7OY, 7PG, 7QD, 7QT, 7QU, 7RP, 7SC, 7SH, 7SN, 7SO, 7TO, 7VN, 7VS, 7WM, 7XAF, 7XUF, 7YA, 7YL, 7ZF, (7ZO), 7ZZ, 8ACN, 8AFF, 8AEG, 8AGP, 8AGT, 8AIC, 8AJD, 8AK, 8ALT, 8AOL 8ANM, 8APT, 8AQA, 8ASR, 8ASV, 8ATH, 8AV, 8AVT, 8BAH, 8BAQ, 8BAZ, 8BBM, 8BBT, 8BBW, 8BBX, 8BCI, 8BDA, 8BDR, 8BF, 8BFM, 8BIX, 8BJV, 8BMG, 8BOW, 8BPA, 8BUF, 8BUV, 8BWK, 8BXA, 8BZC, 8BZD, 8BZF, 8CCA, 8CCQ, 8CFO, 8CGJ, 8CKE, 8CLF, 8CM, 8CCMC, 8CMT, 8CMY, 8CES. 8CFO, 8CJ, 8CGJ, 8CJD, 8CKE, 8CLF, 8CO, 8COM, 8CP, 8CQJ, 8CRF, 8CRK, 8CRN, 8CRY, 8CSE. 8CSK, 8CUN, 8CVX, 8CWK, 8CWR, 8CWW, 8CX, 8CYA, 8CYU, 8CZY, 8DA, 8DAX, 8DCY, 8DD, 8DDO, 8DG, 8DGP, 8DIS, 8DKM, 8DLM, 8DLT, 8DUJ, 8EFN, 8EL, 8ES, 8FC, 8FM, 8FU, 8HN, 8GZ, 8JJ, 8KG, 8LV, 8OA 8OI, 8PL, 8PV, 8RG. 8RJ, 8RM, 8RN, 8RO, 8TT, 8TV, 8UF, 8UP. 8BG, 8BV, 8BZ, 8WL, 8XAN, 8XX, 8XV, 8YN, 8YV, (8ZZ), 9ABT, (9ACS), 9AD, 9AEC, 9AEM, 9AEY, 9AFT, 9AGL, 9AHZ, 9AIB, 9AL, 9AMX, 9ANA, 9ANQ, 9AOC, 9AOD, 9AOM, 9AOU, 9AP, 9APF, 9APS, 9AQK, 9AR, 9ARG, 9AUA, 9AUN, 9ABZ, 9AXB, (9AYD). (9AYL), 9BAL, 9BAX, 9BCB, 9BCF, (9BG), 9BJE, (9BJK), 9BKP, 9BOF, 9BOP, 9BPU, 9BQY, 9BRI, 9BRS, 9BSX, 9BU. (9BVN), 9BWC, 9BXJ, 9CMK, 9CMN, 9CMS, 9CMT. 9CNY, 9COT, (9COL), 9COW, 9CSY, 9CU, 9CUC. 9CWZ, 9CZM, 9CZW, 9DAV, (9DAY), 9DEN, 9DEQ. 9DJP, 9DJQ, 9DK, 9DRB, (9DKY), 9DNV, 9DSV. 9DXN, 9DXU, 9DYY, 9DZF, 9EE, 9ECN, 9EFX, (9EIL), 9ELL, (9ELV), 9EQ, 9FM, 9GY, 9HN, 9IF, 9LA, (9UR), (9BM, 9WI 9XAT 100 meters, 9YU, 9YY, 9ZL.

Can.: 2HG, 3GG, (3WS), 4CA, (4CL), 4CM, 4CN, 4CR, 4CW, 4DX, 4ER, (4HH), (5GO), (9BX) fone.
French: 8AB, 8AM or N?

8ZT, 26 Mechanic St., Pontiac, Mich.

6AD, 6AK, 6AO, 6AW, 6BJ, 6BM, 6BQ, 6BZ, 6CC, 6CU, 6DD, 6DT, 6FP, 6GR, 6GX, 6HC, 6IL, 6JA, 6LV, 6MH, 6NX, 6OD, 6OL, 6PE, 6PL, 6PX, 6RN, 6TV, 6VF, 6AAO, 6AAJ, 6AAQ, 6ABC. 6ABD, 6ABK, 6ABX, 6ACM, 6ACV, 6ADT, 6AFQ. 6AFZ, 6AGE, 6AGK, 6AHH, 6AHP, 6AHU, 6AJJ, 6AJU, 6AKW, 6AKZ, 6ALH, 6ALU, 6AMS, 6ANB, 6ANE, 6AOI, 6AOS, 6AOU, 6APE, 6ARB, 6ARF, 6ARO, 6ARQ, 6ARU, 6ASU, 6ATN, 6AUU, 6AVV, 6AWQ, 6AWT, 6AWZ, 6BAH, 6BCL, 6BCQ, BDF, 6BEN, 6BGC, 6BHC, 6BIC, 6BIH, 6BIQ, 6BJR, 6BLW, 6BNC, 6BNT, 6BQB, 6BQE, 6BQL, 6BFF, 6BSJ, 6BUM, 6BUO, 6BUR, 6BUY, 6CAQ, 6CBD, 6CBW, 6CDG, 6CEI, 6CEJ, 6CET, 6CFM, 6CFZ, 6CGD, 6CGW, 6CHE, 6CID, 6CJB, 6CJV, 6CLK. 6CKP, 6CKR, 6CMR, 6CMU, 6CMT, 6CNC, 6CNG, 6CQC, 6ZA, 6ZH.6ZU, 6ZV, 6ZAG, 6ZAH.6ZAR, 6ZBU, 7AF, 7BJ, 7CO, 7DC, 7ER, 7LH, 7LR, 7QC, 7QD, 7QU, 7TT, 7WM, 7WS, 7ZL, 7ZU, 7ABB, 7ACI, 7ADS, 7AFN, 7AFO, 7AGV, 7AHV, 7AIC, 7AIF, 7AIM, 7ALD.

Use Reinartz set with up to two step A.F. Glad to make tests with anybody, anywhere.

8DHQ, Chesaning, Mich.

4IZ, (4JK), 4EH, 4ER, (4QF), (4RM), 4BD, 4FZ, 4LL, 4HX, 4MA, 4OY, 4SH, 4HS, 4HN, 4AI, 4KU, 4ON, 4FT, (5AMU), (5AJB), (5VF), (5LG), (5VM), 5AOM, 5AAC, 5NW, (5AGV), 5AMB, (5QL), (5RH), (5GY), (5ADV), (5AP), (5KX), (5AAW), (5ADO), 5JL, 5ABC, 5AET, 5ACN, 5XD, 5AMH, (5AAT), 5AIC, 5AGH, 5ANC, 5AHD, 5FT, 5AJB, 5ACM, (5GJ), 5LR, 5HT, 5AIU, 5QW, 5PV, 5WS, 5PY, 5XV, 5RD, 5ZAS, 5HH, 6CDG, 6CHE, 6VF, 6BRP, 6BUY, 6CIE, (6ARU), 6RN, 6AWT, (6BPZ), (6AOI) 6ZP, 6AZK, 6BZN, (6BCL), 6LA, 6CMT, 6BUJ, (6AHP), 6GH, 6CEI, 6BBW, 6CBW, 6ZIS, 6LV. 6FM, 6CMU, 6BUH, 6BUH, 6AOH, (6XAD), 6CBB, 6AQQ, 6NB, 6IF, 6AAO, 6EB, 6CGW, 7CO, 7AHI, 7TO, 7IH, 7LV, 7LB, 7ABB, 7SY, (7BJ), 7AJV, 7ZL, 7AF, 7AHU, 7VM, 7ACX, 7ADS, 7FN, 7AHV, 7FQ.

8AGO, Pittsburgh, Pa.
(Loop and no r.f.)

(1KX), (1ATJ), (others too numerous), 5AAC, (5ADS), 5AFQ, 5AGS, 5AHD, 5AHJ, 5AIC, 5AIR. 5AJP, 5AMW, 5ANA, 5AP, (5CV), 5EK, 5FV, 5JE, (5KC), 5LI, 5LR, 5MK, (5NV), 5PE, 5PV, 5PW, 5QL, 5SK, 5UK, 5VC, 5VT, 5WE, 5WS, 5XA, 5XAB, 5YL, 5ZA, 5ZAV, 6AHU, 6AJA, 6AK, 6AO, 6ARF. 6AUU, 6AVV, 6BBW, 6BGC, 6BJR, 6BM, 6BRF. 6BVE, 6CBW, 6CGW, 6CMR, 6JA, 6LV, 6PL, 6XAD. 6ZH, 6ZR, 7ABB, 7AF, 7AFQ, 7AHV, 7QJ, 7SX. 7ZL, 7ZU, 9AAB, 9AMB, (9AOG), 9BHY, 9BXM, 9CCR 9EEA, 9EHQ, (9TM), (others too numerous).
Canadians: 2AZ, 3NI, (other threes too numerous). 4CN, 4DY. Brit.: 2WZ. French: 8AB.

9CXP, Minneapolis, Minn.

1ABU, 1AFN, 1BAU, 1BDT, 1BG, 1CMP, 1CTP. 1FD, 1OI, 1XAM, 1XAQ, 2AGB, 2AN, 2BBN, 2BG, 2BQH, 2BSC, 2CEE, 2CXL, (2DX), 2KU, 2RK, 3ABW, (3AKL), 3AIS, 3AQR, 3AW, 3BG, 3BUN. 3BP, 3BPF, 3BVA, 3BWJ, 3CKP, 3DB, 3GG, 3HI. 3IT, 3OE, 3PZ, 3TR, 3UD, 3YO, 3ZM, 4AA, 4AI. 4CE, 4DO, 4EA, 4ER, 4HH, 4GZ, 4PD, 4PK, (6AGE), 6AHU, 6AJA, 6AKZ, 6AO, 6AOU, 6AOS. 6ARK, 6ARF, 6AUU, 6AUV, 6AVR, 6AYX, 6BCL, 6BCU, 6BDH, (6BH), 6BIC, 6BQE, 6BRK, 6BRY, 6BSH, 6BSN, 6BUH, 6BUR, (6BUY), 6WP, 6CC, 6CKB, 6CJB, 6JA, 6LH, 6LV, 6MH, 6NX, 6PE, 6RU, 6TJ, 6UO, 6XAD, 6ZAR, 6ZH, 6ZP, 7ABB, 7ADS, 7AJP, 7BQS, 7CO, 7HC, 7HW, 7IF, 7JD, 7KJ, 7LU, 7NR, 7OM, 7OT, 7SC, 7VM, (7WP), 7ZU, 9DTE, 9BJK, 9ADD, 9AMB.
Can.: 2BN, 3ADN, 3AQ, 3BG, 3IA, (8NI). (3OJ), 3QS, 3RG, 3TM, 3WI, (3XI), 3YV, (3ZT), 4CL, 4EA, 4FT, 4FZ, 4SH.
English: 2OD, 5NN.
French: 8AB.

9DYT, Ladoga, Indiana

1AEZ, 1AFA, 1AGM, 1AGS, 1AH, 1AJH, 1AJX. 1AKZ, 1ALA, 1ALJ, 1AMF, 1AOL, 1AVW, 1AWE, 1BAM, (1BCR), 1BEC, 1BGQ, 1BOW, 1BSC, 1CAB, 1CAZ, 1CIT, 1CMP, 1COC, 1CPN, 1CRU, 1CSW, 1ER, 1FD, 1HX, 1KC, 1RW, 1RR, 1SK, 1XAM, 1XAQ, 1YB, (1ZJ), 2AAY, 2ACU, 2AEN, 2AJF, 2AL, (2APY), 2BEO, 2BJX, 2BQB, 2BQU, 2BSC, 2BT, 2BTW, 2BXP, (2BXW), 2BYN, 2CEE, 2CHZ, 2CJA, 2CJR, (2CNH), 2COA, 2CPX, 2CTN, 2CVJ, 2CXL, 2CXW, 2CZL, 2CZR, 2CZY, 2GK, 2HH, 2HM, 2JN, 2KF, (2KU), 2RK, 2WR, 2XWA, 3AR, 3ADV, 3AHP, 3AMJ, 3AWR, 3BCG, 3BDB, 3BMN, 3BPF, 3BPP, 3BTL, 3BUY, 2CCU, 3CEZ, (3CJN), (3CKJ), 3CRF, 3HS, 3KQ, 3LG, 3WK, 3AT, 3VO, 3WN, 4AI, 4BA, 4DB, 4DV, 4GZ, 4HR, 4HW, 4JC, 4SK, 4JY 4OG, 4OM, 4PB, 4SB, 5AAC, 5ADB, 5ADS, 5ADV, 5AFQ, 5AGD, 5AGN, 5AGS, 5AGV, 5AHD, 5AIC, 5AII, 5AIJ, 5AIU, (5AJB), 5AJQ, 5AJT, 5AKL. 5AKP, 5AMB, 5AMH, 5AWU, 5AOW, 5AP, 5BX, 5CE. (5FA), (5FU), 5HJ, 5IQ, 5JE, (5JZ), 5LG, 5LR. 5NN, 5NW, 5OV, (5PA), 5PB, 5PH, 5QI, 5QL. (5QY), 5QZ, 5SD, 5SR, 5TJ, 5TO, (5TS), 5UY. 5VC, 5WS, 5WX, 5XA, 5XAC, 5XD, (5XW), 6AAQ. 6ADT, 6AFU, 6AFQ, 6AGE, 6AK, 6AN, 6AO 6ACE. 6APA, 6ARB, 6ARF, 6ARU, 6AUQ, 6AUU, 6AWT. 6BCL, 6BCZ, 6BGC, 6BIN, 6BJJ, 6BLN, 6BM, 6BNC. 6BQB, 6BQE, 6BSJ, 6BTA, 6BUH, 6BUI, 6BUM. 6BUN, 6BUO, 6BUR, 6BUY, 6BVE, 6CBB, 6CBC, 6CBW, 6CDG, 6CEU, 6CGD, 6CGW, 6CHE, 6CHV. 6CRR, 6CNL, 6EA, 6FP, 6GT, 6HC, 6JX, 6LV. 6NX, 6OD, 6PL, 6RN, 6TV, 6XAD, 6ZAH, 6ZAR. 6ZBH, 6ZH, 6ZU, 7ABB, 7ADR, 7AIF, 7ALD, 7BR. 7CO, 7DS, 7EN, 7GI, 7HG, 7IO, 7IR, 7LU, 7MN (?), TNP, 7NR, 7PJ, 7QD, 7QT, 7SC, 7SO, 7WN, 8AAF. 8AFQ, 8BCR, (8BHF), 8BNY, (8BUM), 8BW, 8COR, (8DGE), (8HJ), 8NB, 9ANB, 9APF, (9AVC), (9AVU), 9BG, 9BKF, 9BXQ, 9CAA, 9CHT (?), 9CLD, 9CLG, 9DKB.
Can.: 2AZ, 2BE, 2HG, 2IO, 3ADN, 3ACC, 3AEM, 3CO, 3DE, 3GG, 3HI, 3MP, (3MS), 3NI, (3OJ), 3PG, 3TB, 3XI, 3YV, 4AJ, 4CO.
Spark: 4BL, 4FG, 4HS, 8EB, 9EFC.
Fone: (2CSL), 3CKP, 5AKI, 5XAJ, 6BIC (??), 9EOU, 9CCV.
Foreign: F8AB.